11 TERRESTRIAL ECOLOGY AND BIRDS

11.1 INTRODUCTION

11.1.1 This chapter discusses the ecological impacts that may result from the AMEP on terrestrial habitats, species and birds. Impacts linked to the aquatic environment are considered in *Chapter 10*. The baseline nature conservation interests of the site are described, potential impacts identified, possible mitigation measures listed and the residual impacts set out. Where baseline data has been provided in *Chapter 10*, then, to avoid repetition, that text will be cross referenced in this chapter.

11.1.2 The consideration of alternatives, need, scale and location of AMEP and the requirement for compensation are presented in *Chapters 4, 5 and 6*. Impacts relating to the construction and operation of the Compensation Site are addressed in *Chapter 35*.

11.1.3 Interaction of potential effects are likely to occur by direct impacts on flora and fauna (discussed in this section), and indirect impacts arising, for example, from possible mobilisation of contaminated dust and sediment, or changes to sediment transport and hydrodynamics. Indirect impacts are discussed, where considered relevant, in *Chapter 7, Chapter 8, Chapter 15* and *Chapter 17*.

11.2 LEGISLATION, POLICY AND GUIDANCE

11.2.1 Legislation, policy and guidance relevant to ecological interests have been reviewed in *Section 10.2*, including all legislation relevant to European Protected Sites. Supplementary data relevant to terrestrial ecology is set out in this section.

Legislation

European Protected Species (EPS)

11.2.2 Great Crested Newts (GCNs) (*Triturus cristatus*) and bats are protected under European law through Annex IIa and IVa of the EC Habitats Directive (92/43/EC), as applied in UK under the Conservation of Habitats and Species Regulations, 2010 (the 2010 Regulations). GCNs also receive protection under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and are a UK Biodiversity Action Plan (UK BAP) priority species, as are seven of the UK bat species.

11.2.3 The legislation makes it an offence to deliberately or recklessly:

- capture, injure or kill GCNs or bats;
- disturb GCNs or bats in any way;
- deliberately take or destroy the eggs of GCNs;
- damage or destroy a breeding site or resting place of such animals; and
- possess GCNs or bats, transport, sell or trade them in any way.

11.2.4 The legislation covers all stages of the GCN life cycle, including their eggs, larvae and immature to adult GCNs.

11.2.5 Where there is the potential for a development to cause death, injury or disturbance to GCNs or bats, or to damage or destroy their resting place, and these impacts are unavoidable, works can only proceed under a GCN or bat licence which is issued by NE (2010).

11.2.6 Both the licensing authority (NE) and the IPC have a duty to protect European Protected Species (EPS) under Regulation 53 of the 2010 Regulations. The planning authority in terms of the Development Consent Order (DCO) and the licensing authority (NE in terms of protected species licensing) must be satisfied that three derogation tests are fully met before granting consent.

11.2.7 The three derogation "tests" are:

- that the proposed development preserves public health or safety, or other imperative reasons of overriding public interest including those of social or economic nature;

- that there is no satisfactory alternative; and

- that the proposed actions will not be detrimental to the favourable conservation status of the species.

Nationally Protected Species

11.2.8 The presence of water voles (*Arvicola amphibious*) and the possibility that trapping may be required, raises licensing issues under national legislation by virtue of its inclusion, since 6 April 2008, on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended). NE has issued guidance to inform this process (NE, 2008).

Protection of Badgers Act, 1992

11.2.9 The Protection of Badgers Act 1992 was specifically put in place to protect the welfare of badgers (*Meles meles*) in the UK and protect them from persecution. The Act makes it an offence to:

- wilfully kill, take, possess or cruelly ill-treat a Badger, or attempt to do so;
- interfere with a sett by damaging or destroying it;
- obstruct access to, or any entrance of, a badger sett; or
- disturb a badger when it is occupying a sett.

11.2.10 Works within 30 m of an active badger sett are subject to guidelines, which state that the following may require a licence:

- using very heavy machinery (generally tracked vehicles) within 30 metres of any entrance to an active sett;
- using lighter machinery (generally wheeled vehicles), particularly for any digging operation, within 20 m; and
- light work, such as hand digging or scrub clearance within 10 metres.

The Hedgerow Regulations, 1997

11.2.11 These Regulations detail the following criteria for the protection of "important" hedgerows in England and Wales. Important hedgerows are those which:

- have existed for 30 years or more; and/or
- satisfy at least one of the criteria listed in Part II of Schedule 1.

11.2.12 The criteria included in Part II of Schedule 1 include hedgerows that possess features of archaeological, conservation or landscape interest. In addition, the regulations detail prohibited actions and exceptions for the removal and replacement of hedgerows.

Guidance

11.2.13 The conservation objectives for the Humber Estuary SSSI have been addressed in the draft document produced by Natural England (2009) regarding the Humber Estuary Conservation Objectives as well as the

Views About Management (VAM) documents also produced by NE (2004). For North Killingholme Haven Pits SSSI (NKHP) a separate Conservation Objectives document (NE, 2009b) was also consulted which gives specific objectives in relation to the SSSI features as well as those covered by the Humber Estuary SPA, SAC and Ramsar site; these relate in particular to the saline lagoons. The VAM document details in particular management of the NKHP, whilst those for the Humber Estuary SSSI seek to protect estuarine dynamics, create climate change resilience, retain ecotone (transition area between two ecosystems) viability and make specific mention of managing reedbeds, and managing sea buckthorn on dune systems.

Biodiversity Action Plan

11.2.14 In the UK a key outcome of the Convention on Biological Diversity in 1992 was for the UK government's commitment to halt and if possible reverse the decline in biodiversity. To achieve this, Biodiversity Action Plans (BAPs) were created at a national, regional and local scale. They consisted of plans to protect and enhance species and natural habitats, with targets against which progress could be measured.

UK Biodiversity Action Plan

11.2.15 The UK BAP reviews the status of species and habitats on a national scale and it sets out targets for a number of Priority Species and Habitats. Section 74 of the CRoW Act, as amended by Sections 40 and 41 of NERC, make priority Species and Habitats material considerations in planning. Of relevance to AMEP, the UK BAP states that the present extent of intertidal mudflats must be maintained and that there is to be 'no net loss', especially due to development.

11.2.16 Priority Species and Habitats in the UK BAP that are potentially relevant to AMEP are listed below. This list includes species and habitats that could be supported within the proposed development or adjacent to it.

- water vole;
- brown hare (*Lepus europaeus*);
- soprano pipistrelle (*Pipistrellus pygmaeus*);
- brown long-eared bat (*Plecotus auritus*);
- noctule bat (*Nyctalus noctula*);
- hedgehog (*Erinaceus Europaeus*);
- great crested newt;
- common toad (*Bufo bufo*);
- coastal saltmarsh;

- hedgerows;
- ponds;
- saline lagoons;
- arable field margins; and
- coastal and floodplain grazing marsh.

UK BAP Priority Bird species are referenced in the relevant ornithological sections later in the chapter.

Lincolnshire Biodiversity Action Plan 2006

11.2.17 The Lincolnshire BAP (LBAP) aims to conserve and enhance the biodiversity resource throughout the county, by recreating habitats on a large scale and encouraging networks of interlinked natural areas. The LBAP includes Habitat Action Plans (HAPs) as well as Species Action Plans (SAPs), which describe the local and national status, threats, progress towards BAP targets for 2005-2015, as well as actions required. The LBAP includes the following HAPs and SAPs:

- saltmarsh;
- farmland and grassland;
- Arable field margins;
- hedgerow and hedgerow trees;
- meadow and pasture;
- road verges;
- ponds, lakes and reservoirs;
- rivers, canals and drains;
- fens, swamps and wet reedbeds;
- farmland birds – including bullfinch *(Pyrrhula pyrrhula),* linnet*(Carduelis cannabina)* and skylark *(Alauda arvensis)*;
- bats;
- brown hare;
- great crested newt; and
- water vole.

11.3 ASSESSMENT METHODOLOGY AND CRITERIA

Overview

11.3.1 Due to the large scale nature of the Project and the significant amount of data required to complete an EIA there have been a number of ecological surveys undertaken over recent years. In addition there has also been significant data collection from published sources as well as through consultation. Surveys have broadly followed the standard

survey guidance for habitats and species and provide an important resource upon which to base the impact assessment.

11.3.2 Following the successful collection of the baseline data an impact assessment has been undertaken. Impacts are defined as a change (which can be positive or negative) that occurs as a consequence of an activity.

11.3.3 Assessing impacts involves:

- identifying the source of the impact;
- identifying what environmental elements/features are affected;
- predicting the magnitude of the impact;
- considering the need and effectiveness of mitigation measures;
- evaluating the significance of the impacts;
- reporting the residual impacts; and
- evaluating any cumulative or in-combination impacts.

11.3.4 For the purpose of reporting, the impact assessment is activity led.

Construction Phase

11.3.5 Impact prediction is essentially an objective exercise in determining what could happen to an environmental receptor as a consequence of the intended activity inclusive of mitigation measures inherent to design. Impact prediction for this ecological assessment has relied on a quantitative element wherever this is possible. Where quantification has not been possible, past experience and professional judgement have been applied. The magnitude of impact is determined as being of negligible, small, medium or large magnitude by encompassing the following:

- the nature of the change (what is affected and how);
- the type of impact;
- its size, scale or intensity;
- its geographical extent and distribution;
- its timing, duration, frequency, reversibility; and
- where relevant, the probability of the impact occurring as a result of accidental or unplanned events.

11.3.6 Evaluation of the impact takes the magnitude of impact and explains what it means in terms of its importance to society and the environment.

Operational Phase

11.3.7 There are not perceived to be any differences in the assessment methodology and criteria for the construction and operational phases of the scheme.

Identification of Sensitive Receptors

11.3.8 The key sensitive receptors for the development site will be those species and habitats associated with the adjacent Humber Estuary SPA, SAC, Ramsar site and SSSI and North Killingholme Haven Pits SSSI (which is also part of the Humber Estuary SPA, Ramsar site) as listed in detail in *Chapter 10*. In addition to this group, species and habitats associated with non-statutory designated sites such as Local Wildlife Sites will also be important receptors. Furthermore, (as expanded below) a number of European and nationally protected species are present on or in the vicinity of the site and could also be affected by the proposed development. These include:

- great crested newt (European protected species (EPS));
- bat species (EPS);
- water voles (nationally protected);
- breeding birds (nationally protected)
- badger (nationally protected) ; and
- Biodiversity Action Plan (BAP) species and habitats.

Ecological Impact Assessment Significance Criteria

11.3.9 The potential for ecological and nature conservation impacts has been assessed in the light of the habitats and species that are likely to be affected by the proposals taking into account the latest *Guidelines for Ecological Impact Assessment in the United Kingdom* published by the Institute of Ecology and Environmental Management (IEEM, 2006).

11.3.10 As part of the assessment the significance of potential ecological impacts has been evaluated taking into account the following factors:

- the magnitude of both positive and negative effects, as determined by intensity, frequency and by their extent in space and time;

- the vulnerability of the habitat or species to the changes likely to arise from the development;

- the ability of the habitat, species or ecosystem to recover, considering both fragility and resilience;

- the viability of component ecological elements and the integrity of ecosystem function, processes and favourable condition;

- value within a defined geographic frame of reference (eg UK, national, regional or district);

- the biodiversity value of affected species, populations, communities, habitats and ecosystems, considering aspects such as rarity, distinct sub-populations of a species, habitat diversity and connectivity, species-rich assemblages, and species distribution and extent; and

- designated site and protected species status, and Priority Biodiversity Action Plan (BAP) or Habitat Action Plan (HAP) status.

11.3.11 Significance was determined by the interaction of these criteria. The value of the affected feature is used to determine the geographical scale at which the impact is significant (eg international, national, regional and local levels). The determination of significance is based on whether the impact will affect the integrity or conservation status of the species, habitat, site or ecosystem within a given geographical frame of reference.

11.3.12 Site integrity is defined in *PPS9* (ODPM, 2005) as follows:

> '*The integrity of a site is the coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was classified.*'

11.3.13 A protected site that achieves this level of coherence is considered to be at favourable condition when it is judged to be meeting established conservation objectives. It may be necessary to expand the parameters under consideration when looking at the wider ecological impacts of a project, ie not just at a protected area.

11.3.14 Impacts are considered to be either significant or non-significant in their residual effect on each ecological receptor, after taking into account the magnitude of the impact, zone of influence, mitigation measures and the confidence in predictions associated with the assessment.

In undertaking any assessments, full regard to the available information and research will be taken, and where there are uncertainties a precautionary approach proportionate to the environmental risks and

available evidence will be adopted. The Precautionary Principle has a number of definitions but has been described in PAN 58 (1) as

> '*-the principle that authorities should act prudently to avoid the possibility of irreversible environmental damage in situations where the scientific evidence is inconclusive but the potential damage could be significant*'.

Ornithological Impacts

11.3.15 The bird species which will be considered in this assessment will predominantly be those species, or components of, the waterbird assemblage that form the qualifying interest of the Humber Estuary SPA and Humber Estuary Ramsar site. The qualifying threshold is generally taken to be over one percent of the European or relevant Pan-European population subject to a minimum absolute level.

11.3.16 From the above criteria it becomes clear that the number given as the SPA population is an important factor in determining whether impacts from construction or operation will be significant to bird populations, although this needs to be understood in the context of the published conservation objectives of the site. As such close liaison has been undertaken with NE as to what figures should be used and those used within this assessment will be taken from Estuary wide count data collected by the British Trust for Ornithology (BTO) with the mean of the last five years of data taken as the qualifying population (as agreed with by NE). Where only incomplete counts exist peak populations have been used to derive the estuary population (see *HRA Annex C* for further details).

11.3.17 Where appropriate WeBS data may be compared with the figures listed on the SPA citation. However, as the species citations are often based on counts approaching 10 years in age it is more appropriate to use the recent data. As such mean of peak data from the last published run of five year WeBS data has been used to provide a qualifying population from which this assessment has been undertaken. This is of particular relevance for species which have increased or decreased their usage of the Humber Estuary over this period.

11.3.18 Key bird sites within and adjacent to AMEP which have been referred to within this document include:

(1) PAN 58 is a planning advice note produced by the Scottish government and provides advice for good practice with regard to Environmental Impact Assessment. The document is available at: http://www.scotland.gov.uk/Resource/Doc/927/0016387.pdf

- North Killingholme Haven Pits (NKHP) (lagoons present adjacent to the Humber foreshore at Killingholme);

- Killingholme Marshes (foreshore area of intertidal mudflat stretching between the Humber Sea Terminal and Immingham Dock); and

- Killingholme Fields (terrestrial area of mixed arable and pasture fields stretching between the Humber Sea Terminal and Immingham Dock).

Conservation Objectives and Defining Adverse Effect

11.3.19 The conservation status of a species is defined in the Habitats Directive as the sum of the influences acting on the species concerned that may affect the long term distribution and abundance of its populations. The guidance states that the conservation status of a species is considered "favourable" when:

> '*population dynamics indicate that the species is maintaining itself on a long-term basis as a viable component of its habitats, and the natural range of the species is not being reduced, nor is likely to be reduced for the foreseeable future, and there is (and will probably continue to be) a sufficiently large habitat to maintain its population on a long-term basis.*'

11.3.20 With regard to species listed on the various citations of the Humber European Marine Site, conservation objectives, as outlined in *Chapter 10* and *Table 11.3,* have been established by NE to preserve the favourable conservation status of those species within the designated site.

11.3.21 In order to arrive at a judgment of the effects on favourable conservation status, the following information will be used in the assessment:

- the number of individuals of a species lost from the site, in this case potentially due to habitat loss, displacement, disturbance etc;

- the existing natural mortality of a species, and the added mortality that may result from the above losses;

- trends of each species within the geographical area under consideration, especially where a species is in decline;

- distribution of each species within the geographical area under consideration (ie strongholds, gaps); and

- mitigation and enhancement measures which will be implemented.

11.3.22 The conservation objectives and definitions of favourable condition for designated features produced by NE (2009) define the limits of acceptable change and will be the basis from which the significance of adverse impacts will be assessed. Disturbance is referred to explicitly in the conservation objectives for the Humber Estuary SSSI, and has been identified as a potentially important impact at the NKHP area. Assessment of baseline conditions relating to disturbance at the NKHP have been completed for noise and light emissions and from these data it has been possible to establish the baseline conditions that waterbirds using the NKHP have become habituated to.

11.3.23 This data has been used to predict the likely affects of AMEP on the waterbirds utilising NKHP during construction and operation. As guidance for species specific sensitivity to impacts and the predicted noise levels from particular construction/operation activities the Institute of Estuarine and Coastal Studies (Cutts *et al*, 2008b) study has been used as well as studies undertaken by Wright *et al.*(2010).

Terrestrial Species

11.3.24 For those species that fall outside the conservation objectives of the Humber Estuary Marine Site, such as GCNs, bats and water voles the criteria outlined in *Paragraph 11.3.10* will be applied.

Baseline Data Collection

11.3.25 *Table 11.1* provides a list of those studies which have been specifically commissioned for use in the assessment of the AMEP:

Table 11.1 Commissioned Field Surveys and Studies

Annex Number	Ecological Survey or Data	Interest Feature / Species	Date Undertaken
11.2	Extended Phase 1 Survey (Applied Ecology)	Habitats and protected species (GCNs)	June 2010 (also undertaken in 2006)
11.2.1	Extended Phase 1 Survey -Southern Extension (applied Ecology)	Habitats and protected species	October 2010 (also undertaken in 2006)

Annex Number	Ecological Survey or Data	Interest Feature / Species	Date Undertaken
11.3	Protected Species Survey (Applied Ecology)	Water voles and reptiles and bats	September 2010 (also undertaken in 2006)
11.4	Bird Survey - (IECS)	Spring Passage and breeding bird survey	April – August 2010
11.8	Protected Species Survey (Applied Ecology)	Great crested newts and bats	Spring 2011
11.9	Bird Survey Through the Tide Counts(TTTC) (IECS)	Wetland Bird Survey (containing data from Annex 11.4)	April 2010 – April 2011
11.10	Breeding Bird Survey (Ecology Consulting)	Breeding Birds for the 2011 season	April 2011 to June 2011
11.11	Waterbird Data Summary	Waterbird Data Summarising all WeBS and IECS collected data	IECS data (TTTC) - April 2010 – April 2011 WeBS 2004/05 -2008/09
11.12	Temporal and spatial use of Killingholme Marshes by Wetland Birds	Interpretation of IECS through the tide count data from Killingholme Marshes	IECS data (TTTC) – April 2010 – April 2011
11.13*	Badger Survey (The Badger Consultancy)	Badgers	October 2010

* potentially exempt information in accordance with the provision of Regulation 12(5)(g) of the Environmental Information Regulations 2004 (EIR)

11.3.26 Arising from the most recent Extended Phase 1 Survey in 2010 (*Annex 11.2*) and from consultation with NE and NLC, additional surveys were recommended and have been undertaken across the site and its surroundings (See also *Annex 11.3* to *11.4* and *Annex 11.8, 11.9 and 11.13*). These surveys included:

- bird survey (waterbird and breeding);
- great crested newt survey;
- bat survey;
- water vole survey;
- reptile survey;
- badger survey; and
- tree and hedgerow survey.

11.3.27 All the surveys listed above have either been newly undertaken in 2010 or updated in 2010 following previous survey work in 2006 and other years. For GCNs and bats, which are EPS, additional survey have been undertaken during the spring of 2011 to accurately inform the EIA and to aid in potential licensing requirements such as the formulation of an accurate Mitigation Plan.

11.3.28 No surveys for invertebrates was undertaken and as a detailed Phase 2 botanical survey was undertaken in 2006 (Just Ecology October 2006 Able Ports Facility, Killingholme: Phase 2 Botanical Survey) it was not considered necessary to update this survey following confirmation from the Extended Phase 1 that habitats were broadly similar to those originally identified. While surveys for vascular plants and invertebrates were requested by North Lincolnshire Council in their response to the Scoping Report it is believed that the current tranche of surveys in addition to the extensive data records and large number of previous surveys including a further National Vegetation Classification (NVC(1)) survey undertaken at Station Road Fields in 2006 is sufficient to provide a robust baseline to deal with any impacts relating to these features.

11.3.29 In addition to the above data sources, a further study on black-tailed godwit (Percival, 2011, see *Annex 35.6*) was commissioned to aid in the requirements for the compensation site. Furthermore a further list of literature has been compiled below which has also been used to inform the assessment. This list refers to studies undertaken on the Project site including studies which were commissioned in 2006 /2007 for habitats, protected species and birds for Killingholme as well as wider data sources from the Humber Estuary. These data sources were also used to aid in the design of field surveys as well as determining whether additional surveys would be required.

Ornithological

- British Trust for Ornithology (BTO) (1999/00 to 2008/9) Wetland Bird Survey (WeBS) Core High Tide Core Count data for:

    - Sector 38406 Killingholme Marshes (TA178187) 10 Year Core Count Data.
    - Sector 38201 North Killingholme Haven Pits (TA166196) 10 Year Core Count Data.

(1) The NVC is a detailed classification, which assesses the full suite of vascular plant, bryophyte and macro-lichen species within a certain vegetation type. These cover nearly all natural, semi-natural and a number of major artificial vegetation communities in terrestrial, freshwater and maritime situations across Great Britain. The NVC is based solely on plant species composition and contrasts with broader-scale classifications, notably the Phase 1 Habitat Classification.

  - Sector 38407 Halton Marshes (TA157218) 5 Year Core Count Data.
  - Sector 38905 Immingham Dock (TA202160) 5 Year Core Count Data.
  - Sector 38590 Humber Estuary (TA205205) 10 Year Core Count Data.
  - Sector 38441 Paull to Stone Creek (TA201215) 5 Year Core Count Data.

- BTO (1998/99) WeBS Low Tide Count data for the Humber Estuary.

- BTO (2003/04) WeBS Low Tide Count data for the Humber Estuary.

- BTO (2008) *Humber Estuary SPA Waterbird Populations: Trend Analyses by count sector,* BTO Research Report No. 497 on behalf of Natural England.

- Catley (July 2006) Wader and wildfowl roosts on the South side of the Humber estuary between East Halton Skitter and Immingham Docks.

- Catley, G. (2007-2008) *Winter Bird Survey of East Halton and Killingholme Marshes and inland fields encompassed by North Lincolnshire Council boundary.* Nyctea Ltd

- Catley, G. (2008) *East Halton- Killingholme Winter Birds Survey 2007/2008.*

- Catley, G (2007) *A breeding bird survey of East Halton and Killingholme April – June 2007.*

- Catley, G. (August to October 2010) *Autumn Bird Surveys,* Humber Environmental Data Centre (HEDC). Nyctea Ltd

- Catley, G. (2011) *North and North-east Lincolnshire autumn and winter bird surveys September 2010 – April 2011.* (Humber INCA).

- Ecology Consulting (July 2011) *AMEP Breeding Bird Survey 2011*

- HEDC (July 2007- March 2008) *Rosper Road Pool Weekly Count Data.*

- HEDC (August 2010 – October 2010) *Rosper Road Pool Weekly Count Data.*

- BE Brooks Ecological (March 2006) *Initial Ornithological Survey Report.*

- Just Ecology (August 2006) *Breeding Bird Survey* (*Annex 11.5*).

- Just Ecology (May 2006 – February 2007) *Coastal Bird Survey* (*Annex 11.6*).

- Just Ecology (February 2007) *Winter Farmland Bird Survey* (*Annex 11.7*).

- Humber Industry Nature Conservation Association (HINCA) (December 2007 – March 2008) *Humber Intertidal Sector J Monthly Maxima.*

- Lincolnshire Bird Club (1985-1989) *Breeding Bird Records.*

- Lincolnshire Bird Club (1998-2005) *All Species Records.*

- URS (May 2007) *East Halton Bird Data Review.*

- Cruickshanks, K., Liley, D., Fearnley, H., Stillman, R., Harvell, P., Hoskin, R. & Underhill-Day, J. (2010) *Desk Based Study on Recreational Disturbance to birds on the Humber Estuary*, Footprint Ecology/Humber Management Scheme.

Habitats & Protected Species

- Just Ecology (May 2006) *Able Ports Facility, Killingholme: Extended Phase 1 Survey and Scoping Study.*

- Just Ecology (October 2006) *Able Ports Facility, Killingholme: Phase 2 Botanical Survey*

- Just Ecology (July 2006) *Able Ports Facility, Killingholme: Great Crested Newt Survey.*

- Just Ecology (September 2006) *Able Ports Facility, Killingholme: Reptile Survey.*

- Just Ecology (July 2006) *Able Ports Facility, Killingholme: Water Vole Survey.*

- Just Ecology (August 2006) *Able Ports Facility, Killingholme: Bat Survey.*

- BE Brooks Ecological (July 2007) *Badger Bait Marking Survey. Able UK site North Killingholme.*

- Able UK Ltd (2006) *Water Vole Mitigation Plan.*

- Humber Environmental Data Centre (HEDC) data for protected species.

- Lincolnshire Environmental Data Centre (LERC) as part of the Lincolnshire Biodiversity partnership for information on Local Wildlife Sites and protected species data.

- National Biodiversity Network (NBN) website.

11.4 CONSULTATION

11.4.1 Consultation has been undertaken throughout the EIA process, even before the scoping was initiated. Key stakeholders in terms of ecology have been approached including NE, the North Lincolnshire Council Biodiversity Team, the Environment Agency, the Royal Society of Protection for Birds (RSPB) and the Lincolnshire Wildlife Trust. A large number of meetings have been undertaken during 2010/11 and formal consultation responses were received from NE during both the scoping stage, as part of the IPC formal response and as part of the s42 consultation response to the Preliminary Environmental Information Report. Responses to the statutory consultation can be seen in *Annex 2.2*.

11.5 BASELINE

General Ecological Context

11.5.1 The AMEP site lies on the southern bank of the Humber Estuary. It is within the middle estuary and located between the Humber Sea Terminal (HST) and Immingham Port. The Lindsay Oil Refinery is located on the landward side of the site, along with two gas fired power stations. The site is in effect surrounded by landward heavy industry which generally extends from East Halton to Grimsby and makes up a large part of the South Humber Gateway.

11.5.2 The ecological interest of the Middle Estuary, from a terrestrial perspective, is limited and the key habitats and species present are those generally associated with the estuary.

Scope of Study Area

11.5.3 The study area has been defined following standard IEEM guidance (2006) and the zone of influence for the site was defined as 10 km for Statutory Designated sites, 2 km for non-Statutory designated sites, and a general field survey of all habitats within the AMEP red line boundary plus a buffer area 500 m around its edge. The additional southern extension area towards Rosper Road Pool was also surveyed although much of this was outside the 500 m limit.

11.5.4 Species records were sought from a wider 5 km area as provided by the Humber Environment Data Centre and Lincolnshire Bird Club.

Protected Sites

11.5.5 Within a 10 km radius of the AMEP scheme a detailed list of all statutory designated areas has been compiled. The locations of statutory and non-statutory designated sites can be seen in *Figure 11.1* and *Figure 11.2*. A summary of the Humber Estuary SPA is presented in *Table 11.2* below (see the Habitat regulations Assessment Report (HRA), *Annex B* for all Humber Estuary European designated site citations).

Table 11.2 Humber Estuary SPA

Reasons for Designation
The Humber Estuary qualifies as a SPA under Article 4.1 of the Birds Directive due to it supporting the following Annex I species of European importance: **During the breeding season;** Bittern *Botaurus stellaris,* 2 males representing 10.5% of the population in Great Britain (2000-2002) Marsh Harrier *Circus aeruginosus*, 10 females representing at least 6.3% of the breeding population in Great Britain (1998-2002) Avocet *Recuvirostra avosetta,* 64 pairs representing 8.6% of the population in Great Britain (1998-2002) Little Tern *Sterna albifrons*, 51 pairs representing at least 2.1% of the breeding population in Great Britain (1998-2002) **Over winter**; Bittern *Botaurus stellaris*, 4 individuals representing at least 1.1% of the wintering population in Great Britain (1998/9 to 2002/3) Hen Harrier *Circus cyaneus*, 8 individuals representing at least 1.1% of the wintering

population in Great Britain (1997/8 to 2001/2)

Bar-tailed Godwit *Limosa lapponica*, 2,752 individuals representing at least 4.4% of the wintering population in Great Britain (1996/7 to 2000/1)

Golden Plover *Pluvialis apricaria*, 30,709 individuals representing at least 12.3% of the wintering population in Great Britain (1996/7 to 2000/1)

Avocet *Recuvirostra avosetta,* 59 individuals representing 1.7% of the population in Great Britain (1996/7 to 2000/1)

On passage;

Ruff *Philomachus pugnax* 128 individuals representing 1.4% of the population in Great Britain (1996-2000)

This site also qualifies under Article 4.2 of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species:

Over winter;

Dunlin *Calidris alpina alpina*, 22,222 individuals representing at least 1.7% of the wintering Northern Siberia/Europe/Western Africa population (1996/7-2000/1)

Knot *Calidris canutus*, 28,165 individuals representing at least 6.3% of the wintering Northeastern Canada/Greenland/Iceland/Northwestern Europe population (1996/7-2000/1)

Black-tailed Godwit *Limosa limosa islandica*, 1113 individuals representing at least 3.2% of the Iceland breeding population (1996/7-2000/1)

Shelduck *Tadorna tadorna*, 4,464 individuals representing at least 1.5% of the wintering Northwestern Europe population (1996/7-2000/1)

Redshank *Tringa totanus*, 4,713 individuals representing at least 3.6% of the wintering Eastern Atlantic - wintering population (1996/7-2000/1)

On passage;

Dunlin *Calidris alpina alpina*, 20,269 individuals representing at least 1.5% of the wintering Northern Siberia/Europe/Western Africa population (1996-2000)

Knot *Calidris canutus*, 18,500 individuals representing at least 4.1% of the wintering Northeastern Canada/Greenland/Iceland/Northwestern Europe population (1996-2000)

Black-tailed Godwit *Limosa limosa islandica*, 915 individuals representing at least 2.6% of the Iceland breeding population (1996-2000)

Redshank *Tringa totanus*, 7,462 individuals representing at least 5.7% of the wintering Eastern Atlantic - wintering population (1996-2000)

Reasons for Designation
The area qualifies under Article 4.2 of the Directive (79/409/EEC) by regularly supporting at least 20,000 waterfowl Over winter, the area regularly supports 153,934 individual waterfowl (peak mean 1996/7 to 2000/1) including: Teal *Anas crecca*, Wigeon *Anas penelope*, Mallard *Anas platyrhynchos*, Turnstone *Arenarea interpres,* Pochard *Aythya ferina*, Scaup *Aythya marila,* Goldeneye *Bucephala clangula*, Bittern *Botaurus stellaris*, Dark-bellied Brent Goose *Branta bernicla bernicla*, Sanderling *Calidris alba*, Dunlin *Calidris alpina alpina*, Knot *Calidris canutus*, Ringed Plover *Charadrius hiaticula*, Oystercatcher *Haematopus ostralegus*, Bar-tailed Godwit *Limosa lapponica*, Black-tailed Godwit *Limosa limosa islnadica,* Curlew *Numenius arquata*, Whimbrel *Numenius phaeopus,* Ruff *Philomachus pugnax*, Golden Plover *Pluvialis apricaria*, Grey Plover *Pluvialis squatarola*, Avocet *Recuvirostra avosetta,* Shelduck *Tadorna tadorna*, Greenshank *Tringa nebularia*, Redshank *Tringa totanus*, Lapwing *Vanellus vanellus*.

11.5.6 Natural England recently produced a document listing all the conservation objectives for the Humber Estuary Designated Sites, which includes the SPA, SAC, Ramsar site and SSSI (NE, 2009a). This is an update to the previously produced Regulation 33 advice produced by NE in 2003. In addition to this document a specific document created for the North Killingholme Haven Pits SSSI, a component part of the Humber Estuary SPA and Ramsar site has also been referred to where appropriate (NE, 2009b).

11.5.7 The relevant conservation objectives for terrestrial ecology and avifauna that may be affected by the proposed AMEP site are listed in *Table 11.3* below.

Table 11.3 Humber Estuary Designated Sites Conservation Objectives

Species Features (species or assemblage)	Attribute	Site Specific Target
Aggregations of non-breeding birds: SSSI – wintering and passage waterfowl species; SPA/ Ramsar internationally important populations of regularly occurring migratory species and internationally important assemblage of waterfowl.	B1 Habitat Extent	No decrease in extent of listed habitats from established baselines, subject to natural change. as defined in the conservation objectives for these habitats. Maintain the ability of the estuary to support bird populations.

Species Features (species or assemblage)	Attribute	Site Specific Target
	B2 Population Size	Maintain the population within acceptable limits.
	B3 Disturbance and displacement	No specific reduction in numbers either on the site, or from one part of the site to another attributable to anthropogenic factors.
	B4 Variety of Species	Maintain diversity as at designation (2004) OR as at any other 5 year period since designation – whichever is most diverse.
Assemblage of breeding birds – SSSI breeding bird assemblage of lowland open waters and their margins	B5 Habitat Extent	No decrease in extent of listed habitats from established baselines, subject to natural change. As defined in the conservation objectives for the specified habitat.
	B6 Assemblage score (BTO index)	Maintain assemblage diversity. (The baseline score is 69.5).
	B7 Disturbance and Displacement	No significant reduction in bird numbers either on the site, or from one part of the site to another attributable to anthropogenic factors.
Aggregation of breeding birds – SPA Annex 1	B8 Habitat Extent	No decrease in extent of listed habitats from established baselines, subject to natural change, as defined in the conservation objectives for these habitats.
	B9 Habitat Condition	No decrease in extent of suitable habitat for breeding species from established baselines, subject to natural change, as defined in the conservation objectives for these habitats.

Species Features (species or assemblage)	Attribute	Site Specific Target
	Bird population size – five year mean counts for each species is the main measure of the population size	Maintain the population within acceptable limits.

Source: Natural England (2009) *Humber Estuary: Conservation objectives and definitions of favourable condition for designated features of interest*.

11.5.8 The Conservation Objectives listed above for the whole Humber Estuary also include those for the North Killingholme Haven Pits SSSI. Additional objectives specific to the lagoon habitat have been included within *Chapter 10*.

Non-statutory Designated Sites

11.5.9 An additional search for non-statutory designated sites was undertaken within 2 km of the AMEP site; refer to *Figure 11.12* and *Table 11.4*, below. The main data source used for this purpose was provided by North Lincolnshire Council and the Lincolnshire Wildlife Trust and the previously produced Just Ecology (2006) *Extended Phase 1 Report* (*Annex 11.1*).

Figure 11.1 Map Showing Statutory Designated Sites within the Vicinity of AMEP

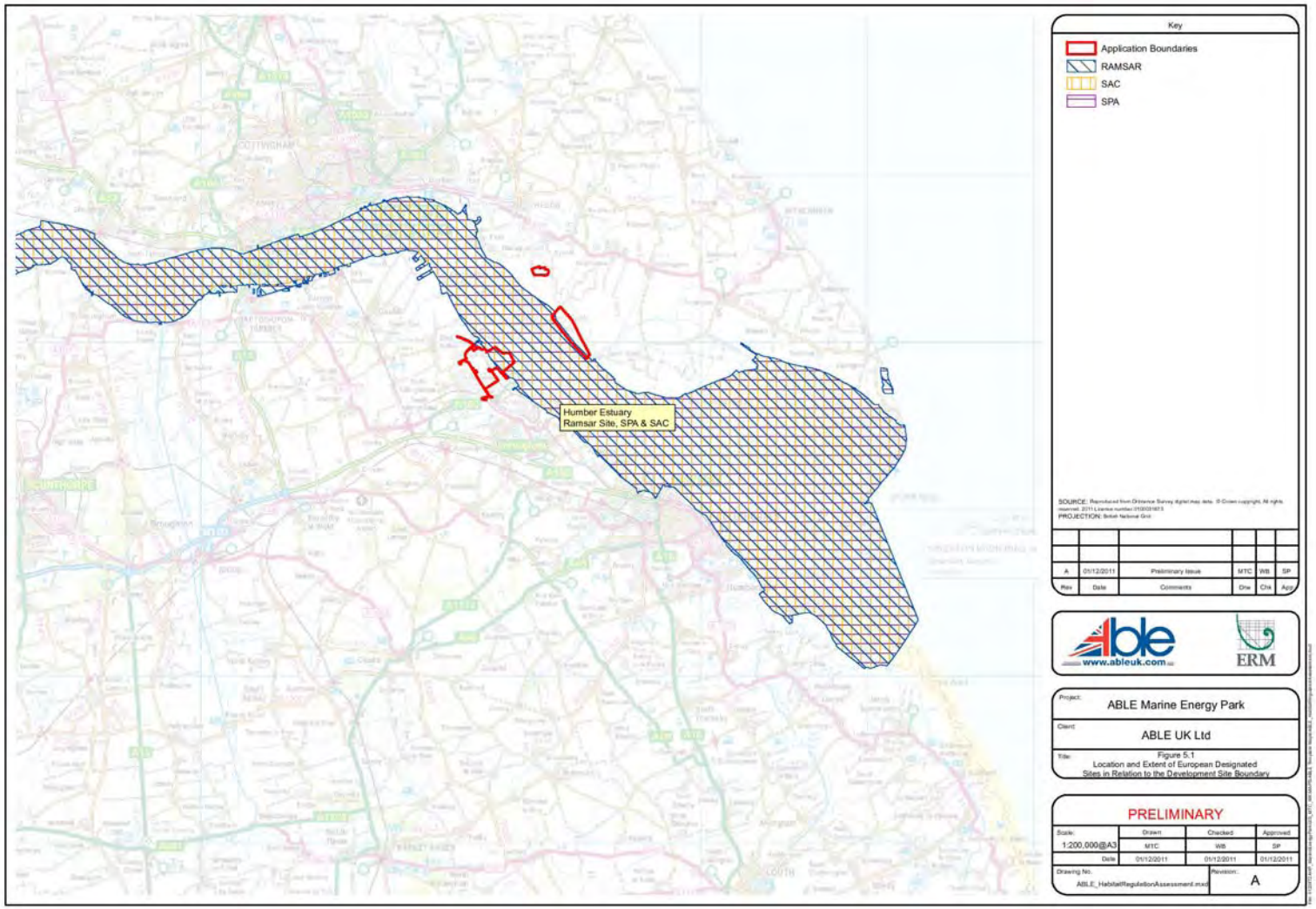


Figure 11.2 Map Showing Non-Statutory Designated Sites within the Vicinity of AMEP

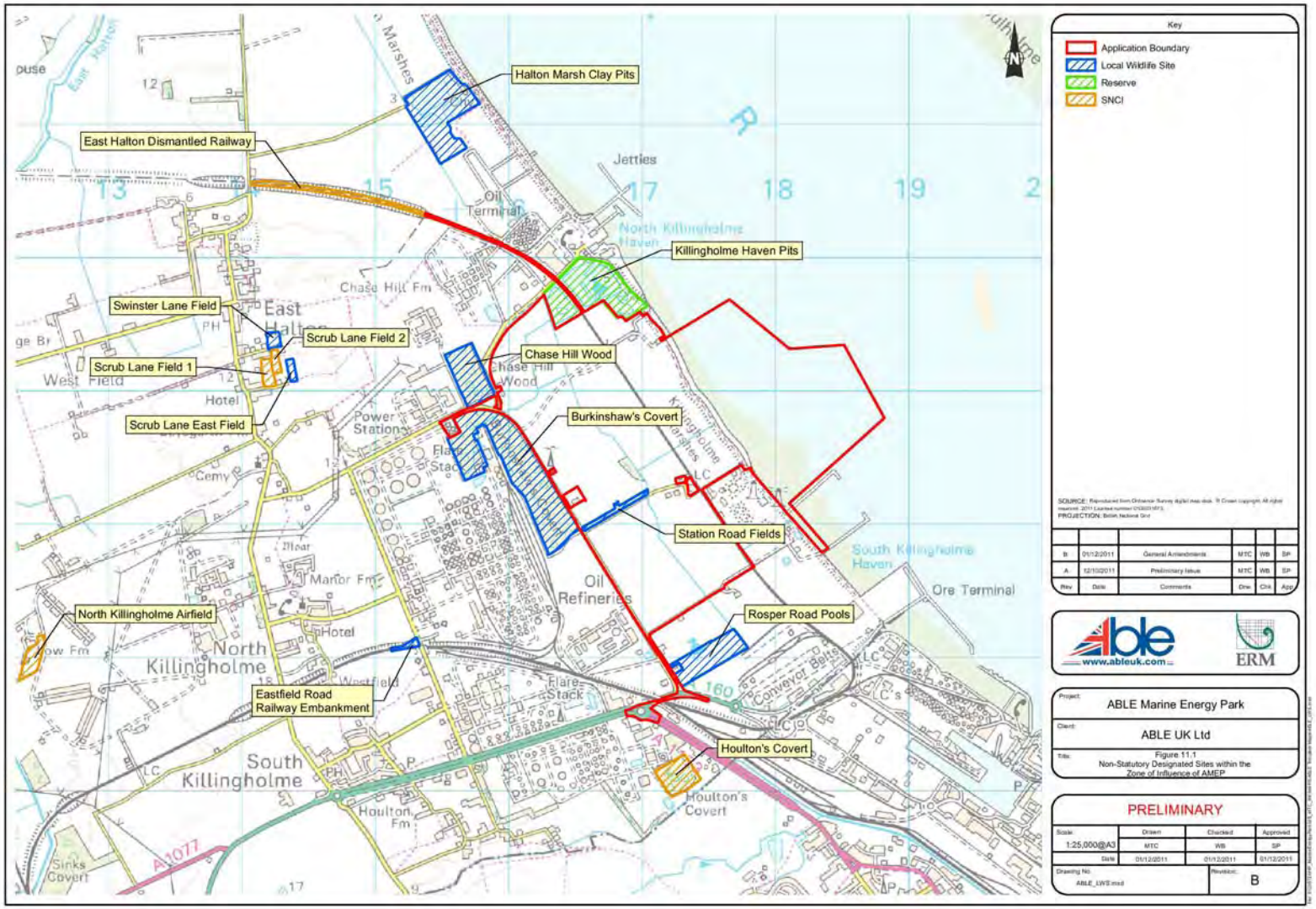


Table 11.4 Non-Statutory Designated Sites

Site Name and distance from AMEP scheme (KM)	Description and qualifying interests
Chase Hill Wood Wildlife Site 0.05 km from the AMEP site	Designated for its botanical interests. Woodland in two distinct sections- the northern section is far older and more open with a large population of early-purple orchid (*Orchis mascula*).
Burkinshaw's Covert Wildlife Site 0.05 km from the AMEP site	Designated for its botanical assemblage. Large plantation of Lombardy poplar (*Populus nigra*) with an area of ash (*Fraxinus excelsior*), silver birch (*Betula pendula*) and sycamore (*Acer pseudoplatanus*). This plantation supports an interesting flora including common spotted orchid (*Dactylorhiza fuchsii*), agrimony (*Agrimonia* sp.), wild angelica (*Angelica sylvestris*), lords-and-ladies (*Arum maculatum*), wood sedge (*Carex sylvatica*), enchanter's-nightshade (*Circaea lutetiana*) and others.
Rosper Road Pool 0.58 km from the AMEP Site	Designated for its bird interests: Consisting of great ornithological interest in recent years. Ninety bird species have been recorded. Teal, which are abundant in winter often stay late into spring. Pintail (*Anas acuta*) and garganey (*Anas querquedula*) are frequent visitors. The site is particularly good for wading birds, the greatest variety of which are seen in autumn when muddy margins suitable for feeding are exposed. Snipe (*Gallinago gallinago*), little stint (*Calidris minuta*), wood (*Tringa glareola*) and green sandpiper (*Tringa ochropus*), spotted redshank, greenshank have been recorded. Up to 70 ruff have been recorded in winter, and in some years a few remain to display in spring, along with migrant black-tailed godwits. Lapwing sometimes nest in the marshy grassland. Water vole are also present in adjacent ditches.
East Halton Disused Railway Wildlife Site Located 1 km from the AMEP site	A disused railway rich in plant species but subject to encroachment by scrub and in need of management to keep open the grassland element.

Site Name and distance from AMEP scheme (KM)	Description and qualifying interests
Houltons Covert Wildlife Site 1.2 km from the AMEP site.	Designated for its ancient woodland and scrub flora.
Halton Marsh Clay Pits 1.6 km from the AMEP site.	Much used by anglers but contains some areas of scrub and reed beds, deeper water areas and some small pools. Plants are typical of marshy and waste ground, with breeding waterbirds present.
Churchside Fields 1.7 km from AMEP site	(in two parts): Part 1 is an old hay meadow supporting ridge and furrow and floods at times. Herb-rich, but over-grazed. Part 2 is a small field between two roads. The field is fairly herb-rich, whilst a muddy ditch in one corner supports some plants of local interest.
East Halton 1.3 km from AMEP site	(also known as 'Scrub Lane Fields'): is a field supporting ridge and furrow with several wet areas. The area is relatively herb-rich and is surrounded by old hedgerows with mature trees.
Swinster Lane Field 1.4 km from the AMEP site	Lying to the north of Swinster Lane, this site contains several wet areas and two ponds. The damp areas are of most interest with a diversity of plant species.
Station Road Field Within AMEP site	Site with neutral grassland, maintained by heavy rotational grazing by horses. Site also includes, wet ditch, hard standing colonised by plants typical of previously developed land and two ponds with GCNs and elm hedge.
Eastfield Road Railway Embankment 1.6 km from AMEP site	The grassland of this reserve represents a type of habitat with specialist plant species that is now scarce. Plants of interest include bee orchid (*Ophrys apifera*), yellow wort (*Blackstonia perfoliata*) and rest harrow (*Ononis repens*), and over 50 species have been recorded.

Site Name and distance from AMEP scheme (KM)	Description and qualifying interests
Humber Estuary Important Bird Area (IBA) Located within AMEP site	The Humber Flats, Marshes and Coast IBA is a non-statutory designated site as identified and monitored by Birdlife International and covers the Humber Estuary and coastline to the north and south of the Humber and is in fact larger than the area designated as part of the Humber Estuary European Marine Site. It includes an elongated shingle-spit capped by sand-dunes (Spurn Point), extensive intertidal habitats (especially Mudflats), saline lagoons and reedbeds (*Phragmites*). This area includes two sites that were previously treated as two separate IBAs, the "Humber Flats, Marshes and Coast" and the "Tetney Marshes". The Humber Flats, Marshes and Coast IBA is designated as an IBA by Birdlife International due to its international importance for supporting a significant number of threatened bird species, its exceptional numbers of migratory species and because the site supports many bird species with restricted ranges.

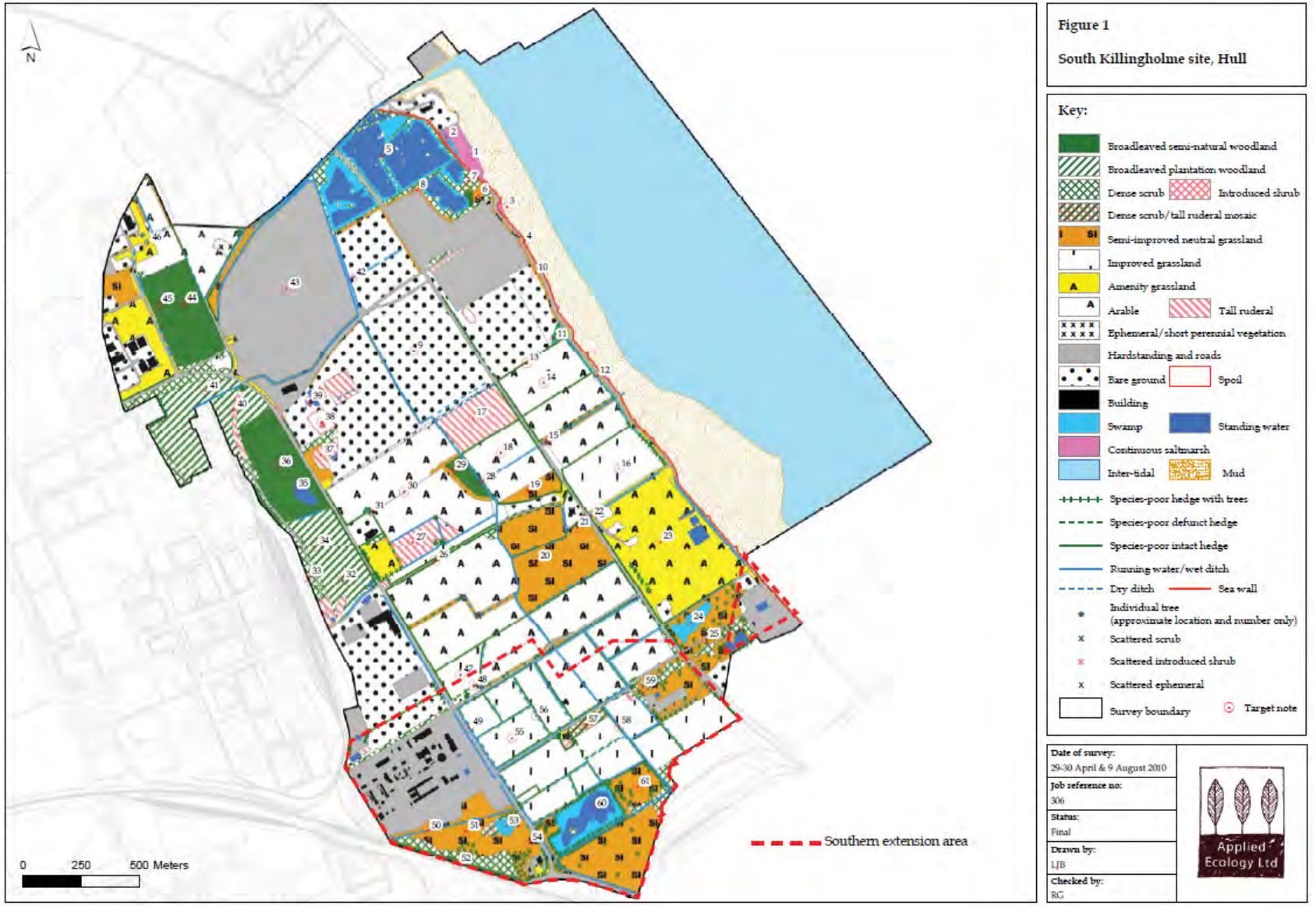
Source: Data provided by the Lincolnshire Wildlife Trust and North Lincolnshire Council

Habitats

Extended Phase 1 Survey

11.5.10 A Phase 1 Habitat Survey (a standardised system developed by the former Nature Conservancy Council to allow identification of areas of habitat of nature conservation interest relatively rapidly over a wide area.) for the AMEP site was carried out during 29 and 30 April 2010 with a further Phase 1 Habitat Survey undertaken on 9 September for a southern extent of the site. These surveys were undertaken using standard methodology (JNCC 1993) but extended for use in environmental assessment (Institute of Environmental Assessment 1995). Habitats are described in this chapter using Phase 1 habitat classification; plant nomenclature (English and scientific names) follows that in Stace (1997). Detailed information with regard to badgers arising from the extended phase 1 survey will be made available to the IPC but is not reported in this document.

Figure 11.3 Extended Phase 1 Survey of AMEP site and Surrounding Habitat



Source: *Annex 11.2.1*: *South Killingholme Phase 1 Ecology Report Southern Extension Area*

11.5.11 Within the AMEP development area there are a variety of habitats, although many are small in size and are a poor representation of the habitat type. As the AMEP site is currently used in part as an active car storage compound, much of the site is covered in hard standing and gravel. The remaining dominant land cover across the site is arable and pasture farmland which is interspersed with smaller pockets of more "interesting" and naturalised habitats.

Standing Water

11.5.12 Adjacent to the northern extent of the AMEP site is located the NKHP. This area totalling approximately 22 ha consists of a series of lagoons fringed throughout by common reed (*Phragmites australis*).

11.5.13 The small western most lagoon is a deep water pit with a reedbed at the northern end and a narrow reed fringe along the western side. It lies alongside the access road to the industrial compounds and is fairly heavily disturbed.

11.5.14 The pit which lies to the west of the railway track is quite shallow and in recent years due to the low levels of management of the site, it has been invaded by common reed and other emergent vegetation to the extent that it is now principally a large reedbed with some enclosed areas of open water. A series of small islands within the pit have been surrounded by common reed. The pit was formerly important for roosting waders but the spread of common reed and the development of scrub around the water areas has all but removed this facet of the pit's importance (Catley, 2008).

11.5.15 The large pit to the north east of the railway track is now the major site for roosting waders and waterfowl within the site. Water levels within the pit can be altered by a sluice system which controls the connection with the adjacent Humber Estuary. Typically, water levels are maintained at a level which provides a variable expanse of open mud within the pit to attract roosting and feeding waders. This shallow water and mud area lies along the northern end of the pit; the remainder of the pit has deeper water and is more attractive to waterfowl.

11.5.16 The smallest of the pits comprises two areas of open water with a variable reed fringe adjacent to a thicket of thorn on the south eastern side, and bounded by the car parking area to the south and west. The water is deep and attracts small numbers of diving duck and has occasionally produced records of wintering Bittern, (although this could be partially as a result of their secretive nature). Water Rails are frequent.

11.5.17 One additional standing water area known as Rosper Road Pool was recorded south-east of the AMEP site during the second Extended Phase 1 survey. This area is listed locally as a Wildlife Site and managed for its ornithological interest and consists of one large flood relief reservoir area with extensive common reed around the margins along with mixed species swamp.

Standing Water Ponds

11.5.18 Within 500 m of the terrestrial site boundary twenty-nine ponds have been identified (Applied Ecology, 2010, Phase 1 Habitat Survey - see *Annex 11.2* and update walk over survey, *pers. comm.*, Applied Ecology, 2011). These ponds include; rectangular, butyl-lined water stores for fire fighting, flooded field corners, enlarged ditches, flooded woodland floor, a probable bomb crater and shallow floods within disturbed ground. Ten of the twenty-nine ponds will be permanently lost to the AMEP development, three of which were found to no longer be present at the time of the 2011 update walk over survey (see *Figure 11.10)*. The remaining seven ponds were subject to a four visit, presence absence survey (see *Annex 11.2* for details). Two ponds within the AMEP development were found to support a medium population of great crested newts (see *Paragraph 11.5.116* and *Table 11.14.*

Swamp

11.5.19 Swamps of pure common reed fringed NKHP to the north of the AMEP site. Common reed also formed a narrow linear band (*Figure 11.3*, Target Note 12 (TN12)) directly behind the sea frontage and coastal road along the banks of a ditch stretching from the eastern extremity of the car storage compound to the coastal access road.

11.5.20 Swamp habitat was also present within an area of scattered scrub and semi-improved grassland near the south-eastern corner of the survey area, south-east of the MOD Fuel Storage Compound.

Ditches

11.5.21 Most of the survey area is drained by one large main drain which runs from the southwest to the northeast where it is connected to the Humber Estuary at the centre of the AMEP site. Connected to this ditch adjacent to the Old Copse woodland is a further large drain which runs from Rosper Road Pool to NKHP. This drain is the main watercourse across the site and is also connected to two other small ditches running from the south within the northern section of the operational car storage compound. Within the area of the AMEP site

surveyed during the second Extended Phase 1, a number of other ditches were recorded which flow into the main drain network.

11.5.22 Ditches have undergone some significant modification within the car storage compound as a result of development works in 2005/6. The banks of the ditches were a mixture of scrub, semi improved grassland and tall ruderal habitats. However, for much of the main drain false-oat grass (*Arrhenatherum elatius*) was the dominant species. Within the ditch water, submerged or emergent vegetation was not present for much of the network. However where vegetation was present species included floating sweet grass (*Glyceria fluitans*) and marsh foxtail (*Alopecurus geniculatus*), with locally dominant patches of common reed (*Phragmities australis*) and great bulrush (*Typha latifolia*).

11.5.23 Evidence of water vole was found throughout the new ditch network and further survey of this species was undertaken throughout the AMEP site as described in *Paragraphs 11.5.129* and *11.5.130* (see also *Annex 11.2.1* and *11.3*).

Grassland & Cultivated Land

11.5.24 The arable land is generally sown with winter wheat and barley which has some value to feeding birds although recent changes to crops in the Killingholme Fields to beans from arable has reduced the use of the site to nesting farmland birds. Records of non-farmland species have been scarce from winter bird survey records (Catley, 2008). Other fields present within the AMEP scheme are mostly pasture and used for horse and cattle grazing. One field located next to the foreshore access road (TN16) is of particular note as it provides an important feeding resource to wader species during the winter, especially curlew. This field is planted up with perennial rye grass (*Lolium perenne*) and does not flood annually while other pasture fields (TN20) located close to the haulage depot are semi-improved grassland with a sward of Yorkshire fog grass (*Holcus lanatus*) cock's foot (*Dactylis glomerata*) perennial rye grass (*Lolium perenne*) and meadow foxtail (*Alopecarus pratensis*). Forbs present within this area included dandelion (*Taraxacum officinale* agg.), white clover (*Trifolium repens*), common nettle (*Urtica dioica*), daisy (*Bellis perennis*), common mouse-ear (*Cerastium fontanum*) and common sorrel (*Rumex acetosa*).

11.5.25 An additional field area located along the northern side of Station Road was previously surveyed as part of the Just Ecology Phase 2 (2006) and classified as an U1f unimproved acid grassland community, although further consultation with North Lincolnshire Council (*pers comm* Andrew Taylor, 2011) has confirmed this site as a neutral grassland. Species within the grassland include abundant common bent (*Agrostis*

capillaris) and frequent red fescue (*Festuca rubra*), false-oat grass (*Arrhenatherum elatius*) and autumn hawkbit (*Leontodon autumnalis*). This field has been well surveyed by the Wildlife Trust and it is thought the plant community is maintained by the heavy grazing from horses, this is done by rotation so some areas are subsequently heavily poached while other areas are fallow. This small grassland strip along with the adjacent elm hedge and the field ponds is designated as a Local Wildlife Site and surveys indicate it is of local value.

11.5.26 Amenity (managed) grassland was also present south of the AMEP site within the MOD underground fuel storage compound. This area was seen to be used by feeding wader species and is heavily managed by mowing throughout the years.

Tall Ruderal Herb Communities

11.5.27 A number of tall ruderal areas are also present within the AMEP site and these areas appear to be fields which have been left to go fallow and latterly to succeed to tall ruderal. Species which dominate this habitat in a mosaic include bristly oxtongue (*Picris echioides*), curled dock (*Rumex crispus*), broad-leaved dock (*Rumex obtusifolia*), great willowherb (*Epilobium hirsutum*), rosebay willowherb (*Chimerion angustifolium*) with a tussocky grass sward of false-oat grass (A*tthenatherum elatius*), creeping bent (*Agrostis stolonifera*) and Yorkshire-fog grass. Within the tall ruderal area close to Station Road (TN27) a complex of three ponds are present which are known to support GCNs.

11.5.28 Tall ruderal vegetation was also present along many of the margins of the cultivated and semi improved fields. Here vegetation tended to be in a narrow band but of value for nature conservation in providing commuting corridors and feeding resource for species.

Hedgerows and Hedgerow Trees

11.5.29 Throughout the AMEP site most field boundaries are bordered by hedgerow habitat as is the rail corridor which runs through the middle of the site and is designated as a local wildlife site. Hedges were invariably dominated by hawthorn (*Crataegus mongyna*) and many were composed entirely of this species. They were therefore mapped as "species-poor". Other species were recorded in some hedges including dog rose (*Rosa canina*) and elder (*Sambucus nigra*) although both species were not recorded in great abundance. Overall no hedgerows qualified for protection under the Hedgerow Act, being species poor and of limited quality.

11.5.30 Only the double hedge (TN26) running along Station Road was not hawthorn and composed almost completely of elm (*Ulmus* sp.). This hedge along with the neutral grassland field it borders are both part of the Station Road Local Wildlife Site and elm trees located close to the northern extent of this hedge have also been protected by a Tree Preservation Order (TPO) (see *Chapter 20*). It has been mentioned by North Lincolnshire County Ecologists that this elm habitat could support the white-letter hairstreak (*Satyrium w-album*) which is LBAP species although there are no recent records for this species at this site.

11.5.31 Most of the hedgerows lacked trees of any sort; the roadside hedge flanking the football pitch adjacent to Rosper Road contained six semi-mature ash (*Fraxinus excelsior*), which were too small and young to possess any features attractive to roosting bats. Two roadside mature ash trees near the entrance to the fuel storage site (TN21) were the only other hedgerow trees on the survey site and one of these did exhibit potentially attractive roosting habitat for bats.

Woodland

11.5.32 Three separate sections of woodland were present within the AMEP survey area. Fox Covert and Chase Hill Wood formed one single unit of semi-natural woodland (TN44) in the north-west of the survey area but outwith the site boundary; Burkinshaw's Covert located to the west of Rosper Road and again outwith the site boundary (TN32, TN36 and TN41) consisting of two large sections of plantation woodland with a more semi-natural area in the middle; and a small area of plantation woodland known as the Old Copse located in the middle of the site.

11.5.33 Plantation sections of Burkinshaw's Covert consisted of a northern section of semi-mature hybrid poplar (*Populus* sp.) (TN41) with limited ground flora and a southern section of sycamore dominated plantation (TN32) with a more pronounced scrub layer of bramble (*Rubus fruticosus* agg.) blackthorn (*Prunus spinosa*), and hawthorn with occasional elder. The more semi-natural middle section of this woodland (TN36) still contained a large number of sycamore trees as well as frequent ash. Scrub and ground flora were similar in this area to the southern part of the plantation woodland.

11.5.34 Within Burkinshaw's Covert a shallow flooded willow carr area is present (TN35) where crack willow (*Salix fragilis*) was the dominant plant species. This area was surveyed as part of the GCN survey programme.

11.5.35 Chase Hill Wood and Fox Covert consist of broad-leaved semi-natural woodland on old ridge and furrow topography. In the canopy ash was

dominant with beech (*Fagus sylvatica*) and elm and Scots pine (*Pinus sylvestris*) rare. Elm and young sycamore are abundant in the understory. Cleavers (*Gallium aparine*) was locally dominant in the ground layer and wood dock (*Rumex sanguineus*), common nettle (*Urtica dioica*), rough meadow-grass (*Poa trivialis*) and ivy (*Hedera helix*) were frequent. In more open sections lords-and-ladies (*Arum maculatum*) self-heal (*Prunella vulgaris*) and wild angelica (*Angelica sylvestris*) were frequent.

11.5.36 The last area of woodland to mention in more detail is the Old Copse (TN29) located in the middle of the site. This woodland is made up of poplar, ash, sycamore with frequent elm although beech was rare. Understory vegetation consisted of elder, hawthorn and young elm. Cleavers and nettle dominated much of the ground layer that wasn't bare ground.

Scrub

11.5.37 Extensive areas of scrub habitat, scattered and dense, occurred at the south-eastern extremity of the survey area and adjacent to NKHP where it forms a habitat mosaic along with hedgerow and fringing reed swamp habitat. The dominant scrub type throughout the site was hawthorn and bramble and provided valuable habitat for nesting birds and other species.

Avifauna Baseline

11.5.38 The Humber Estuary is one of the most important estuaries in the UK for its populations of waders and wildfowl, particularly for its wintering populations. Furthermore, it is important in a European context, supporting internationally important bird populations. The most recently published WeBS counts 2008/2009 place the Humber Estuary as the sixth most important site in the UK in terms of total numbers of waterbirds (Calbrade *et al*, 2010). The Humber Estuary has a five year mean peak count of 140 197 birds (2004/05 - 2008/09) ranging from a peak of 158 949 (2005/06) to a low of 109 197 (2008/09). The SPA Assemblage has been taken from raw WeBS data provided by the BTO rather than the Waterbirds in the UK 2008/09 book as the sum of waterbirds in any one month in the year is given for BTO raw data whereas the figure in the Waterbirds in the UK is the sum of the peaks of all species regardless of month. Historically the assemblage five year mean peak has been much higher, although, over the last 10 years declines in species such as knot and dunlin may have contributed to an overall fall in estuary numbers. The cause of such declines is not fully understood, but may in part be due to the phenomena of "short stopping" in the Wadden Sea where numbers have dramatically

increased probably in response to the recent run of more clement winters (Calbrade *et al*, 2010).

11.5.39 The importance of the estuary to avifauna stems from, amongst others:

- location, i.e. on the spring and autumn migration routes of many species of birds;
- from the abundance of food which it provides;
- from its abundance of habitats which it provides over a relatively large area;
- from its location within relative close distance to some of the other large estuaries located on the east coast of England including the Wash which is the most important estuary in the UK for birds; and
- from the comparatively warm winter climate of the UK.

11.5.40 Many species of wader and wildfowl are migratory and will stop off on their spring and autumn migrations to build up their energy reserves before continuing their journeys. The large estuaries of Britain provide ideal places for many of these species migrating to or from Scandinavia, Africa or mainland Europe to land and replenish energy reserves. Many other species overwinter in the UK.

11.5.41 The majority of the food utilised by birds in the estuary comes from the abundant invertebrate populations living in the mud and sand flats, as well as from the surrounding saltmarsh and farmland fields.

11.5.42 In addition to the provision of food, estuaries are important for wildfowl and wader species for provision of safe roost and moult sites and some species will annually come to moult at a particular location due to the presence of a known safe roost site within the vicinity of an abundant food resource.

11.5.43 Of particular importance in conservation terms in the Humber Estuary are those species which have been identified by the Wild Birds Directive and Ramsar Conventions as being internationally important.

11.5.44 *Table 11.5* and *Table 11.6* below; show SPA, Ramsar site and SSSI qualifying species recorded within the AMEP site and its vicinity. It should be noted that not all species listed on the SPA citation, including bittern *Botaurus stellaris*, little tern *Sterna albifrons* and hen harrier *Circus cyaneus,* have been included in *Table 11.6* as these species were not

recorded in either WeBS data for the site over the last five years, breeding bird surveys (see *HRA Annex C*) or from the Institute for Estuarine and Coastal Studies (IECS) through the tide count (TTTC) surveys undertaken across 2010-11 (see *Annex 11.4* and *Annex 11.9* for details).

11.5.45 It should be noted that a large number of different species make up the SPA assemblage including those listed in the tables below. These further species are part of the assemblage but do not qualify individually under any of the criteria listed below. As requested by NE in their s42 consultation response to the PEIR, they have been included individually within this assessment. As such, all relevant assemblage species and their Humber populations are listed in *Table 11.8* and *Table 11.9* for Killingholme Marshes Foreshore and NKHP respectively.

11.5.46 Population numbers given represent the qualifying populations under which the later assessment has been undertaken and figures are based on the mean of peaks for the last 5 years of available BTO WeBS data from (2004/05 -2008/09) as updated from Calbrade *et al.*(2010) (1). For breeding avocet and marsh harrier, counts are based on data provided by the RSPB from 2010 for the Humber Estuary (including North Cave) (2).

Table 11.5 Annex I Bird Species of the Humber Estuary and Surveyed on or near the AMEP Site

Species	Population	Population (Five Year Mean of Peaks)
Avocet	Wintering Population from Western Europe/Western Mediterranean population	493
Bar-tailed Godwit	Wintering Population from Western Palearctic population	5 926
Golden Plover	Wintering Population from Breeding North-Western Europe population	46 926

Source: BTO WeBS data from 2004/05 -2008/09 and Calbrade *et al.* (2010) *Waterbirds in the UK 2008/09*

(1) Due to the publication of Calbrade et al.in 2010 previously incomplete counts for species such as ringed plover may have been updated so for the Humber Estuary, this species from WeBS data was updated from 1277 to 2168.
(2) Data provided by Peter Short from the Royals Society for the Protection of Birds.

Table 11.6 Annex I Breeding Bird Species

Species	Population	Population (Five Year Mean of Peaks
Avocet	Western Europe/Western Mediterranean – breeding	250-300 pairs
Marsh Harrier	Europe Breeding	45-50 nesting females

Source: RSPB data 2010.

Table 11.7 Internationally Important Populations of Regularly Occurring Migratory Species of the Humber Estuary SPA Surveyed on or near the AMEP Site

Species	Population	Population (Five Year Mean of Peaks)
Ruff	Passage Population from Western Africa – wintering population	64
Dunlin	Passage and Wintering Populations of Northern Siberia/Europe/Western Africa population	21 518
Knot	Passage and Wintering Populations of North-eastern Canada/Greenland/Iceland/North-western Europe population	41 772
Black-tailed Godwit	Passage and Wintering Populations of Iceland Breeding population	3 887
Shelduck	Passage and Wintering Populations of North-western Europe population	5 314
Redshank	Passage and Wintering Populations of Eastern Atlantic wintering population	5 445
SPA Assemblage (Overall)	Non-breeding Assemblage of >20 000 bird species	140 197

Source: BTO WeBS data from 2004/05 -2008/09 and Calbrade *et al.* (2010) *Waterbirds in the UK 2008/09*

11.5.47 The Ramsar site has been designated for its populations of all of the above regularly occurring migratory species.

Humber Estuary WeBS Summary

11.5.48 Over the past ten years WeBS data for the Humber Estuary has shown significant inter annual variation as detailed in *HRA Annex C*. There are likely to be a number of reasons for this including weather conditions, the preferential use of other estuaries and the annual variability in population numbers.

11.5.49 The key figures from these data are the winter peak mean counts taken over the last five years between 2004/5 to 2008/9 as these, being the largest for the estuary have been used to derive the SPA assemblage population as given in *Table 11.7*.

11.5.50 From the monthly peak data it appears that mid-winter is when peak usage of the estuary occurs although this is not the case at NKHP and Killingholme Marshes Foreshore when autumn is the key period (*HRA, Annex C*).

11.5.51 With respect to the individual species, similarly to the overall assemblage data there have been significant inter annual variations (see *HRA, Annex C*). Bird species which occur on the AMEP site, including redshank, have decreased in overall number within the Humber Estuary over the last ten years. In contrast to this, the population of black-tailed godwit has gone up dramatically across the estuary.

11.5.52 For the overall Humber Estuary, WeBS low tide 2003/04 data from November to February was examined as well as additional data provided in NE's (then English Nature) summary publication on the Low Tide Counts programme (Mander & Cutts, 2005). Species diversity and abundance for 2003/04 low tide counts broadly reflected high tide count data across the entire estuary for the same period from 2003/04, although the recorded use of sectors at low and high tide showed marked differences reflecting the limitations of only using High Tide Core Count data (as is the case at Killingholme Marshes Foreshore).

Middle Estuary Contextual Data

11.5.53 East Halton and Immingham Dock WeBS data from the Immingham Docks (WeBS Sector 38905) from 2004/05 to 2008/09 is broadly similar in terms of species composition of the most abundant species to that recorded at Killingholme Marshes Foreshore (WeBS Sector 38406), this is probably the result of the same lack of high water roosting opportunities and the type of habitat locally present. Killingholme

Marshes Foreshore does have a higher number of waterfowl species compared to the Immingham docks and this is likely to reflect the adjacent position of NKHP where the shallow lagoons provide ideal habitat for species. Despite the generally low numbers at the docks for most species, mean counts for black-tailed godwit (110, 2.8 percent) and redshank (164, 2.2 percent) were recorded in numbers greater than 1 percent of their Humber Estuary qualifying population. For these species it is likely that these WeBS counts only represent a small proportion of the population utilising this area during low tide.

11.5.54 WeBS data for East Halton (WeBS Sector 38407) from 2004/05 to 2008/09 shows a clear difference in species composition from that of Killingholme Marshes Foreshore and Immingham Docks which have very similar intertidal habitat. East Halton differs by having a number of regularly used large arable fields. Lapwing and on occasion golden plover are key species recorded here in numbers greater than 1 percent of their SPA populations. This sector also provides habitat for a number of waterfowl species in clay pits similar to those at NKHP (WeBS Sector 38201).

11.5.55 From the north bank of the Humber, WeBS data collected for the Paull to Stone Creek (Cherry Cobb Sands) section, black-tailed godwit were shown to be present in large numbers each year from 2004/05 with a peak count of 665 (17.1 percent) recorded in 2007/08. Peak counts for this species were also all recorded between July and October. Within this sector recently collected data from TTTC (2010/11 surveys) shows similar usage by large numbers of this species (see also Mander *et al*. 2011 and *Annex 35.6*).

11.5.56 These black-tailed godwit counts suggest that within the middle estuary after NKHP (which is the main roost site for birds during Autumn passage) the managed re-alignment site at Paull Holme Strays within the Paull to Stone Creek sector is an important roost and loafing site. This site created in 2003 has started to attract large numbers of wader species especially black-tailed godwit (peak count 2 000 in 2007 (Halcrow 2007), but primarily as a roost site rather than a feeding site (Mander *et al.* 2007 and Mander *et al*.2010)

11.5.57 From the WeBS records at Paull to Stone Creek, counts of a number of key species were much greater than those from Killingholme Marshes Foreshore WeBS sector and well in excess of the one percent threshold (Paull to Stone Creek WeBS sector mean peaks - redshank 1 489; dunlin 3 086; curlew 818. Killingholme Marshes Foreshore WeBS sector mean peaks – redshank 80; dunlin 89; curlew 46). In general the north Humber intertidal mudflat is of much greater extent to that of the south bank providing greater amounts of habitat for feeding, roosting and

loafing and with the provision of the safe hightide roosting at Paull Holme Strays numbers have increased as shown by trend analysis performed by the British Trust for Ornithology (BTO (2008)).

11.5.58 The 2003/04 low tide WeBS data revealed usage by black-tailed godwit of Immingham Dock with a peak count of 137 (3.5 percent) there in July, and also along the North Humber bank at Cherry Cobb, with a peak count in August of 800 (20.6 percent). SPA qualifying species including redshank and dunlin were all seen to use other parts of the estuary in much greater numbers than in comparison to Killingholme Marshes Foreshore and NKHP. For example redshank was recorded almost every month at Immingham Dock with a peak count of 168 representing 3.1 percent of the Humber population.

11.5.59 Further analysis of black-tailed godwit activity along the Humber showed a distinct shift in usage from Killingholme to Pyewipe located south-east of the AMEP site. At Pyewipe few counts were recorded in Autumn however, from December to March, large counts for this species were taken with a February peak representing 21.6 percent of the Humber Estuary population. Evidence supporting this statement includes recently published data from Catley (2011) and low tide count data from the Humber from 2003/04 (Mander & Cutts, 2005). It is currently thought from ringing studies that the Pyewipe population are winter residents while the Killingholme birds are a passage population present at Killingholme for moulting before a likely further trip to the Wash 82 km along the coast to the south (Mander & Cutts, 2005).

11.5.60 WeBS low tide data gives a maximum density of black-tailed godwit per ha of 4.89 along the Killingholme Marshes Foreshore. This figure is significantly greater at NKHP its maximum density during the same period being 27.59 birds per ha, showing the increased density of birds when roosting (as is likely at NKHP in comparison to foraging on the Killingholme Marshes Foreshore).

Killingholme Marshes Foreshore

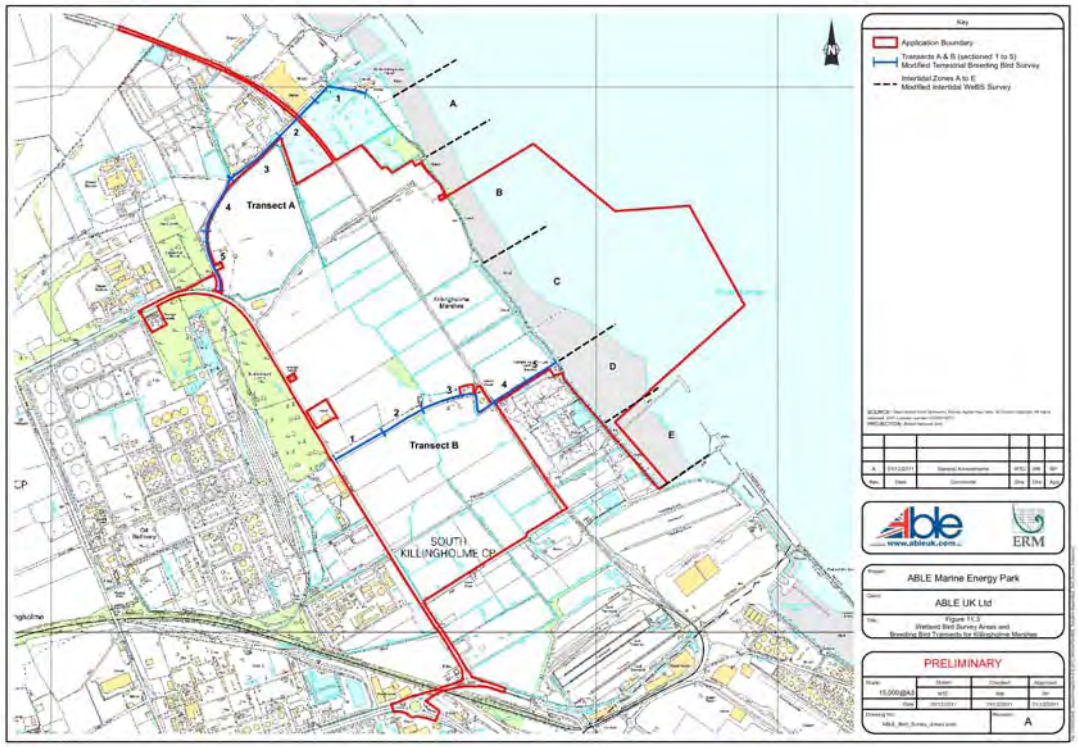
11.5.61 The Killingholme Marshes Foreshore stretches from the Humber Sea Terminal (HST) to Immingham Dock. This is approximately 2.6 km in distance. For Killingholme Marshes Foreshore, data was collected through WeBS Core Count Data from 2004/05 - 2008/09, IECS through the tide waterbird surveys from April 2010 – April 2011 as well as contextual data from WeBS Low Tide Surveys during 2003/04.

11.5.62 In contrast to the data provided through WeBS at either High Tide or Low Tide, IECS undertook waterbird surveys throughout the tidal cycle along the foreshore at Killingholme. This methodology, first

developed by the BTO, is now the standard for surveying of intertidal areas. The section of mudflat surveyed at Killingholme was between the Humber Sea Terminal and Immingham Dock and the survey area was split into a number of sectors as illustrated in the *Figure 11.4* below. Sectors B, C and the majority of D are within the footprint of the proposed scheme while A and E are not.

11.5.63 It should be noted that while 2010/11 has been an atypical year in terms of weather it is not thought necessary that two years worth of data collection are required. Firstly weather did not hamper the key period of bird usage at Killingholme Marshes Foreshore or NKHP during Autumn passage, secondly highly detailed through the tide data was collected every month and on 17 occasions over one year, thirdly fieldwork data from 2010/11 has been supported by a large amount of WeBS and other data sources collected at Killingholme for NKHP, Killingholme Marshes Foreshore and Killingholme Fields over the last 10 years (see list of studies in *Paragraph 11.3.29* and *Annex 11.5 – 11.7* and *11.9 – 11.12*), which has helped create a robust baseline from which the assessment can be made.

Figure 11.4 Wetland Bird Survey Areas and Breeding Bird Transects for Killingholme Marshes Foreshore



11.5.64 Data presented in ***Error! Not a valid bookmark self-reference.*** shows the key peak counts collected from TTTC Wetland Bird Surveys and WeBS Core Count data together along with the Humber population and the percentage each peak count is as a proportion of the Humber population. In addition to the data presented below *Annex C of the HRA* should be referred to for specific month by month detail as created from WeBS Core Count data, TTTC data as well as contextual WeBS Low Tide data from 2004/05.

Table 11.8 Killingholme Marshes Foreshore Wetland Bird Data Summary

Species	Humber population	Peak / Mean of Peak count	Proportion Of Humber Population (%)	Month	Data Source
Assemblage	140 197	3 766	2.7	Oct	TTTC
		314	0.2	Dec	WeBS
Avocet	493	4	0.8	Aug	TTTC
		-	-	-	WeBS
Bar-tailed godwit*	(5 926)	123	2.1	Mar	TTTC
		-	-	-	WeBS
Black-headed gull	(7 865)	252	3.2	Aug	TTTC
		-	-	-	WeBS
Black-tailed godwit	3 887	2 566	66	Oct	TTTC
		50	1.3	Oct	WeBS
Common gull	2 005	73	3.6	Jan	TTTC
		-	-	-	WeBS
Common sandpiper	(46)	3	6.5	Aug	TTTC
		-	-	-	WeBS
Coot	1 166	2	0.2	Dec	TTTC
		31	2.8	Dec	WeBS
Cormorant	219	2	0.9	Nov	TTTC
		-	-	-	WeBS
Curlew*	4 440	158	3.6	Mar	TTTC
		61	1.4	Dec	WeBS
Dunlin	21 518	1 029	4.8	Nov	TTTC
		87	0.4	Dec	WeBS
Gadwall	179	-	-	-	TTTC
		4	2.2	Feb	WeBS
Golden plover	46 926	1	<0.1	Jul	TTTC
		-	-	-	WeBS
Great black-backed gull	(226)	40	17.7	Sep	TTTC
		-	-	-	WeBS
Grey heron	74	-	-	-	TTTC
		1	1.6	Jan	WeBS
Grey plover	2 916	6	0.2	Oct,Nov,Dec	TTTC
		-	-	-	WeBS
Herring gull*	(117)	7	6.4	Jul	TTTC
		-	-	-	WeBS
Knot	41 772	4	<0.1	Aug	TTTC
		1	<0.1	Nov	WeBS
Lapwing*	18 756	325	1.7	Jan	TTTC

Species	Humber population	Peak / Mean of Peak count	Proportion Of Humber Population (%)	Month	Data Source
		15	0.1	Mar	WeBS
Lesser black-backed gull	93	6	6.5	Jul	TTTC
		-	-	-	WeBS
Little grebe	92	-	-	-	TTTC
		2	1.7	Aug,Feb	WeBS
Mallard	2 096	14	0.7	Jul	TTTC
		13	0.6	Mar	WeBS
Mediterranean gull	(2)	2	100	Aug	TTTC
		-	-	-	WeBS
Moorhen	146	-	-	-	TTTC
		4	2.5	Mar	WeBS
Mute swan	288	2	0.7	Dec,Jan	TTTC
		3	1.1	Jan,Apr	WeBS
Oystercatcher	3 528	12	0.3	Mar	TTTC
		<1	<0.1	May	WeBS
Pochard	317	-	-	-	TTTC
		<1	<0.1	Feb	WeBS
Redshank	5 445	540	9.9	Aug	TTTC
		83	1.5	Dec	WeBS
Ringed plover	(2 168)	210	9.7	Aug	TTTC
		-	-	Mar	WeBS
Ruff	64	1	1.6	Aug, Sep	TTTC
		-	-	-	WeBS
Shelduck	5 314	109	2.0	Feb	TTTC
		9	0.2	May	WeBS
Shoveler	145	-	-	-	TTTC
		11	7.6	Mar	WeBS
Smew	2	-	-	-	TTTC
		1	50	Jan,Feb,Mar	WeBS
Teal	2 865	12	0.4	Sep	TTTC
		13	0.5	Dec	WeBS
Tufted duck	417	-	-	-	TTTC
		4	0.9	Mar	WeBS
Turnstone	(570)	-	-	-	TTTC
		1	0.2	Sep	WeBS
Whimbrel	88	2	2.2	Aug	TTTC
		-	-	-	WeBS
Wigeon	3 520	24	0.6	Jan	TTTC
		-	-	-	WeBS
Yellow-legged gull	6	1	25	Jul	TTTC
		-	-	-	WeBS

Table Legend

Humber Population – Population taken from Mean of Peak data from 5 Year WeBS Core Count Data between 2004/05 – 08/09 for Sector 38950 the Humber Estuary. () indicates mean calculated from an incomplete 5 year data set.

Peak count – The highest species count recorded within Killingholme Marshes from TTTC data or Mean of Peak Count taken from WeBS data (datasets expanded below).

WeBS – Mean of Peak Count derived from WeBS 5 Year Core Count Data from 2004/05 - 08/09 for Sector 38406 Killingholme Marshes (TA178187).

TTTC – Through the Tide Count, Waterbird Surveys undertaken at Killingholme Marshes by Institute of Estuarine Coastal Studies (IECS) between April 2010 – April 2011

Month – For TTTC data the month(s) refers to when the peak count per species was recorded from the Peak Count column. For WeBS data the month still refers to when the peak count was recorded although the corresponding Peak Count figure for WeBS is a mean of peak rather than a peak of peaks.

Records highlighted in blue represent counts ≥1% of the Humber Population

11.5.65 Bird data collected for the Killingholme Marshes Foreshore recorded 27 species at ≥1 percent of their Humber population, either through WeBS data or through the TTTC 2010 – 2011 Waterbird Surveys. In addition 2.7 percent of the overall assemblage was also recorded.

11.5.66 It is unlikely that Killingholme Marshes Foreshore is an important area in a UK context for all 27 species. Many will be annually present (such as mute swan) but only in small numbers in a UK context or will only be recorded sporadically (such as whimbrel on passage).

11.5.67 As such it is considered that Killingholme Marshes Foreshore site is of importance for 8 species in the Humber Estuary. These species include bar-tailed godwit (2.1 percent), black-tailed godwit (66 percent), curlew (3.6 percent), dunlin (4.8 percent), lapwing (1.7 percent), redshank (9.9 percent), shelduck (2 percent) and ringed plover (9.7 percent). It should be noted that while whimbrel and ruff are present in numbers in excess of the 1 present threshold, the presence of a peak of one (ruff) or two birds (whimbrel) does not suggest the site is of particular importance for these species in the context of the whole estuary.

11.5.68 In general IECS 2010 TTTC data, in comparison to the WeBS data (at both high and low tide) was significantly higher on the Killingholme Marshes Foreshore. This corresponds with the overall trend in black-tailed godwit numbers on the Humber Estuary which have been increasing since the early 1990s when less than 10 birds were recorded. The increase in number also probably reflects the high detail of the recent surveys and it is possible that any use of previous WeBS core count data alone would underestimate black-tailed godwit and other species (see *HRA, Annex C* for data comparison).

11.5.69 For the SPA assemblage qualifying feature, counts were ≥1 percent threshold for both August and October surveys (see *HRA, Annex C*).

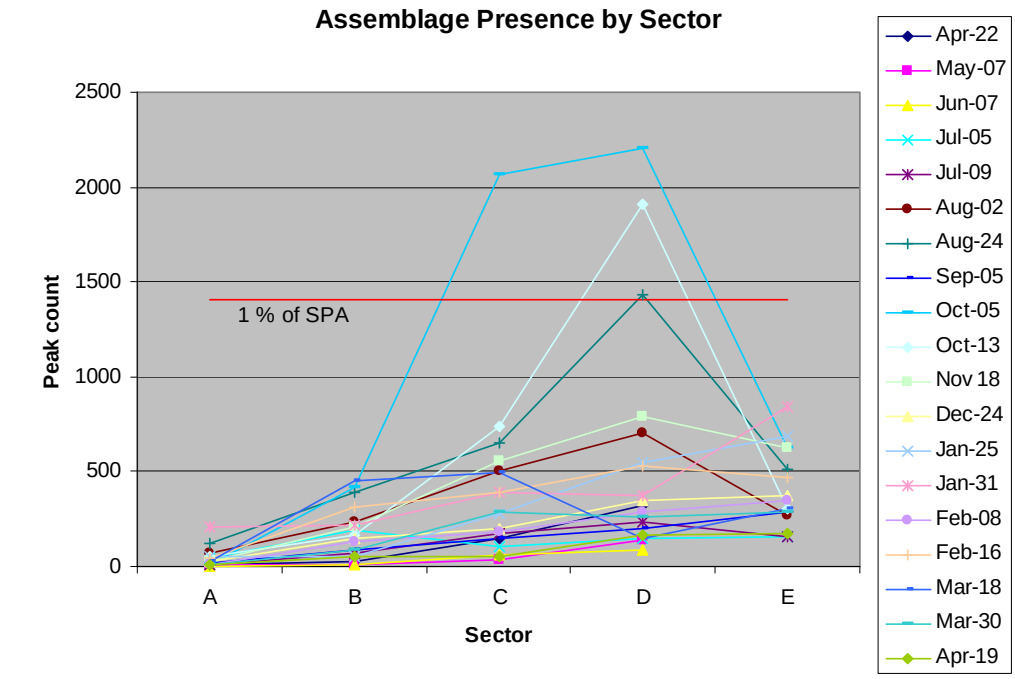
11.5.70 Of the surveys undertaken by IECS, those conducted on the 5 and 13 October recorded the largest counts for species utilising the intertidal habitat within the AMEP scheme. At that time of year, birds present are likely to be on passage while some failed breeders will have already arrived from July onwards and will stay on the estuary to moult.

11.5.71 Of the IECS Sectors A to E, Sectors C and D had many more birds present than other sectors (see *Figure 11.5 and HRA Annex C*). This is potentially unsurprising as both sectors have relatively large areas of

mudflat exposed through the tidal cycle and thus provide more feeding habitat. As can be seen for the annual TTTC Waterbird Surveys in *Figure 11.5* below, Sectors C and D in particular seems to support the largest assemblage of birds with October being the key period for birds.

11.5.72 Some species seem to favour different stretches of the foreshore with shelduck present throughout whilst black-tailed godwit, dunlin and redshank favour Sectors C, D and E (see *Figure 11.5 and HRA Annex C*). It should be noted that sectors A and B are located much closer than C, D and E to the roost at NKHP but these sectors are much less utilised for feeding.

Figure 11.5 Surveys Showing Bird Assemblage Presence at Killingholme Marshes Foreshore Across Each Sector from April 2010 – April 2011



Source: Data provided by TTTC Waterbird Surveys April 2010 – April 2011.

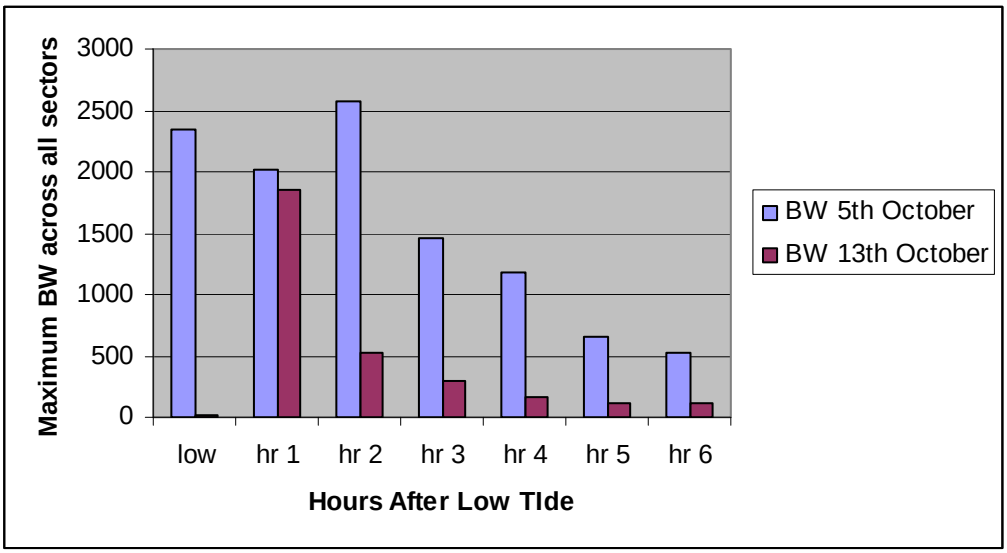
11.5.73 A peak of 3 766 of all bird species was recorded over one hour of survey on the 5 October for all sectors combined, this represents 2.7 percent of the SPA assemblage population. Off this overall peak, 3 300 birds (2.4 percent of the SPA assemblage) were present only in Sectors B to D (within the AMEP site). From this count a birds per ha figure can be derived using the 33 ha of the development zone as the habitat available in Sectors B to D. This gives a peak figure of 100 birds per ha, much higher than that predicted from WeBS data.

11.5.74 IECS through the tide counts have also shown there is high usage of the site at certain points during the tidal cycle (See *Figure 11.6*). Different species seem to have varying usage. Some species such as dunlin and

redshank will remain at relatively constant numbers until two hours before high tide when they will presumably head to roost sites. Shelduck in contrast remain almost constant in number through the tidal cycle and will feed along the tide mark throughout the sectors.

11.5.75 Black-tailed godwit as illustrated in *Figure 11.6* below tend to peak in activity closer to low tide. During Autumn black-tailed godwits tend to moult (Mander & Cutts, 2005) so during a single tidal cycle birds will maximise feeding over a short period of time and spend the remainder of their time conserving energy by roosting or loafing at NKHP, hence the peak foraging recorded closer to low tide.

Figure 11.6 October Surveys showing Black-tailed Godwit activity through the tidal cycle for all sectors



Source: Data provided by IECS Spring Passage & Winter Bird Data. (BW is the British Trust for Ornithology, BTO for Black-tailed Godwit.)

11.5.76 When examined in conjunction with counts for NKHP (see *Table 11.8*) it can be seen that the peak period of usage by black-tailed godwits at NKHP in August did not coincide with peak usage of the Killingholme Marshes Foreshore in October. Furthermore, minimal counts at both sites were recorded in September over the six hour tidal cycle suggesting the birds are not solely reliant on Killingholme as a roost or feeding site although it is their favoured or optimal site during autumn passage on the estuary.

11.5.77 Surveys from late winter indicate that black-tailed godwits which remain on the Humber tend to utilise mudflat habitat in Sector E more than other Sectors (see *HRA, Annex C*). It is not clear why there is this change in usage but it could be as a result of feeding resources becoming depleted in Sectors C and D (where godwits predominately feed in autumn) or that the core population of godwits in winter tends

to be in Pyewipe (Catley, 2011) which is closer to Sector E than C and D.

11.5.78 Additional data gathered by Just Ecology in 2006/07 (see *Annex 11.6*) showed similar species composition to that recorded by IECS and WeBS data at Killingholme Marshes Foreshore. Generally numbers were lower than the IECS through the tide counts. The exception to this was for lapwing which was recorded with a peak of 603 (3.2 percent) which is double that recorded in TTTC or WeBS (see *Table 11.8*)

North Killingholme Haven Pits

11.5.79 The North Killingholme Haven Pits (NKHP) are non-tidal, although through means of a pipe fitted with a manually operated valve, estuarine water can be allowed to flow into the pits at high tide and vice versa at low tide. There is limited mudflat area within NKHP and as such they do not provide good low tide foraging habitat for most species. However, NKHP make an ideal high tide roost site and provide ample habitat for dabbling duck species and species such as water rail which breed and winter within the marginal reedbeds.

11.5.80 For NKHP, data was collected through WeBS Core Count Data from 2004/05 - 2008/09, IECS high tide count data from April 2010 – April 2011 as well as contextual WeBS Low Tide Data from Surveys during 2003/04.

11.5.81 TTTC data and WeBS Core Count data is completely comparable at NKHP as both datasets were collected at high tide and the total dataset therefore extends from 2004/05 to 2010/11. As for the Killingholme Marshes Foreshore monthly data is presented in *HRA Annex C* and this dataset should be referred to for more detail on the monthly variation of site usage by species throughout the year.

Table 11.9 North Killingholme Haven Pits Wetland Bird Data Summary

Species	Humber population	Peak / Mean of Peak count	Proportion Of Humber Population (%)	Month	Data Source
Assemblage	140 197	4112	2.9	Aug	TTTC
		3787	2.7	Sep	WeBS
Avocet	493	16	3	Mar	TTTC
		27	5.5	Mar	WeBS
Bar-tailed godwit	(5 926)	1	<0.1	Aug,Sep,Oct	TTTC
		-	-	-	WeBS
Black-headed gull	(7 865)	41	0.5	Aug	TTTC
		-	-	-	WeBS

Species	Humber population	Peak / Mean of Peak count	Proportion Of Humber Population (%)	Month	Data Source
Black-tailed godwit*	3 887	3 800	97.8	Aug	TTTC
		3 338	85.9	Sep	WeBS
Canada goose	580	-	-	-	TTTC
		1	0.1	Apr	WeBS
Common sandpiper	(46)	1	2.2	Jul,Aug	TTTC
		-	-	-	WeBS
Coot	1 166	2	0.2	May,Feb,Mar	TTTC
		3	0.3	Mar	WeBS
Cormorant	(219)	1	0.5	Aug	TTTC
		1	0.3	Sep	WeBS
Curlew*	4 440	7	0.2	Oct,Mar	TTTC
		12	0.3	Feb	WeBS
Dunlin	21 518	270	1.3	Oct	TTTC
		380	1.8	Nov	WeBS
Golden plover	46 926	1	<0.1	Aug	TTTC
		-	-	Feb	WeBS
Great black-backed gull	226	1	0.4	Jan	TTTC
		-	-	-	WeBS
Grey heron	74	3	4.1	Oct	TTTC
		3	4.1	Sep,Oct	WeBS
Knot	41 772	12	<0.1	Aug	TTTC
		-	-	-	WeBS
Lapwing*	18 756	5	<0.1	Oct	TTTC
		276	1.5	Nov	WeBS
Little egret	38	1	2.6	Jun,Jul	TTTC
		-	-	-	WeBS
Little grebe	92	-	-	-	TTTC
		1	0.9	Sep	WeBS
Little ringed plover	6	2	34	Apr	TTTC
		-	-	-	WeBS
Mallard	2 096	34	1.6	Oct	TTTC
		71	3.4	Sep	WeBS
Moorhen	146	4	2.7	Jul	TTTC
		2	1.6	Sep	WeBS
Mute swan	288	1	0.3	Jul,Oct,Jan	TTTC
		1	0.3	Feb	WeBS
Oystercatcher	3 528	4	0.1	Mar	TTTC
		2	<0.1	Aug	WeBS
Redshank	5 445	249	4.6	Aug	TTTC
		215	3.9	Aug	WeBS
Ringed plover	(2 168)	-	-	-	TTTC
		1	0.1	Aug	WeBS
Ruff	64	-	-	-	TTTC
		1	0.9	Sep	WeBS
Shelduck	5 314	9	0.2	May	TTTC
		7	0.1	Mar	WeBS
Shoveler	145	61	42.1	Oct	TTTC
		29	20	Dec	WeBS
Smew	2	1	50	Jan	TTTC
		-	-	-	WeBS

Species	Humber population	Peak / Mean of Peak count	Proportion Of Humber Population (%)	Month	Data Source
Snipe	118	6	5.1	Oct	TTTC
		4	3.4	Oct	WeBS
Teal	2 865	46	1.6	Oct	TTTC
		30	1.0	Nov	WeBS
Tufted duck	417	1	0.2	Jul	TTTC
		1	0.2	Sep	WeBS
Water rail	7	2	28	Jun	TTTC
		-	-	-	WeBS

Table Legend
Humber Population – Population taken from Mean of Peak data from 5 Year WeBS Core Count Data between 2004/05 – 08/09 for Sector 38950 the Humber Estuary. () indicates mean calculated from an incomplete 5 year data set.
Peak count – The highest species count recorded within North Killingholme Haven Pits from TTTC data or Mean of Peak Count taken from WeBS data (datasets expanded below).
WeBS – Mean of Peak Count derived from WeBS 5 Year Core Count Data from 2004/05 - 08/09 for Sector 38201 North Killingholme Haven Pits (TA166196).
TTTC – Through the Tide Count, Waterbird Surveys undertaken at Killingholme Marshes by Institute of Estuarine Coastal Studies (IECS) between April 2010 – April 2011
Month – For TTTC data the month(s) refers to when the peak count per species was recorded from the Peak Count column. For WeBS data the month still refers to when the peak count was recorded although the corresponding Peak Count figure for WeBS is a mean of peak rather than a peak of peaks.
Records highlighted in blue represent counts ≥1% of the Humber Population
Species written in red are those which are individual qualifying interests of the Humber Estuary SPA.
Species with a * by there name are listed as UKBAP species

11.5.82 Of the bird data collected for the NKHP, 16 species were recorded at ≥1 percent of their Humber population either through WeBS data or through the TTTC 2010 – 2011 Waterbird Surveys. In addition, the overall assemblage was also recorded in numbers of up to 2.9 percent of the Humber population.

11.5.83 It is unlikely that the Humber Estuary and consequently NKHP will be important for all 16 of these species and (excluding 5 of these species (grey heron, little egret, common sandpiper, smew, snipe) on the basis of very low actual numbers and chance use) the Pits have therefore, been assessed as being important for the 11 species listed below (the rationale for selecting species where likely significant effect may be anticipated is presented in more detail in the HRA screening document). These include avocet (5.5 percent), black-tailed godwit (97.8 percent), dunlin (1.8 percent), lapwing (1.5 percent), little ringed plover (34 percent), mallard (3.4 percent), moorhen (2.7 percent), redshank (4.6 percent), shoveler (42.1 percent), teal (1.6 percent) and water rail (28 percent).

11.5.84 The most important species numerically is black-tailed godwit, and peak abundance is in early autumn (average 5 yr peak 3 338, TTTC maximum 3 800), when birds are moulting. At this time the Pits may

hold almost the entire Humber population. By the end of October, bird numbers drop and for 2010/11, it was below the 1 percent threshold for the rest of the winter.

11.5.85 Other key species recorded at the Pits included dunlin (1.8 percent) and redshank (4.6 percent). These species were present during autumn and early winter when birds were roosting at the NKHP during high tide and utilising Killingholme Marshes Foreshore during low tide, although dunlin feeding on Killingholme Marshes Foreshore did not always roost at NKHP.

11.5.86 When IECS, TTTC, data is compared to WeBS monthly data (which provide identical count data), redshank showed a similar trend with peak counts recorded in both datasets during August while dunlin showed a more sporadic usage of the site with few but usually large counts recorded. Dunlin counts did however show that late Autumn/early Winter was the key time for usage of this site, with the last five year peak occurring in November during late Autumn.

11.5.87 From looking at the TTTC data as well as WeBS data for NKHP (*HRA, Annex C*) it becomes clear that for the overall assemblage, as well as most species records ≥1 percent level, that NKHP are of peak importance for waterbird species during autumn passage. Species including shoveler (42.1 percent) and mallard (3.4 percent) do show usage through the winter from WeBS data although counts taken during TTTC do not indicate this (possibly as a result of the harsh 2010/11 winter).

11.5.88 Spring does not seem to be a key period for most species other than avocet (5.5 percent) which was recorded both from TTTC and WeBS data in important numbers during March and April. For this species additional breeding bird survey for 2011 showed eight pairs being present, representing 3.2 percent of the Humber breeding population (see *Annex 11.10*).

11.5.89 Additional data gathered by Catley in August and September 2010 mapped flight lines of black-tailed godwits into and out of the NKHP. This data indicated that while the majority of flight lines were to/from Killingholme Marshes Foreshore at this time of year moulting birds do utilise other areas of the estuary to forage and are not solely reliant on the Killingholme Marshes Foreshore. In addition, surveys undertaken by Just Ecology in 2006 also showed usage of the foreshore at East Halton at low tide by 824 birds (21.2 percent) during September and Catley data for the same period in 2010 confirms that birds continue to utilise this area of mudflat for foraging (which has accreted over the last 10 years following construction of the HST). Furthermore data by

Mott MacDonald (2009) and Catley (2011) both show that black-tailed godwit do not exclusively use Killingholme as almost all the autumn passage population was recorded in October at Pyewipe in 2008 and 2010.

Killingholme Fields

11.5.90 The Killingholme Fields are the terrestrial fields located between the Humber Sea Terminal and Immingham Dock. These fields vary in habitat type and a limited number are regularly used by waterbird species associated with the Humber Estuary.

11.5.91 TTTC surveys at the Killingholme Fields were undertaken by IECS during their Waterbird surveys from April 2010 – April 2011. These surveys complimented the surveys previously undertaken by Just Ecology in the winter of 2006/07 (*Annex 11.7*) and surveys undertaken by Catley each month from January 2007 to December 2008 (Catley, 2008) as well as those undertaken more recently from September 2010 to April 2011 (Catley, 2011). TTTC surveys concentrated solely on the single field to the North of the tank farm on the coast while the Catley surveys covered all fields between Immingham and the Humber Sea Terminal (and also in the wider area).

11.5.92 Only seven species were ever recorded within the AMEP site during either Catley or TTTC surveys (redshank, black-tailed godwit, lapwing, redshank, whimbrel, shelduck and curlew), and of these, only curlew was recorded ≥1 percent threshold by Catley or TTTC. Historically lapwing was recorded at the Killingholme Fields in large numbers ≥1 percent threshold, but recent years have seen much fewer birds at Killingholme. Catley recorded a peak count of 142 (0.76 percent) in December 2007, TTTC recorded no such counts (see *Annex 11.9*).

11.5.93 Curlew has been recorded in numbers ≥1 percent of the Humber Estuary SPA population, however, the remaining species have been recorded but only either infrequently, or in very low numbers. Historically lapwings were recorded at the Killingholme Fields in much larger numbers (ie ≥1 percent), but recent years have seen much fewer birds at Killingholme with a count of 142 (0.76 percent) on one occasion in December 2007 (Catley, 2008).

11.5.94 For curlew a peak count during the TTTC surveys of 72 (1.6 percent) was recorded in January while numerous counts ≥1 percent threshold were recorded by Catley in 2007/08 with a peak of 89 (2 percent) in January 2008. Numbers for this species on the Killingholme Fields did not necessarily correspond with those on the Killingholme Marshes Foreshore with counts on the foreshore well in excess of those at the

Killingholme Fields. It is likely that the southern flock of curlew which generally inhabit the Killingholme Fields are joined by other birds, possibly from the East Halton Northern Flock during low tide to feed on the mudflat at Killingholme Marshes Foreshore as has been previously observed by Catley.

11.5.95 Of the Killingholme Fields curlew usage tended to be limited to a particular number of fields, identified by Catley as being improved grassland (see *Figure 11.7, Figure 11.8* and *Figure 11.9*). These fields provide high tide roosting as well as a feeding resource for this species. The number of curlew recorded during the surveys were regularly ≥1 percent of the Humber Estuary population (ie ≥44 birds).

11.5.96 The main areas used by the southern curlew flock are Fields J (field 103 in Catley (2008) and field 240 in Catley (2011)) which is approximately 8 ha, K (field 98 in Catley (2008) and field 325 in Catley (2011) which is approximately 13 ha and Fields L (fields 88, 89 and 90 in Catley (2008) and fields 225, 226 and 227 in Catley (2011) which is approximately 34 ha as shown in *Figure 11.7*. These fields were permanent pasture/hay and provided high tide roosting as well as a feeding resource for curlew. Other areas used included NKHP and Rosper Road Pools (a Lincolnshire Wildlife Trust (LWT) Nature Reserve), neither of which will be directly affected by AMEP.

Figure 11.7 Key Roost and Terrestrial Feeding Sites for Wetland Bird Species within the South Humber Gateway

Source: Catley 2007/08 Winter Bird Survey of East Halton and Killingholme Marshes and inland fields.

11.5.97 The largest number of curlew in a single field within the AMEP site was recorded in field 103 (Field J) in January 2007 with 89 birds (see *Figure 11.8*). This represents 2 percent of the current five year peak mean. This field was of particular importance throughout the year. Fields 88, 89, 90 and 98 (fields L and K) also supported curlew, although typically on a less regular basis and in lower numbers than those recorded in Field J (Catley, 2008). 106 curlews were, however, recorded in Fields L in March 2007 (Catley, 2008). Counts that represented ≥ 1 percent of the Humber Estuary population were recorded in January, February, March, April and August.

11.5.98 The survey in 2010/11 showed a similar pattern (see *Figure 11.9*). A peak of 75 birds were recorded in field 240 (field J) in November 2010. This represents 1.7 per cent of the current five year peak mean. Curlew were present in every month surveyed (September 2010 to April 2011). Counts that represented ≥ 1 percent of the Humber Estuary population were recorded in September, October, November, January, February and March. Curlew utilised similar areas within fields J, K and L.

Figure 11.8 Curlew Usage of Killingholme Fields Within the A MEP Site Between January 2007 to December 2008

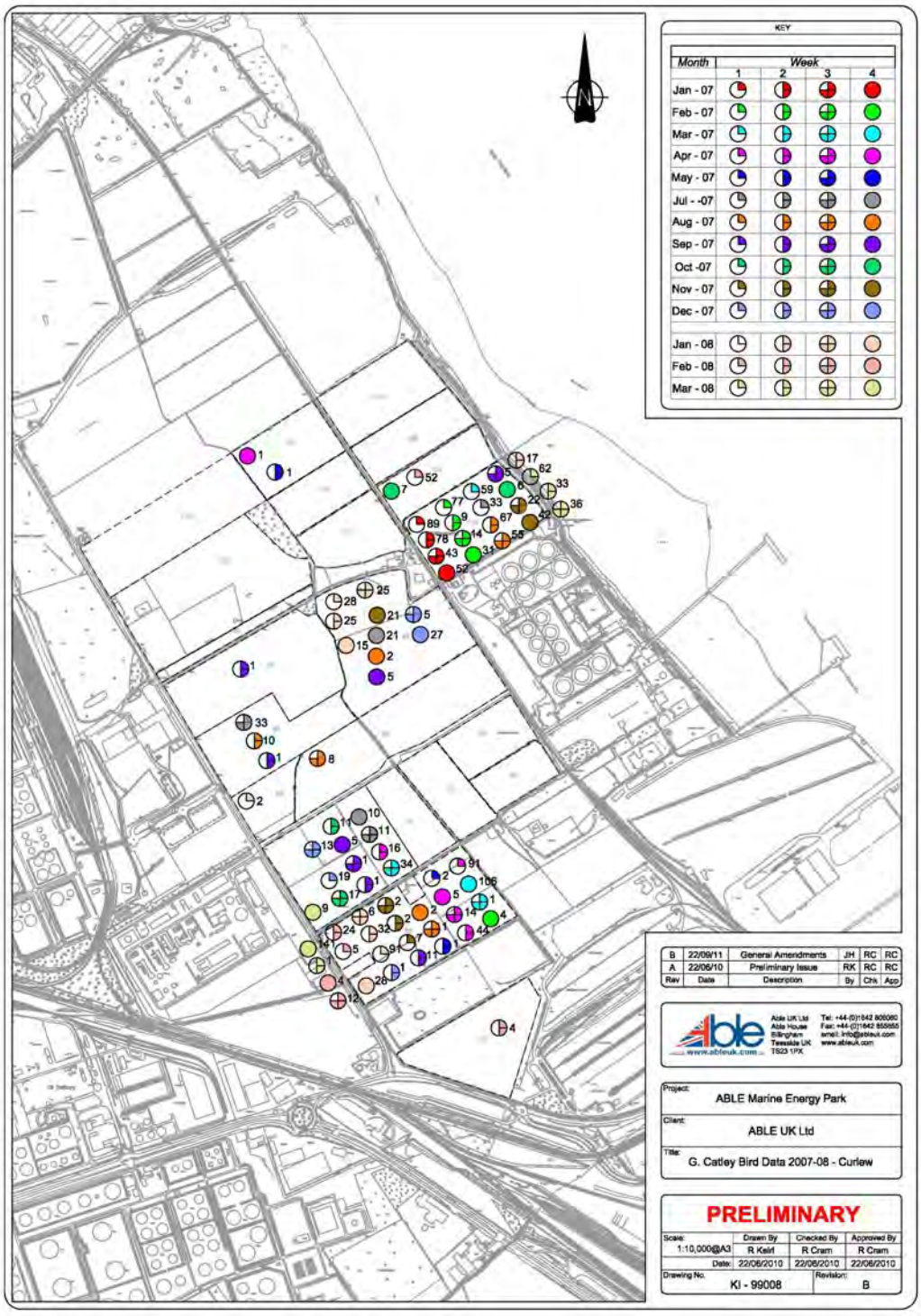
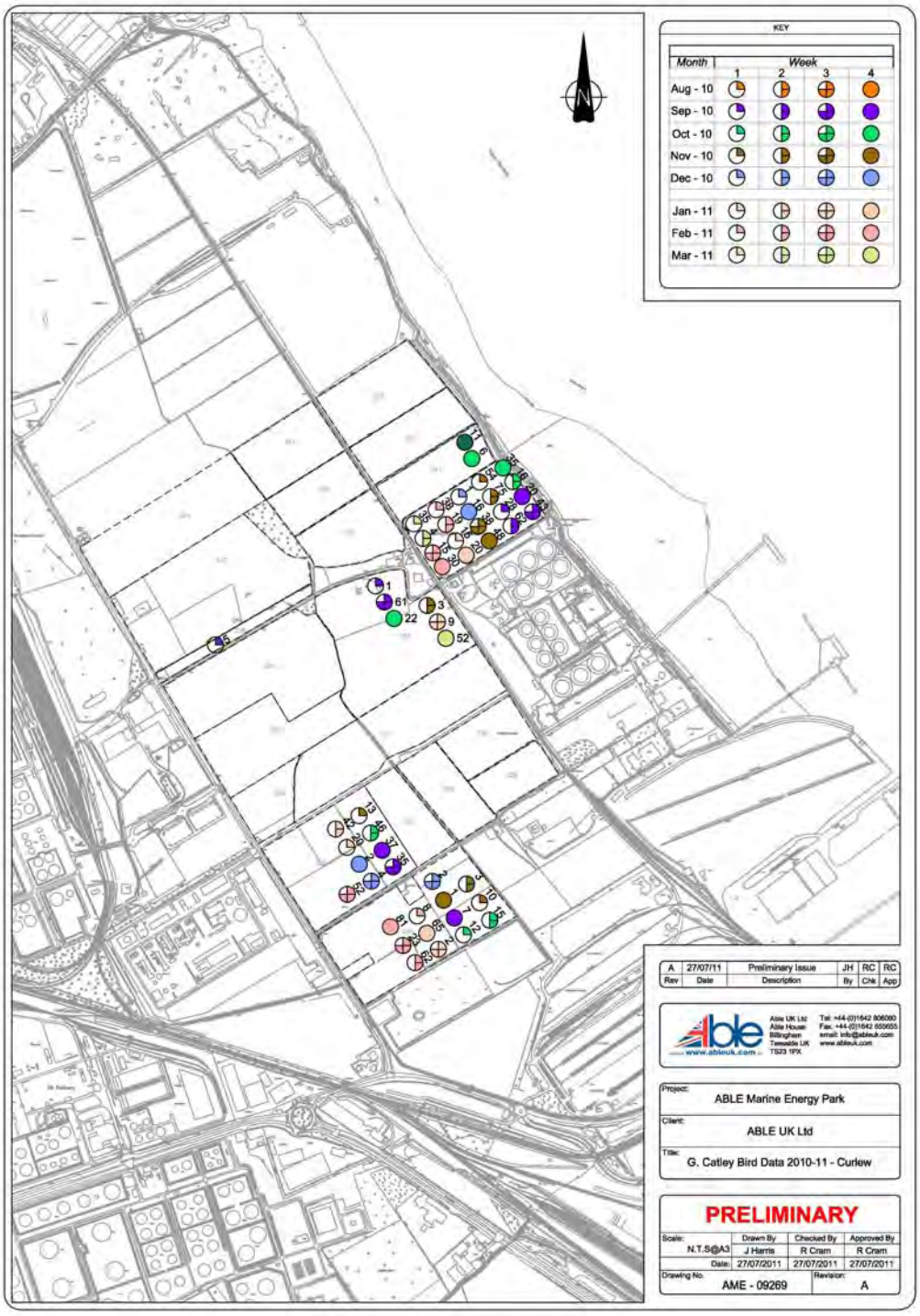


Figure 11.9 Curlew Usage of Killingholme Fields Within MEP Site Between January 2010 to December 2011



Breeding Birds

Survey Methods

Two dedicated breeding bird surveys were undertaken at the AMEP site, a Breeding Bird Survey (BBS) in 2010 and a Common Bird Census (CBC) in 2011. Both these surveys were undertaken in addition to previously collected Catley breeding bird survey undertaken for East

Halton and Killingholme from a five visit Common Bird Census (CBC) undertaken between April – June 2007 (Catley, 2007) and data collected from 2006 across the site by Just Ecology (2006) (*Annex 11.5*). Lincolnshire Bird Club records (1998-2005 All Species Records) were also used to inform the breeding bird baseline.

11.5.99 The 2010 Breeding Bird Survey comprised two line transects (Transects A and B) along the port access road and Station Road (See *Figure 11.4*). The transects were selected on the basis that they represented the two areas of easiest access around the site and were also the most representative of the marginal areas of the site which encompassed the best breeding habitats for terrestrial birds. In addition, they also surveyed the breeding birds of NKHP. For details of the exact methodology see *Annex 11.4*.

11.5.100 For the 2011 Common Bird Census (see *Annex 11.10*) undertaken by Ecology Consulting, standard principles for this technique were undertaken with all habitat within the survey area covered, all birds encountered were recorded with details on behaviour and location noted. Six visits (see *Table 11.10*) were completed as per current NE guidance Natural England (2010). The surveys were carried out throughout daylight hours, avoiding strong winds, heavy rain, fog and low cloud.

11.5.101 As it was possible that the study area may support breeding marsh harriers and barn owls, specific surveys for these species were undertaken, following standard methodologies Gilbert *et al*. (1998). In addition a programme of vantage point surveys were undertaken to quantify their flight activity over the study area (see *Annex 11.10* for details of the methodology).

Table 11.10 Dates of Breeding Bird Surveys

Survey Number	2011 Dates	2010 Dates
1	12/04/11	22/04/10
2	27/04/11	07/05/10
3	10/05/11	07/06/10
4	25/05/11	05/07/10
5	08/06/11	09/07/10
6	21//06/11	02/08/10

Source: Annex 11.4; *IECS Spring Passage & Breeding Bird Survey April to August 2010;* Annex 11.10 *Able Marine Energy Park, Killingholme; Breeding Bird Survey 2011*

11.5.102 Breeding birds were recorded throughout the site during the IECS survey of 2010 and the Ecology Consulting survey of 2011. Along with these records and those from Catley (2007) and the other data sources previously mentioned lists of the breeding bird species present for the Killingholme terrestrial sites are given in the results below, *Table 11.11* shows SPA qualifying breeding bird species while *Table 11.12* shows all other breeding birds.

Results

Table 11.11 SPA Qualifying Breeding Bird Species Recorded Within or Adjacent to AMEP in Summer 2011

Bird Species	Humber population	Peak count	Proportion Of Humber Population (%)	Month	Breeding Location
Avocet	250-300	8	2.7-3.2	June	Killingholme Pits
Marsh Harrier	45-50	1	2-2.2	May	Killingholme Pits

Table Legend
Humber Population – Population taken from data provided by RSPB for Humber populations for 2010.
Peak count – Peak count relates to the maximum number of breeding pairs or pairs attempting to breed.
Source – Data taken from Ecological Consulting Survey from 12 April 2011 to 21 June 2011. (see *Annex 11.10*).
Month – Month when peak breeding population recorded.
Location - Location where breeding recorded (see *Annex 11.10*)
Records highlighted in blue represent counts ≥1% of the Humber Population
Species written in red are those which are individual qualifying interests of the Humber Estuary SPA.

11.5.103 Avocet were recorded breeding at NKHP in 2011 and records from 2006 and 2007 also show that birds have regularly tried to breed at this site over the last 10 years. As can be seen the breeding population represents up to 3.2 percent of the Humber population and with the expansion of the avocet population on the Humber, sites such as Killingholme are becoming more important for this species. Breeding marsh harriers were recorded for the first time at the NKHP in 2011 illustrating the nationally expanding population (Brown and Grice, 2005) using previously sub-optimal habitat for breeding on the Humber, it may also reflect the continuing succession of the south-western most lagoon to a reedbed which was documented by Catley in 2008.

11.5.104 Breeding bird data compiled from Ecology Consulting surveys of 2011, preliminary IECS 2010 surveys and from those undertaken by Catley (2007) is presented below.

Table 11.12 Breeding Birds Recorded in the AMEP site

Bird Species	UK BAP Species	Ecology Consulting, 2011 Territories within AMEP site	Catley, 2007 or other. Territories within AMEP site	Habitat Preference
Blackbird		9		Hedgerow and Tree borders, woodland
Blackcap		3		Hedgerow and Tree borders, woodland
Blue Tit		9		Hedgerow and Tree borders, woodland
Bullfinch	X	4	2	Hedgerow and Tree borders, woodland
Carrion Crow		13		Open woodland, Agricultural Fields and Coastal
Chiffchaff		1		Hedgerow and Tree borders, woodland
Collard Dove		3		Hedgerow and Tree borders, woodland
Chaffinch		28		Hedgerow and Tree borders, woodland
Cuckoo*,**	X	-	1	Where other nesting birds occur
Dunnock	X	3	17	Hedgerow and Tree borders
Goldfinch		21		Field edges, rough grassland
Great Tit		7		Hedgerow and Tree borders, woodland
Grey Wagtail		3		Ditches rivers and lake edges where water is present
Grey partridge*	X	-	4	Non-specific Agricultural Fields
House Sparrow*	X	4		Hedgerow and Tree borders
Jay		1		Hedgerow and Tree borders, woodland
Kestrel		1	4	Open farmland habitat with woodland and hedgerow edges
Lapwing*	X	12	3	Agricultural Fields-Spring Sown Cereals
Linnet*	X	(50)	3	Field edges, rough grassland
Little Ringed Plover***		2	1	Gravel, made ground, shingle and quarries
Long-tailed Tit		3		Hedgerow and Tree borders, woodland
Lesser Whitethroat		5		Hedgerow and Tree borders
Magpie		27		Hedgerow and Tree borders, woodland
Meadow pipit		10	14	Agricultural Fields –

				Permanent Pasture
Mistle thrush		4	3	Hedgerow and Tree borders
Pheasant		21		Hedgerow and Tree borders, woodland
Pied Wagtail		6		Non-specific land
Robin		3		Hedgerow and Tree borders, woodland
Red-legged Partridge		23		Agricultural Fields – Oil seed Rape, Set aside overwinter pasture
Reed bunting**	X	9	7	Field edges and ditch habitat
Reed Warbler		7		Reedbeds adjacent to lagoons, rivers, ditches or estuaries
Ringed Plover		3		Made ground, gravel, shingle
Sedge Warbler		16		Marshes and margins of lakes, rivers and ditches
Skylark*	X	28	44	Agricultural Fields – Oil seed Rape, Set aside overwinter pasture
Song thrush*	X	2	2	Hedgerow and Tree borders, woodland
Sparrowhawk		2		Hedgerow and Tree borders, woodland
Stock Dove		19		Woodland edge Agricultural Fields – Oil seed Rape, Set aside overwinter pasture
Swallow		28	2	Farm buildings
Treecreeper		1		Woodland
Tree sparrow*	X	18	4	Hedgerow and Tree borders
Turtle dove*	X	-	3	Hedgerow and Tree borders
Whitethroat		52		Hedgerow and Tree borders, woodland
Willow tit*	X	1	1	Hedgerow and Tree borders, woodland
Willow warbler		3	2	Hedgerow and Tree borders
Wood Pigeon		(101)		Woodland, Agricultural Fields
Wren		15		Hedgerow and Tree borders, woodland
Yellowhammer*	X	8	14	Agricultural Field Edges, Hedgerow and Tree borders
Yellow wagtail*,**	X	4	3	Non-specific Agricultural Fields

*Birds of Conservation Concern (BOCC) listed on the UK Red List 2009 Eaton *et al*. (2009). Birds of Conservation Concern (BoCC) in the UK have been listed under a

partnership of Governmental and non-governmental organisations. Every five years the listings are reviewed for the 247 species included, with species categorised as – red, amber or green.
**Species listed as assemblage interests of the Humber Estuary SSSI (Natural England (2009) Humber Estuary: Conservation objectives and definitions of favourable condition for designated features of interest.) as two datasets from Catley and IECS have been used to compile this table the peak number of territories has been used.
Source: *Annex 11.4*; IECS Spring Passage & Breeding Bird Survey April to August 2010, Catley (2007) Breeding Bird Survey and Ecology Consulting Breeding Bird Survey (2011).
***Species listed on Schedule 1 of the Wildlife and Countryside Act (1981)
() Species in brackets indicate those species which can nest communally and are therefore difficult to estimate exact breeding numbers.

11.5.105 Breeding bird species were recorded throughout the AMEP site and in the surrounding area. The site appears to be of importance for a number of species including two pairs of little ringed plover (Schedule 1 species) as well as 15 UKBAP of which 12 are also red listed species. In addition to the records above, the survey by Applied Ecology in 2010 found anecdotal evidence of barn owl activity in the MOD fuel storage compound although no confirmed breeding was noted.

11.5.106 Species present were generally those associated with woodland edge habitat, hedgerows and farmland. Some more coastal and riparian species were also recorded but overall records across the site reflect the species locally present in North Lincolnshire and along the Humber Estuary coast.

Great Crested Newts

Survey Methods

11.5.107 Great Crested Newt (GCN) surveys were undertaken by Just Ecology in 2006 and surveys to update results were undertaken by Applied Ecology during the spring of 2010 and were undertaken following the guidance produced by Natural England (then English Nature) in 2001.

11.5.108 NE presence/absence survey (EN, 2001) recommends that three survey methods should be completed in each water body; torch survey, bottle (or funnel) trapping and egg searching. The guidance suggests that four separate survey visits in suitable weather conditions should be completed between mid-March and mid-June as a reasonable standard of survey effort, with at least two of the visits being completed during the period mid-April to mid-May. This is because there is a risk that GCN may not have reached their breeding ponds in full numbers before mid-April, and because adult GCN may have left their breeding ponds after mid- May depending on local conditions.

Table 11.13 Great Crested Newt Surveys Undertaken

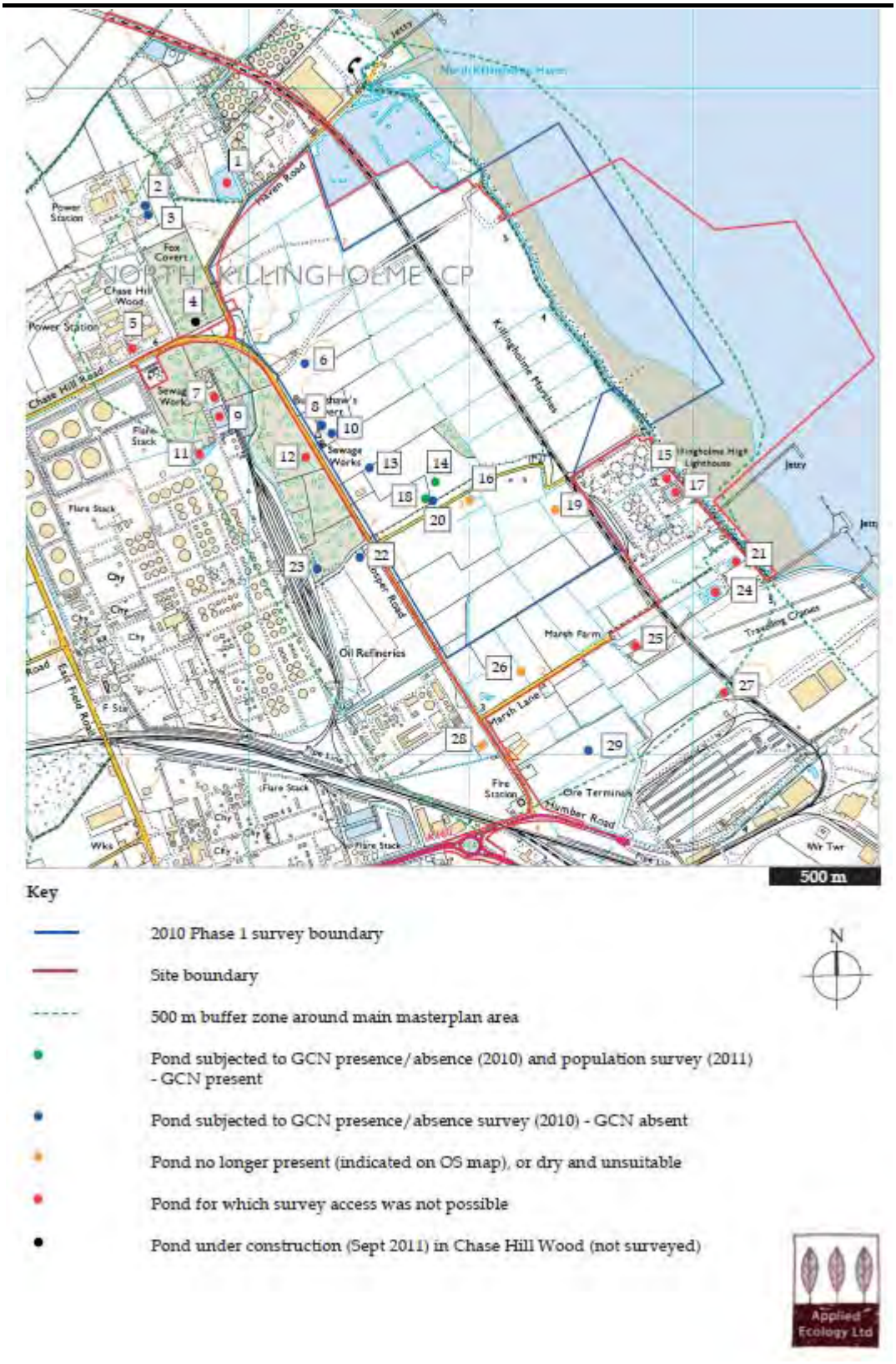
Survey Number	Date
1	12/13 May
2	13/14 May
3	17/18 May
4	18/19 May

Source: Annex 11.2: *Applied Ecology Ltd; South Killingholme Phase 1 Ecology Survey and Great Crested Newts*

11.5.109 During the initial Extended Phase 1 Survey, seventeen ponds were identified within 500 m of the 2010 survey area. Eleven ponds were surveyed further for GCNs, while six were not surveyed due to access issues (see *Annex 11.2* and *Annex 11.8* for details).

11.5.110 Two ponds located within the AMEP site were sandy bottomed oligotrophic pools with clear water and without vegetation (*Annex 11.2 TN39*) and as such were thought unsuitable for GCNs.

Figure 11.10 Ponds Located Within and Adjacent to the AMEP Site Surveyed During Protected Species Surveys 2010



Source: *Pers Comm* Applied Ecology (2011), based on results from Applied Ecology, 2010 (*see Annex 11.2*) and Applied Ecology, 2011 (*see Annex 11.8*).

11.5.111 A further two visits to assess the size of a GCN breeding population in a pond (as is standard in NE (2001) guidance) was not undertaken in

2010 as part of the Applied Ecology survey programme. This was due to the elongated timescale for the Project. Further surveys were finally undertaken in 2011 and the results discussed below.

Results

11.5.112 GCNs were detected during four surveys undertaken at two ponds between the 12 and 19 May 2010 by Applied Ecology. One of these ponds was also recorded as supporting GCNs during surveys undertaken in 2006 by Just Ecology (2006). Both ponds (recorded as pond 12 and 13 in the Applied Ecology 2010 report (*Annex 11.2* Extended Phase 1 Report) and as Pond 18 and 14, in 2011*)* were located on the northern side of Station Road within 80 m of each other.

Table 11.14 Presence/Absence Survey Results from Applied Ecology (2010)

Survey dates			12/13th May 2010		13/14th May 2010		17/18th May 2010		18/19th May 2010	
Pond no.	HSI Score	No. of traps	SN	GCN	SN	GCN	SN	GCN	SN	GCN
1	0.35*	No access								
2	0.47	6	-	-	-	-	-	-	-	-
3	0.65	5	-	-	-	-	-	-	-	-
4		New pond								
5	0.35	No access								
6	0.54*	7	-	-	-	-	-	-	-	-
7	0.39*	No access								
8	0.53	3	1	-	4	-	2	-	-	-
9	0.29*	No access								
10	0.71	8	-	-	-	-	-	-	-	-
11	0.32*	No access								
12	0.49*	No access								
13	0.65	5	9	-	3	-	5	-	-	-
14	0.67	4	5	-	9	1m	16	2f	8	1f
15	0.43*	No access								
16		Not surveyed- pond dry/absent								
17	0.43*	No access								
18	0.71	7	3	9m; 13f	2	7m; 14f	6	4m; 4f	1	6m; 3f
19		Not surveyed- pond dry/absent								
20	0.40	5	-	-	-	-	-	-	-	-
21	0.33*	No access								
22	0.55	9	-	-	-	-	-	-	-	-
23	0.53	3	9	-	3	-	Not trapped- pond dry			
24	0.45*	No access								
25	0.80*	No access								
26		Not surveyed- pond dry/absent								
27	0.64*	No access								
28		Not surveyed- pond dry/absent								
29	0.23	20	-	-	-	-	-	-	-	-

Source: Applied Ecology (2010) *South Killingholme Phase 1 Ecology Survey*. Report for Institute of Estuarine and Coastal Studies (IECS). Pond numbers updated by Applied Ecology as a result of walk over survey in November 2011.
SN = Smooth Newt.
* HIS score calculated remotely using Google Earth (or distant site views) *pers. comm.* AE (17/11/11)
Records highlighted in blue will be lost to the AMEP development

11.5.113 A rapid assessment (only based on four visits) of population size class gives populations as follows.

- Pond 18: Medium (maximum count of 22 between 11 and 100).

- Pond 14: Small (maximum count of 2 between 1 and 10).

11.5.114 Just Ecology only recorded newts in a single small population within one of the ponds; in comparison the more recent Applied Ecology Survey recorded newts in two ponds with medium and small populations. These ponds are located within 50 m of each other and they can be classed as one metapopulation.

11.5.115 Smooth newts were also recorded at the ponds where the GCNs were recorded and in addition they were also recorded in ponds 6, 8 and 10 where no GCN's were present.

11.5.116 Due to the confirmed presence of GCN's at Killingholme an additional six visit population size class assessment survey was undertaken over the Spring of 2011 (*Annex 11.8*). During this survey undertaken between the 4 and 5 April and the 16 and 17 May 2011, GCN's were recorded on all but one of the visits at both Pond 18 and 14. Between these two ponds the metapopulation was confirmed to be of Medium size with 19 individuals recorded between both ponds on the 11 and 12 April. Breeding was confirmed at Pond 18 while a gravid (egg laden) female was recorded at Pond 14 although no breeding was confirmed. This information has been used to develop the mitigation plan and will be used to fully inform licensing requirements once the potential DCO is granted.

11.5.117 During all surveys no evidence of the Ramsar listed natterjack toad (Epidalea calamita), or habitat capable of supporting them was recorded. Furthermore, no historic records exist for this species within the vicinity of the AMEP site and records that do exist in relation to the Humber Estuary population are mostly in relation to Saltfleetby-Theddlethorpe which is an area some 30 km from AMEP.

Bats

Survey Methods

11.5.118 Bat Surveys were undertaken by Just Ecology in 2006. During these surveys little evidence that bats might be roosting on the AMEP site was recorded and activity was not thought to be significant. These surveys followed the standard guidance available at that time (Mitchell-Jones & McLeish, 2004). When additional bat surveys were commissioned two surveys were completed in the summer of 2010 to update records for the site and to show whether bats could be roosting in the Old Copse.

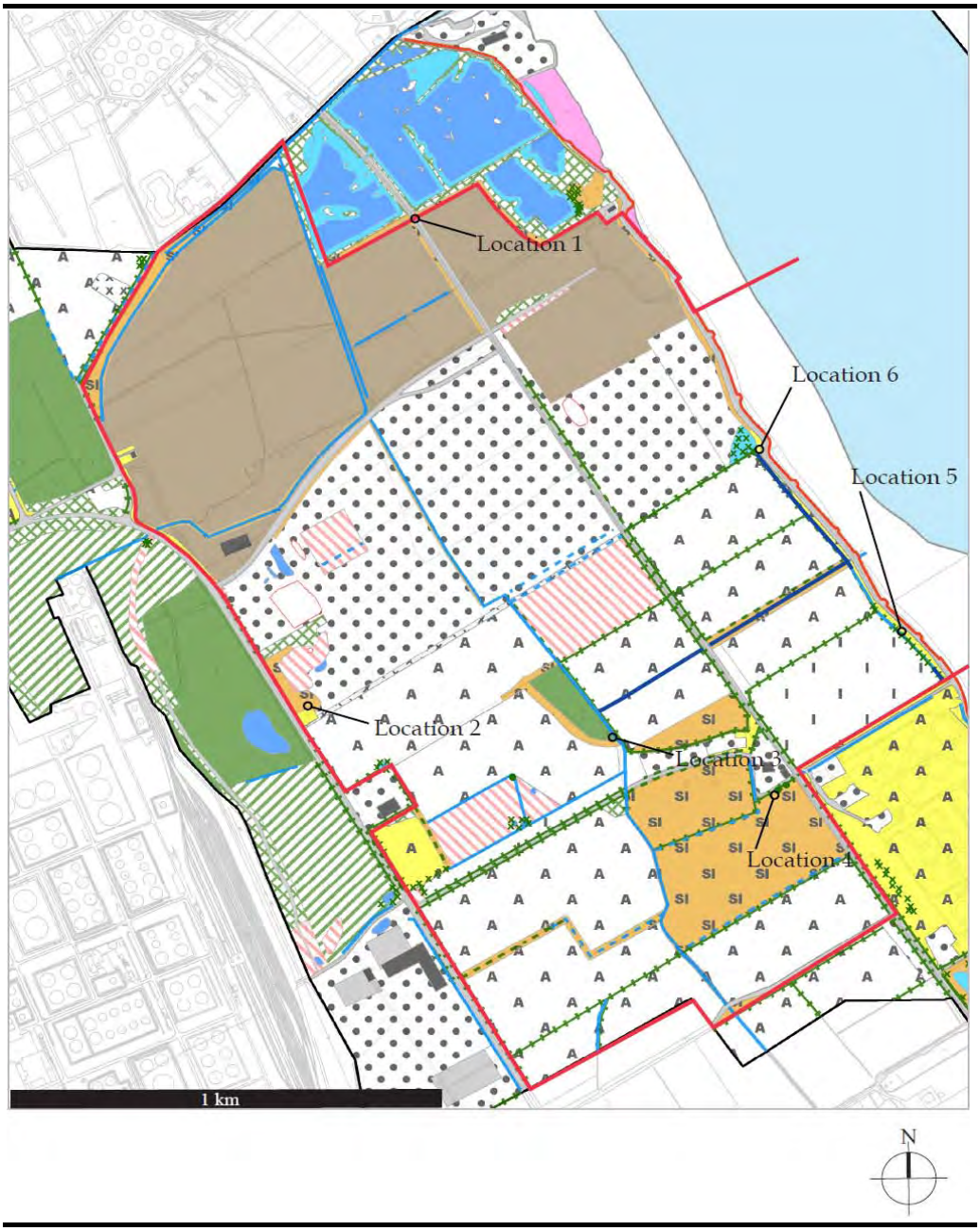
11.5.119 Surveys used automated bat detectors (Anabat SD1 and SD2 models) located in a range of habitats considered to be of greatest potential value to foraging bats within the site. The surveys have been completed on 24 July and 24-25 August 2010.

11.5.120 The 24 July survey commenced 15 minutes before sun set (sun set was at 21.12) in dry weather conditions (air temperature 16.5 ºC) and a light wind (average wind speed – 0.7 m/s) and continued for 2.5 hours before the detectors were removed from site because of weather predictions for rain in the night.

11.5.121 The 24 August survey commenced 15 minutes before sun set (sun set was at 20.10 air temperature 14.3 ºC, average wind speed 0.7 m/s) and continued throughout the night with the detectors programmed to switch off at 30 minutes after sun rise after which point they were removed.

11.5.122 A total of six Anabat bat detectors were positioned across the site in the locations shown in *Figure 11.11*. All bat calls were downloaded on to a PC and analysed using Analook software to establish what bat species were present.

Figure 11.11 Bat Detector Locations Within AMEP Site for Summer 2010 Surveys



Source: Annex 11.3: Applied Ecology Ltd; *South Killingholme Protected Species Survey*

Results

11.5.123 Results from surveys undertaken by Applied Ecology in July 2010 indicate that there is not a significant population of bats utilising the AMEP site. Activity was centred on the Station Road and Copse area and also around the NKHP. These habitats are likely to provide ideal foraging and commuting habitat and the Pits in particular will provide ideal insect feeding resource for bats. Five species were recorded during Applied Ecology surveys including:

- Common pipistrelle (*Pipistrellus pipistrellus*);
- Noctule or Leisler's bat (*Nyctalus* sp.);
- *Myotis* sp;
- Soprano pipistrelle (*Pipistrellus pygmaeus*); and
- Brown Long-eared Bat (*Plecotus auritus*).

11.5.124 It was thought unlikely that any of these species were roosting within the site as the majority of species were seen well after sunset. The previous study undertaken by Just Ecology in 2006 showed an identical pattern of site usage as well as a broadly similar species composition (at least to genus level with cryptic species). No evidence of roosting on site or habitat capable of supporting a bat roost was recorded during the previous Just Ecology Surveys.

11.5.125 However, due to the European protected status of bats and following further consultation with NE, additional surveys were undertaken on the 4 and 18 April 2011. These surveys focused on the Old Copse woodland and included an inspection of the woodland for potential roost sites followed by a bat activity survey which was undertaken using five Anabat SD1 frequency division bat detectors as well as by two trained staff with hand-held bat detectors.

11.5.126 Results from this survey confirmed none of the trees recorded with bat roost potential possessed any evidence that indicated use by roosting bats. Activity surveys recorded no evidence of bat roosting within any of the woodlands or trees within the site as species were recorded much later than would be expected if they had been emerging from local tree roosts or were not recorded during the return to roost survey. Five species were recorded foraging over the woodland edge and adjacent habitat (hedgerows, scrub and drainage ditch). This 2011 survey recorded no brown long-eared bats but a possible Nathusius's pipistrelle (*Pipistrellus nathusii*) was recorded bringing the total species recorded to six.

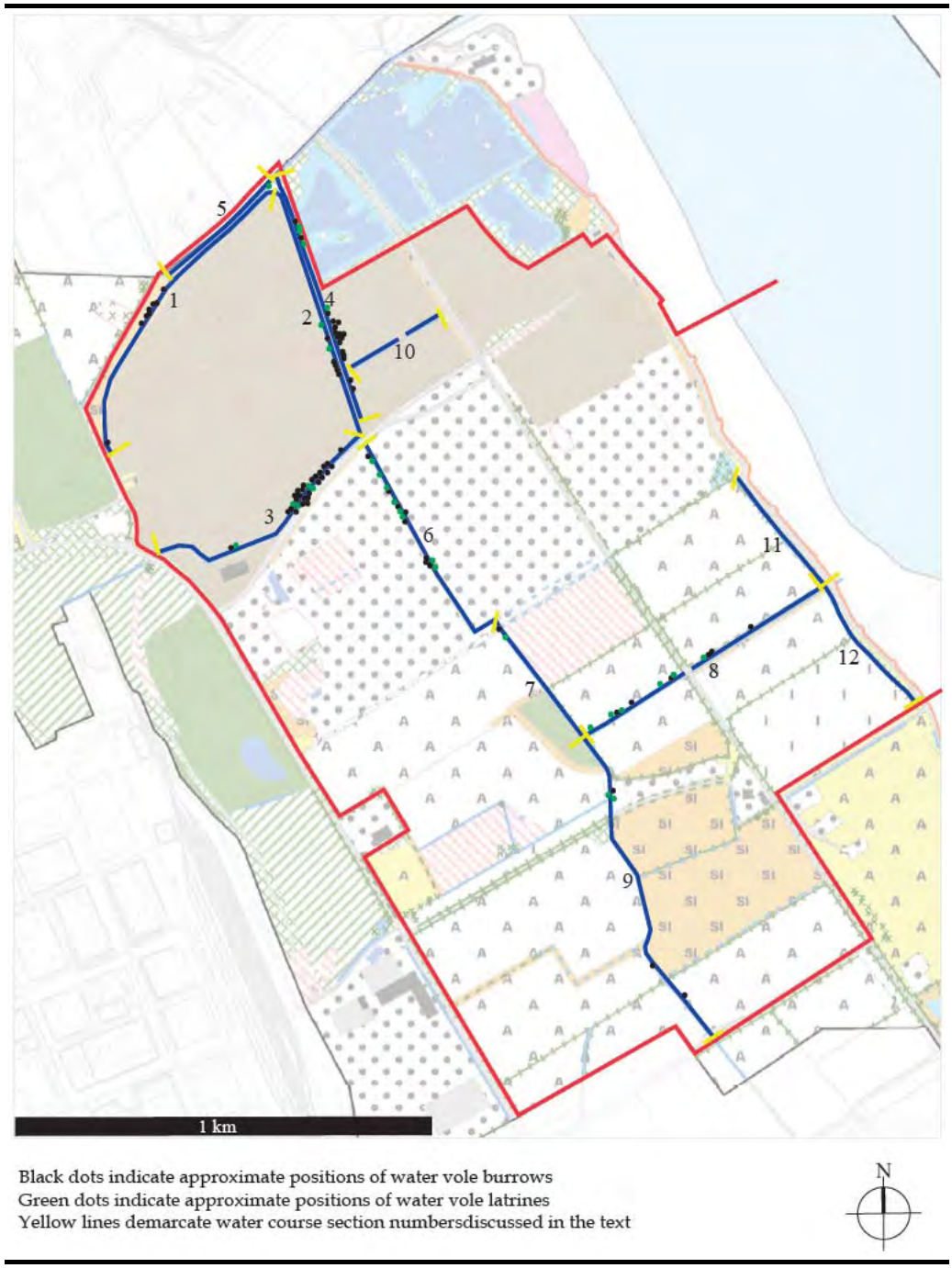
Water Voles

Survey Methods

11.5.127 The water vole survey was undertaken from the 19 -21 July 2010. Field evidence was searched for along the entire length of the water courses shown in blue on *Figure 11.12*. This comprised the animals themselves, their characteristic bank side burrows and runs, grazed grass lawns around burrow entrances, and small collections of grass and rush stems, bitten off and piled in a manner characteristic of the species. In addition, latrines, consisting of accumulations of water vole droppings,

often trodden into a paste by the animals, and also more loosely scattered droppings along bank side runs were searched for. The methodology broadly followed that set out by Strachan & Moorhouse (2006).

Figure 11.12 Applied Ecology Survey for Water Voles Summer 2010



Source: Annex 11.3: Applied Ecology Ltd; *South Killingholme Protected Species Survey*
Note: This figure displays a superseded red line boundary

11.5.128 An additional survey of the habitat adjacent to Rosper Road Pool was undertaken in September 2010. These surveys recorded large numbers of latrines and activity, this tended to be concentrated in smaller areas but generally in higher density then that recorded at AMEP.

Results

11.5.129 Water voles were recorded on most of the major ditches running through the AMEP site during the Applied Ecology 2010 Protected Species Survey, and it was conservatively estimated that there were at least 22 breeding females within the ditch network of the AMEP development site (Applied Ecology, 2010, see *Annex 11.3*).

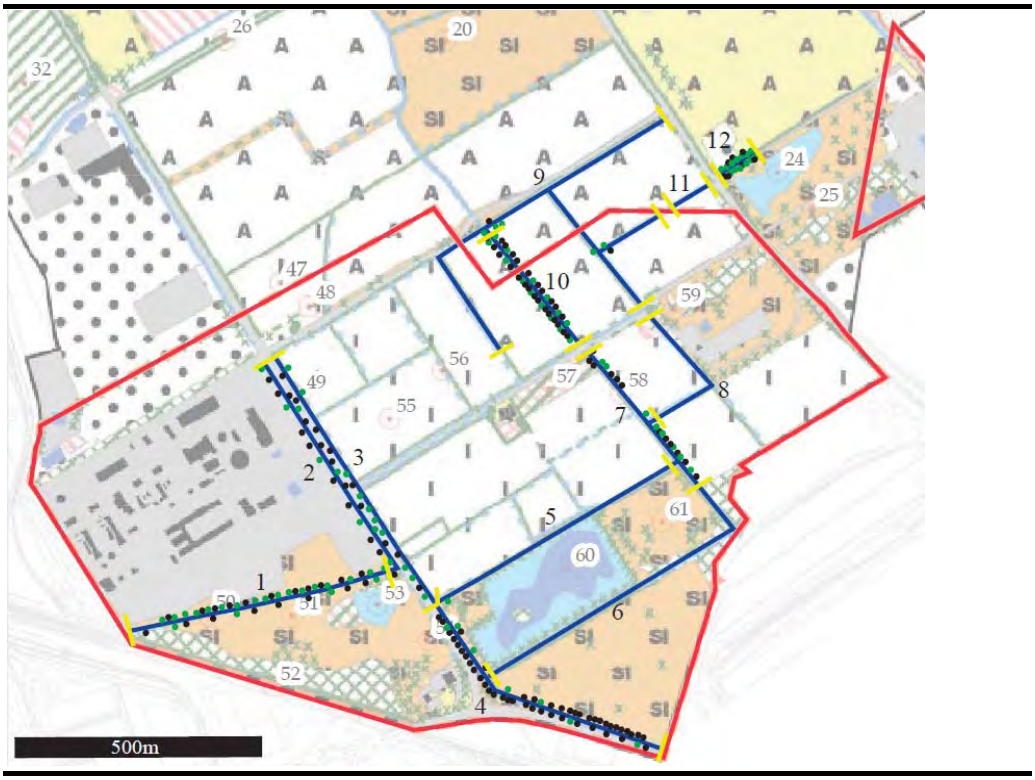
11.5.130 An additional survey (which was not a dedicated water vole survey) of the area directly to the south east of the development area including land adjacent to and including the Anglian Water owned Rosper Road Pools recorded approximately 60 breeding females along the continuing ditch network.

11.5.131 This data confirms findings in 2003, 2005 and 2006 that the water vole is present almost continuously between NKHP to Rosper Road Pool and it is clear the AMEP land provides a valuable resource for this species.

11.5.132 Records of water vole usage across the site were also noted following the re-engineering of the ditch system in 2005 by Able. It was found that counts of water vole were higher in the new drains which had a ditch and flood relief berm than the older more overgrown ditches.

11.5.133 Water voles were also recorded in Area A which forms part of the mitigation area for AMEP (see *Figure 11.13*). Other breeding females were recorded on the drains in and surrounding Area A (see *Figure 11.13*).

Figure 11.13 Water Vole Presence in Area A (black dots indicate burrows, green dots indicate latrines)



Badgers

Survey Methods

11.5.134 Surveys for badgers were undertaken on the 11 and 13 October by the Badger Consultancy in 2010.

11.5.135 The survey involved a detailed walk-over survey of the proposed development site and two adjacent areas of woodland (Burkinshaw's Covert and Chase Hill Wood). The area was searched systematically, with particular attention paid to areas where the vegetation and/or the topography offered suitable sett sites for badgers. Areas with dense ground cover (hedges, scrub, woodland etc) were examined closely: if the vegetation prevented entry, then the perimeter was examined, in order to detect paths suggesting a hidden sett within the area.

11.5.136 Sett locations were noted and all holes were examined closely to determine if they were, or ever had been, badger setts. The number of entrances and level of use was recorded, and the sett was then classified according to the criteria used in the National Badger Survey (Cresswell *et al.* (1990), Wilson *et al.* (1997)). Each sett was given a unique reference number (S1, S2 etc.).

11.5.137 In addition to setts, the presence of hairs, footprints, pathways, dung pits and feeding signs were used to plot the patterns of movements of the badgers. Where pathways were confirmed as badger pathways, these were also noted on the map.

Results

11.5.138 No badger setts were found within the proposed development area. There were a series of disused/collapsed holes on the disused railway line (*Annex 11.13 (1) TN1 on Plan 3.1*), one of which was large enough to have been used by badger, although there was no evidence of usage by badger.

11.5.139 No foraging signs, footprints or badger paths were found within the proposed development area. The only evidence of badger activity within the site were two dung pits containing old faeces (>6 months old), located by the disused railway and close to the woodland (*Annex 11.13 TN2 and 3 on Plan 3.1*).

11.5.140 Setts were located within habitat outwith the AMEP site which will not be affected by the Project. Further details on these sett locations are listed within the *Annex 11.13* which is potentially excepted from disclosure.

Reptiles

Survey Methods

11.5.141 Surveys for reptiles were undertaken in 2006 by Just Ecology and updated by further survey work by Applied Ecology in 2010.

11.5.142 A total of 146 artificial reptile refugia (made from roof felt) were placed across the site in locations appropriate for reptiles identified during the Extended Phase 1 Survey in 2010. These refugia were checked across August and September on the dates given in *Table 11.15*.

(1) Potentially exempt information in accordance with the provision of Regulation 12(5)(g) of the Environmental Information Regulations 2004 (EIR)

Table 11.15 Survey Dates for Reptile Surveys

Survey Number	Date and Time of Survey
1	24 August 2010 (morning)
2	24 August 2010 (afternoon)
3	25 August 2010 (morning)
4	25 August 2010 (afternoon)
5	14 September 2010 (morning)
6	14 September 2010 (afternoon)
7	15 September 2010 (morning)

Source: *Annex 11.3*: Applied Ecology Ltd; *South Killingholme Protected Species Survey*

Results

11.5.143 Surveys were conducted for reptiles by Applied Ecology between the 24 August and the 15 September 2010. No reptiles were found despite the large survey effort and suitability of the habitat, and confirmed the negative findings of the Just Ecology Reptile Surveys of 2006.

11.6 IMPACTS

11.6.1 The impact assessment has sought only to assess those receptors which are likely to be affected by the proposed development. Badgers and reptiles have been screened out of the assessment as none are present.

11.6.2 All impacts relating to the Humber Estuary SAC, Ramsar site and SSSI relating to marine or aquatic habitats or species which are qualifying interests of these sites (other than birds) are addressed in *Chapter 10* and are not considered further in this chapter. Such interest features include intertidal benthic and saltmarsh habitat as well as interest species such as grey seals, river and sea lamprey. Other terrestrial interests of the Humber Estuary Ramsar site including natterjack toad (*Epidalea calamita*) have also been screened out at this stage as none have been recorded during survey or historically in the AMEP site.

11.6.3 Dust has been identified as a key issue with regard to air quality impacts. Impacts from changes in air quality from dust are not predicted to be significant for species or habitats during construction or operation assuming standard mitigation measures are applied. Mitigation (dust suppression) will be implemented to avoid impacts to NKHP (part of the SPA) and Burkinshaw's Covert. Detailed modelling of air quality showed that there would be no impact on the SAC habitats such as saltmarsh or mudflats which occur within the vicinity

of the site (see *Chapter 17, Section 17.6* for further details). As such air quality has not been considered further in this Section.

11.6.4 As part of this impact assessment it is acknowledged that there will be likely significant effects on the Humber Estuary European Site and its qualifying interests. As such, an Appropriate Assessment (AA) will be undertaken by the Competent Authority, and supporting information is submitted separately within the application for development consent.

Construction Phase

11.6.5 Full details of the description of the development and the proposed construction process are set out in *Chapter 4* and this information will be used to distinguish how the construction phase may affect nature conservation interests.

11.6.6 The following section lists all construction activities which are thought likely to affect the nature conservation interests within the zone of influence of the AMEP scheme. This zone has been defined following the result of the air quality (see *Chapter 17*) and hydrodynamic assessment (see *Chapter 8*) where impacts are likely to be felt most widely.

11.6.7 The following impacts may occur as a result of the proposed development:

- direct loss of estuary habitat both intertidal and sub-tidal;
- in-direct losses or gains of intertidal and subtidal habitat;
- changes to sediment distribution in the estuary;
- changes to hydrodynamics and the sediment regime of the estuary;
- loss of habitat for feeding and roosting waterbirds;
- loss or reduction in value of roosting and loafing opportunities for waterbirds;
- loss of staging site for roosting wetland birds;
- loss of habitat for nesting birds;
- loss of habitat for great crested newts;
- loss of habitat for water voles;
- loss of neutral grassland and hedgerow of local value;
- loss of bat foraging habitat;
- noise and visual impacts during construction could cause disturbance or displacement to waders roosting/loafing within NKHP and using any remaining Killingholme Marshes intertidal mudflat for feeding; disturbance could be caused by visual and noise sources including:
- people on site and undertaking the construction works;

- plant movement including ships, vehicles and cranes;
- lighting;
- piling activity;
- rainbowing (see Construction *Chapter 4*) of dredge material into new quay;
- dredging; and
- disturbance or displacement of breeding birds including Schedule 1 species.

11.6.8 As specifically stated in the conservation objectives for the Humber Estuary (NE, 2009) relating to SPA qualifying bird species, habitat extent, population size and species variety should be maintained at current or recent peak levels within natural variation. (At levels listed within the citation or as in the case of the SPA, at the mean of peak count levels for the Humber Estuary as in the latest available 5 year data from 2004/5 to 2008/9). In addition the conservation objectives also state that disturbance or displacement levels caused by anthropogenic factors should not exceed a point where there is a specific reduction in numbers either on the site, or from one part of the site. These objectives also apply to NKHP for which specific conservation objectives relating to black-tailed godwit have been created but which is also covered by the conservation objectives for the overall Humber Estuary.

Direct and Indirect Loss of Designated Estuary Habitat

11.6.9 The construction of the new deep water quay will require reclamation of part of the Humber Estuary where 31.5 ha of intertidal mudflat and a further 13.5 ha of sub-tidal habitat will be reclaimed, totalling 45 ha for sub and intertidal areas. This area is all located within the Humber Estuary European Marine Site and it is acknowledged that the loss of this area is inconsistent with the conservation objectives for the site in terms of its SPA, SAC, Ramsar and SSSI interests (The Humber Estuary Marine Site: English Natures advice given under Regulation 33(2) of the Conservation (Natural Habitats &c.) Regulations 1994. Interim Advice April 2003 and also under the more recently produced Conservation Objectives (NE, 2009a)).

11.6.10 There will also be indirect effects to estuarine habitats that will occur over time from the effects on coastal processes of the new quay. Over time ,it is estimated that approximately 10.35 ha of existing intertidal mudflat will become saltmarsh; and new areas of intertidal mudflat and saltmarsh,(7.88 ha and 1.95 ha respectively), will form in areas that are currently below mean low water springs, see *Table 11.16*. Therefore in terms of the Humber Estuary SAC interests there will be the net loss of

31.97 ha of intertidal mudflat and 23.33 ha of sub-tidal habitat but with a gain of 10.3 ha of saltmarsh (see *Table 11.16*). In terms of the Humber Estuary SPA there will be the net loss of 37.97 ha of intertidal mudflat (due to the additional functional loss of 6 ha in Sector E) and 23.33 ha of sub-tidal habitat also with a gain of 10.3 ha of saltmarsh (see *Table 11.17*).

Table 11.16 Direct and Indirect loss of Humber Estuary SAC Habitat Resulting from the AMEP scheme

Losses/Gains (ha)	Saltmarsh	Intertidal mudflat	Sub-tidal (estuary)
Direct	-2*	-31.5	-13.5
		+2	
Indirect	+12.3	-10.35	-9.83
		+7.88	
Totals	+10.3	-31.97	-23.33
Totals requiring compensation	0	+64	+13.5**

Source: For full details on direct and indirect losses see *Chapter 2 Project Description and Chapter 8 Compensation Measures*
*Loss of saltmarsh taken from creation of compensation site.
**The 13.5 ha of sub-tidal losses are losses to the 'estuary' feature. These can be compensated for with any other estuary feature; therefore the saltmarsh gains of 10.3 ha can be subtracted from the indirect sub-tidal losses. Due to the uncertainty of the indirect changes, they are not offset against any direct losses.

Table 11.17 Direct and Indirect loss of Humber Estuary SPA Habitat Resulting from the AMEP scheme

Losses/Gains (ha)	Saltmarsh	Intertidal mudflat	Sub-tidal (estuary)
Direct	-2	-31.5	-13.5
		+2	
Indirect	+12.3	-10.35	-9.83
		+7.88	
Additional Functional Loss		-6	
Totals	+10.3	-37.97	-23.33
Totals requiring compensation	0	+76	+13.5

11.6.11 The loss of the intertidal mudflat from the Humber Estuary SAC should be viewed in the context of the overall Humber Estuary where the loss of 31.97 ha of this habitat represents 0.34 percent of the approximate total intertidal area of 9 384 ha (JNCC, 2011 which) which have been designated as part of the Humber Estuary SAC. In terms of the more local intertidal mudflat located between the Humber Sea Terminal and

Immingham Port the 31.97 ha area represents 58.6 percent of the total area which is calculated to be approximately 54.6 ha.

11.6.12 Sub-tidal area for the estuary is estimated to be 16,800 ha (JNCC 2011) so the loss of 13.5 ha sub-tidal habitat from direct and indirect impacts represents 0.08 percent of the overall Humber Estuary sub-tidal area.

Impacts to SPA Qualifying Bird Species and Assemblage

Birds Affected by Loss of Estuary Habitat

11.6.13 The estuarine habitat, specifically Killingholme Marshes Foreshore is known to support large numbers of foraging, staging, roosting and loafing birds, particularly during autumn passage. This section addressed the impacts to SPA qualifying interest bird species that are present on Killingholme Marshes Foreshore in numbers greater than or equal to 1 percent.

11.6.14 Nineteen of the species (which include shoveler, ruff and whimbrel) recorded in numbers ≥ 1 percent of the Humber Estuary population are not included in this assessment as they are not predicted to be significantly affected. This is because they are not reliant on the habitat and are only present in low numbers (see *Section 5.4* of *HRA*, *Chapter 5*).

11.6.15 Species present in numbers ≥1 percent with the potential to be affected by AMEP include those listed below as taken from WeBS and TTTC 2010/11 wetland bird survey data for Killingholme Marshes Foreshore in *Table 11.8*.

- 66 percent of black-tailed godwit SPA population;
- 4.8 percent of dunlin SPA population;
- 2.1 percent of bar-tailed godwit SPA population;
- 2.0 percent of shelduck SPA population;
- 9.9 percent of redshank SPA population;
- 3.2 percent of breeding avocet SPA population.
- 3.6 percent of curlew population;
- 1.6 percent of lapwing population; and
- 9.7 percent of ringed plover population.

11.6.16 In addition, 2.7 percent of the overall species assemblage qualifying feature uses this habitat.

11.6.17 The Killingholme Marshes Foreshore is important for estuarine bird species, especially for black-tailed godwit, (supporting up to two thirds of the Humber SPA passage population) and redshank (supporting

9.9 percent of the SPA population). With the overall loss of 38 ha of this intertidal area (conservation objectives for the site require no net loss of habitat), it is likely that there could be significant impacts on those species listed above which will have to find alternative feeding and roost sites and this has the potential to adversely affect their favourable conservation status.

11.6.18 The relatively high usage of the mudflat by waterbirds is likely to be a result of its location within an important section of the South Humber Bank between Pyewipe to the south and East Halton to the north (Catley, 2011) and also its location directly adjacent to the NKHP which are part of the SPA, Ramsar site and also listed as a separate SSSI. These Pits are an important roost site in the context of the estuary supporting significant populations of dunlin and redshank, as well as nearly the entire SPA Autumn passage population of black-tailed godwit that annually roost and moult at the Pits between July and November (Mander & Cutts, 2005). While counts of black-tailed godwit and other species are regular and of important numbers during Autumn, counts were minimal in September at both sites showing birds are not solely reliant on the Killingholme site and records from Mott MacDonald (2009) and Catley (2011) indicated the entire Autumn passage population of black-tailed godwits were recorded at Pyewipe as well as large proportions of the dunlin and redshank populations also at East Halton (near the HST terminal) and at Pyewipe.

11.6.19 The particular usage of the NKHP and Killingholme Marshes Foreshore by black-tailed godwit is not entirely understood although the vicinity of both sites close to each other must be of key importance. Further evidence from Gunnarsson *et al.*(2005) suggests that black-tailed godwit have high site fidelity and also migrate independently of their parents meaning that once they have established that a site meets their requirements, they will return to use it annually. Juveniles are often the birds recorded in other areas on the Humber and this information is supported by Catley (2008, 2011) who recorded mostly juveniles in areas used less often by the species such as fields at East Halton. The implication of the above behaviour is that other parts of the Humber may in fact be more than adequate in terms of roosting, loafing and feeding resource for this species but due to the species high site fidelity the Autumn passage population currently stays at NKHP to roost and uses the adjacent mudflat as the major feeding resource.

Loss of Terrestrial Habitat for SPA Birds

11.6.20 An area of arable, pasture and farmland mosaic habitat will be lost as a direct result of the proposed AMEP development. Habitat loss for SPA

bird species will include a direct loss of 100.3 ha of greenfield terrestrial habitat, of which approximately 21.2 ha (areas J and K in *Figure 11.7*) are regularly used as inland feeding habitat for wintering and passage wader species.

11.6.21 Species which regularly use this habitat include up to 2 percent of the Humber population of curlew. One particular field (field J in *Figure 11.7*) is regularly used by curlew and its loss is potentially significant. As such careful mitigation for this species has been agreed with NE (see *Section 11.7)* to negate potential adverse impacts and to sustain the curlew population at a favourable conservation status. It should be noted that outside the proposed mitigation area additional fields (in particular located adjacent to Rosper Road Pool (89 in Catley (2008), see *Figure 11.8* which is part of area I in *Figure 11.7*) are used by the same population of curlew and work by Catley (2008 and 2011) showed these birds move around a particular number of fields between Immingham Dock and Humber Sea Terminal and a number of these fields have been included in the mitigation area.

Disturbance and Displacement during Construction for SPA Birds

11.6.22 The construction period will take around two years for the construction of the quay and the initial phase of terrestrial works. After this a further two years of construction will proceed on the terrestrial part of the site. Over this four year period construction will be ongoing and will, if consented, continue throughout the year and will be likely to produce noise and light emissions which may cause disturbance and potential displacement of waterbirds.

11.6.23 While this section highlights the potential impacts and displacement as a result of disturbance it is recognised that disturbance itself is not necessarily the key issue for bird species using intertidal habitat and studies by Stillman *et al.* (2005) and Gill *et al.* (2001) indicate that bird movement can be driven more by food resource issues than anthropogenic disturbance.

11.6.24 The conservation objectives for the Humber Estuary (NE, 2009), list particular conservation objectives relating to disturbance and displacement. Within these objectives it states with regard to disturbance and displacement that there should be no specific reduction in numbers, either on the site, or from one part of the site to another attributable to anthropogenic factors.

11.6.25 While compensatory habitat will be provided for birds displaced by the development, intertidal mudflat in Sector E will remain outside the

development area. It is probable that not all birds in Sector E will be displaced even though they will be subject to noise, visual and light emissions caused by the construction activities.

11.6.26 The following sections detail the species present that have the potential to be affected by construction in each of the key areas and then discusses the issues relating to impacts from construction. This section firstly concentrates on general construction noise and visual impacts before discussing impacts from piling noise and light.

11.6.27 Bird species in Sector E in numbers ≥ 1 percent of the Humber population on Killingholme Marshes Foreshore that could potentially be affected by displacement as a result of construction are listed below:

- up to 5.9 percent of ringed plover population;
- up to 2.7 percent of redshank population;
- up to 1.7 percent of curlew population;
- up to 1.3 percent of bar-tailed godwit population;
- up to 5.1 percent of black-tailed godwit population;
- up to 1.9 percent of dunlin population;
- up to 1.3 percent of lapwing population; and
- up to 1.4 percent of shelduck population.

11.6.28 Bird species at NKHP that could potentially be affected by displacement as a result of construction are listed below:

- up to 85.9 percent of black-tailed godwit population;
- up to 4.6 percent of redshank population;
- up to 1.8 percent of dunlin population;
- up to 5.5 percent of wintering avocet population;
- up to 3.2 percent of breeding population of avocet population; and
- up to 2.2 percent of breeding marsh harrier population.
- up to 1.5 percent of lapwing population;
- up to 48.4 percent of shoveler population; and
- up to 1.6 percent of teal population.

The main species with the potential to be affected on Killingholme Fields is curlew.

- Up to 2 percent of Humber Estuary curlew population and smaller numbers of other species (see *Paragraph 11.5.92*).

Visual and General Construction Activities

11.6.29 The main sources of disturbance impact on Killingholme Marshes Foreshore are likely to be from the presence of the construction workforce and from piling noise which is discussed separately below.

11.6.30 Evidence from various studies such as Cutts *et al* .(2008), Goss-Custard (2007) and most recently from Liley *et al.*(2010) gives contrasting views with regard to disturbance distances. Disturbance distances from construction tend to range from approximately 120 m for dunlin/ringed plover to around 275 m for curlew assuming unhabituated birds (Cutts *et al.* 2008b). There is evidence suggesting that disturbance caused by construction activity is relatively low once species are habituated as recorded by Cutts *et al*, 2008 as part of the six year study at the Humber International Terminal (Immingham Dock). These data and other sources, including ERM's own experience on monitoring the disturbance effects on birds from piling across the foreshore near South Humber Bank (which affected birds within approximately 200 m), have been examined and compared with the area within Sector E. This review suggests that the area of mudflat which is likely to remain unaffected will vary between species, depending upon their sensitivity to disturbance. Given the effects are from construction, and taking a precautionary approach based on curlew as the species most likely to be disturbed at greater distances, it is likely that some species (eg curlew) will be affected within an area approaching two thirds of Sector E.

11.6.31 At NKHP no significant visual disturbance is predicted as the site will largely be shielded from construction by the large existing bund which extends around the south of the Pits. This bund is two meters high, seven meters wide and has screen planting on top. In addition, construction within the vicinity of the NKHP will be minimal as the area around the Pits has already been concreted so will require minimal development. In addition, those areas requiring large scale construction works such as the quay or the nacelle, blade, tower and foundations factories and the erection of cranes along the quay are well in excess of 200 m from the NKHP. This area is already subject to planning consent for port related storage and plans set out for AMEP show that, for the car storage compound and all land within 200 m of the NKHP, current conditions will not differ from the baseline other than for noise associated with the construction of the Quay and other buildings outside of the 200 m area.

11.6.32 At the Killingholme Fields, the size of the mitigation area has taken into consideration the likelihood of disturbance impacts to birds from

AMEP. The mitigation incorporates a buffer of 150 m around the core area which includes an operational buffer of 50 m on the northern side.

11.6.33 Impacts from construction may be modified by the habituation demonstrated at NKHP and Fields to existing high levels of noise, light and visual disturbance.

Piling Noise

11.6.34 A variety of construction noise will emanate from the site; however the loudest likely noise is from piling during construction of the quay. The following section therefore assesses the impacts of piling during the construction of the quay on SPA birds, as all other noise will be quieter. To provide continuity and to facilitate the impact assessment, this section first describes the baseline noise environment at ecological receptors; NHKP, Killingholme Marshes Foreshore, Killingholme Fields. Predicted L_{AMax} piling noise levels at the ecological receptors are also detailed to allow comparison with baseline levels and to inform the impact assessment. Predicted L_{AMax} levels are dependant on distance from the noise source and at source mitigation levels. As a result, at source mitigation strategies for the reduction of the impacts of piling activity are presented upfront.

11.6.35 Baseline noise data at Killingholme were collected in December 2010 and data is presented below in *Tables 11.18* to *11.21*, these display the general noise profile of the baseline recorded at the ecological receptors. The existing acoustic environment was characterised by long term noise monitoring at locations which reflect areas currently used by wetland birds as follows.

- on Station Road close to Killingholme Marshes Foreshore (Location S1);
- on Station Road close on Killingholme Fields (Location S2);
- on Killingholme Fields (Location S3); and
- in North Killingholme Haven Pits (ECO_1).

11.6.36 Noise levels monitored at these locations are considered to be representative of the noise levels in the general area. Hence the survey data recorded at ECO_1 on the northern side of NKHP are representative of the existing noise levels across NKHP. Location S1 is located to the west of the flood defences, as it was not practical to undertake measurements actually on the mudflats. As the marine environment has a significant effect on the acoustic environment, it is possible that existing levels may actually be slightly higher on the

foreshore, however, it is still considered that the existing noise levels recorded at S1 are representative of the foreshore area.

11.6.37 As this section focuses on the impacts of piling activity, which will occur between 6 am and 10pm, only daytime baseline data is reported. For further information on the baseline noise environment see *Chapter 16.* See also *Chapter 16, Figure 16.1* and *Figure 16.2* for receptor locations and *Section 16.5* for further information on baseline data collection methods.

Table 11.18 Baseline Noise Sampling from Killingholme Marshes Foreshore (S1)

Date	Average Day Time L_{A90}, dB (A)	Average Day Time L_{Aeq} dB (A)	Average Day Time L_{A10} dB (A)	Range L_{Amax} dB (A)
09-12-10	45	52	50	54 - 83
10-12-10	46	51	51	54 - 87
11-12-10	40	47	47	45 - 78
12-12-10	35	45	45	44 - 75
13-12-10	43	51	50	53 - 82
14-12-10	29	39	36	33 - 70
Overall Level	**40**	**49**	**47**	

Table 11.19 Baseline Noise Sampling from Station Road Close to Killingholme Fields (S2)

Date	Average Day Time L_{A90} (dB (A))	Average Day Time L_{Aeq} (dB (A))	Average Day Time L_{A10} (dB (A))	Range L_{Amax} dB (A)
09-12-10	46	56	55	54 - 79
10-12-10	48	56	55	54 - 76
11-12-10	40	51	48	45 - 74
12-12-10	38	52	45	44 - 73
13-12-10	39	56	50	53 - 76
14-12-10	38	58	52	33 - 77
Overall Level	**42**	**55**	**51**	

Table 11.20 Baseline Noise Measurements for Killingholme Fields (S3)

Date	Average Day Time L_{A90} (dB (A))	Average Day Time L_{Aeq} (dB (A))	Average Day Time L_{A10} (dB (A))	Range L_{Amax} dB (A)
06-01-11	47	55	55	54 - 72
07-01-11	55	59	62	61 - 74
08-01-11	54	59	60	60 - 69
09-01-11	47	53	55	55 - 65
10-01-11	52	59	62	58 - 71
11-01-11	56	59	61	60 - 73
Overall Level	**52**	**58**	**59**	

Table 11.21 Baseline Noise Measurements for North Killingholme Haven Pits (ECO_1)

Date	Average Day Time L_{A90} (dB (A))	Average Day Time L_{Aeq} (dB (A))	Average Day Time L_{A10} (dB (A))	Range L_{Amax} dB (A)
09-12-10	45	53	54	53 - 75
10-12-10	43	52	53	50 - 68
11-12-10	45	51	52	49 - 64
12-12-10	42	51	54	45 – 64
13-12-10	42	53	55	48 - 67
14-12-10	42	55	56	45 - 70
Overall Level	**43**	**53**	**54**	

11.6.38 From recordings at all sites there appears to be a wide variation in noise levels throughout a 24 hour period. The main noise sources included the Humber Sea Terminal (HST) and the Immingham Dock (or Humber International Terminal) which operates 24 hours a day and noise emissions from ship loading or offloading will depend on the state of the tide and not necessarily in relation to daylight hours. The following section describes the baseline noise environment in important bird areas on and near the AMEP site.

11.6.39 A statistical analysis of the noise monitoring data reveals the following regarding the existing acoustic environment with respect to existing maximum (L_{AMax}) noise levels (see also *Table 11.22*):

- the highest L_{AMax} noise levels recorded during the daytime period were 87 dB(A) at S1 and 75 dB(A) at ECO_1;

- L_{AMax} noise levels exceed 55 dB(A) 91% of the time at ECO_1 and 71% of the time at S1 (see *Table 11.22*); and

- the range of L_{AMax} noise levels within one standard deviation of the statistical mean ranges up to 72 dB(A) at ECO_1 and up to 68 dB(A) at S1.

11.6.40 This shows that the existing acoustic environment at S1 is less noisy than at NKHP but LAMax levels are still above 55 dB (A) for almost three quarters of the time (see *Table 11.22*).

Table 11.22 Analysis of L_{AMax} Noise Levels (December 2010)

Parameter	*ECO_1*	*S1*
Occurrence of LAMax noise levels > 55 dB(A)	91%	71%
Occurrence of LAMax noise levels ≥ 75 dB(A)	5%	2%
Statistical Mean LAMax	65 dB(A)	60 dB(A)
Standard Deviation (SD)	7	8
Mode (noise level which occurs the most frequently) dB(A)	68 (7%)	64 (7%)
LAMax Range within 1 SD, dB(A)	58 – 72	52 - 68
Occurrence of LAMax noise levels within 1 SD	73%	69%
Occurrence of LAMax between 55 dB(A) and 75 dB(A)	86%	79%
Occurrence of LAMax between 58 dB(A) and 72 dB(A)	73%	-
Occurrence of LAMax between 52 dB(A) and 68 dB(A)	-	69%

11.6.41 The findings of the noise survey indicated that the key noise sources contributing to the existing noise climate were related to typical activities at the docks. Whilst the survey was undertaken over a period of six days in December 2010, the activities recorded are considered typical of those which will occur at the docks throughout the year.

11.6.42 The bird surveys commissioned by Able UK Ltd have recorded important numbers of bird species associated with the SPA/Ramsar designations particularly along the foreshore (S1) and in NKHP (ECO_1). The noise surveys were not undertaken at the same time as the bird surveys, so it is not possible to draw conclusions on the exact effect of specific noise levels on the birds at the time, or determine whether the existing noise climate is having any effects currently on birds. However, these levels are considered to be indicative of the general noise climate in these areas, and important numbers of birds are still being maintained in these areas. Similarly the various reports by Catley and the Lincolnshire Wildlife Trust over the last 5-10 years show that birds continue to use both the Killingholme Fields and the Rosper

Road Ponds under current conditions despite existing noise from Rosper Road and dock related activities which represent two of the largest local noise sources.

11.6.43 The predicted L_{AMax} noise levels at the receptors during piling activities, based on a max source sound power level of 134 dB(A) are given in *Table 11.23)* (see *Annex 11.11* for noise contour maps).

Table 11.23 Predicted L_{AMax} Noise Level Range Relating to Location and Mitigation

Location	L_{AMax} range from Piling, South Quay, dB(A)[1]	L_{AMax} range from Piling North Quay, dB(A)[1]
S1	66-72	57-63
S2	58-64	56-61
S3	51-57	47-52
ECO_1	48-53	58-63

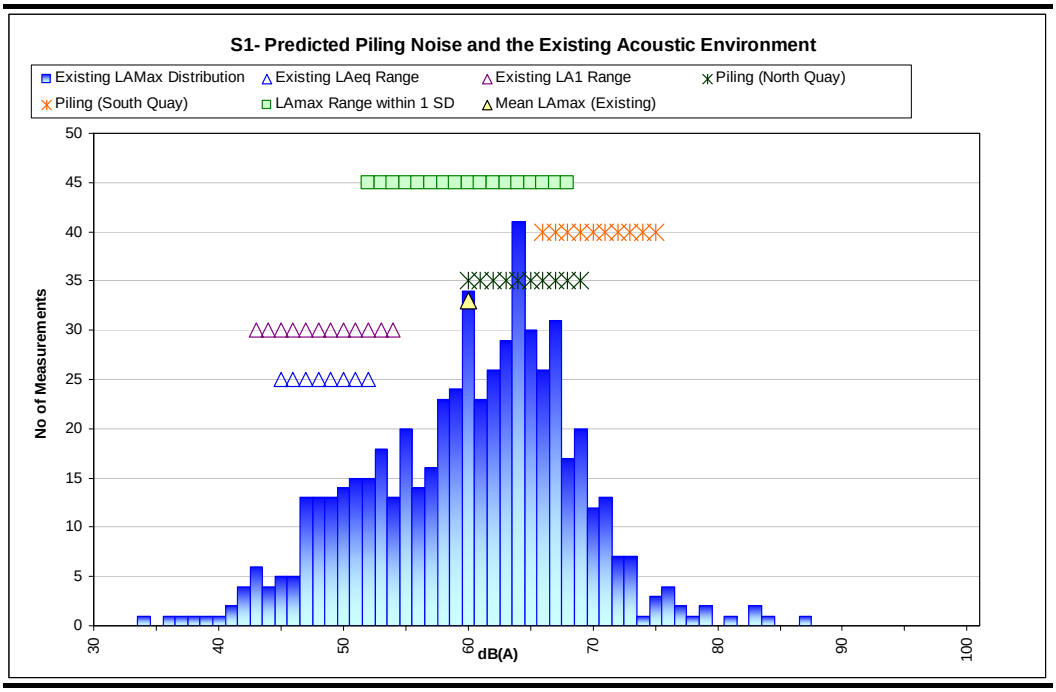
Note 1: Piling L_{AMax} noise level dependant on location (proximity to receptor) and level of mitigation

11.6.44 It is clear from *Table 11.23* that predicted unmitigated noise levels from piling at Killingholme Fields (S2 and S3) and NHKP (ECO_1) are less than the existing average L_{AMax} levels. There will therefore be no discernable noise effects from these levels at these sites.

11.6.45 Assuming baseline noise levels are relatively consistent along the foreshore, it is likely that the difference between the existing mean maximum noise level and predicted unmitigated piling noise levels would be representative of the increase in noise at other locations on the foreshore. Unmitigated piling noise levels that are higher than the baseline mean L_{AMax} noise levels are predicted along the foreshore at S1. This is illustrated further in *Figure 11.14.*

11.6.46 This shows that the predicted L_{AMax} noise levels at Killingholme Marshes Foreshore (S1), with piling occurring at the southern end of the quay, are largely towards the upper end and above the range around the recorded average (see also *Table 11.23*).

Figure 11.14 Predicted Piling LAMax Noise Levels and Existing LAMax Noise Levels S1



Graph displays the range of LAMax noise levels; this is dependant on distance from the noise source and to the level of mitigation being applied.

Table 11.24 Predicted Noise Levels Incorporating Partial and Full Mitigation

Site	Average LAMax dB(A)	Predicted LAMax Noise Levels with No, Partial and Fully Mitigated Piling (dB(A))		
		None	Partial	Full
S1	60	72	68	66
S2	68	64	61	59
S3	69	57	53	51
ECO-1	65	63	60	58

None- piles free standing, no shroud or completely lifted.
Partial- Incomplete enclosure of piles by noise shroud.
Full- Complete enclosure of piles down to water level.

11.6.47 A piling specialist has advised that the use of full mitigation will not be possible until the piling gate has been removed. This means that the majority of the piling work will only be possible with partial mitigation, and work could not commence with full mitigation in place.

11.6.48 The predicted LAMax noise level at the foreshore (S1) with partial mitigation is 68 dB (A), which is above the existing mean LAMax noise levels along the foreshore, being 60 dB (A). It is however, less than the highest recorded LAMax noise level recorded during the noise survey in December 2010. The predicted noise level with partial mitigation is

within the same category of predicted disturbance as the baseline mean L_{AMax} level as described in Cutts *et al* (2008b) (see *HRA, Annex F*). There will, therefore, be no discernable change to the existing situation, and hence the effects on birds are not expected to be any greater than they are at present. NE has confirmed that they will not be seeking any seasonal restrictions on piling activity.

11.6.49 This is further supported by ongoing monitoring of piling activities during works to replace a dolphin at the South Killingholme Oil Jetty on the foreshore on the south bank of the Humber Estuary in close proximity to the AMEP site, where large numbers of birds have still been observed on the mudflats (*pers. comm.* Darren Clarke, HINCA, 2011). It also matches with Able's own experience on the River Tees during the construction of the TERRC facility which found that construction including piling activities did not cause a major disturbance to waterfowl in the area, in areas approximately 400 m from the work (Scott Wilson, 2009). Only one major disturbance incident was recorded throughout the six week monitoring period. The majority of disturbance events were related to activities unrelated to piling activities.

11.6.50 The most significant source of vibration during the construction works will be from the installation of the tubular steel piling and sheet piling for the quayside wall. BS 5228 provides guidance for the prediction of an estimate of vibration from piling operations which is based on the energy per blow or cycle (determined by the type of piler and ram weight), the distance of the receptor from piling and generalised soil conditions.

11.6.51 Reference vibration levels from Table D8 Item C32 of BS 5228 for similar piling operations, indicated a measured Peak Particle Velocity (PPV) of 7.4 mm/s and 3.3 mm/s at plan distances of 27m and 55m respectively. The calculation formulae provided in Annex E of BS 5228 were adjusted to these measured values to calculate expected vibration emissions.

Table 11.25 Estimated Vibrations from Tubular Piling and Sheet Piling Operations

Threshold Value, PPV mm/s	Sheet Piling Plan Distance, m	Tubular Steel Piling Plan Distance, m		
		500 KJ	300 KJ	200 KJ
50	2	6	5	4
25	3	11	9	8
20	4	13	20	9
10	6	22	18	15
5	10	37	30	26
1	32	126	104	89
0.5	52	213	175	150
0.3	75	300	258	220

11.6.52 Ground vibration from pile driving is likely to be perceptible at the nearest sensitive receptors S1 and S2 when piling activities approach within a distance of 150 m to 300 m based on 500 KJ hammer energy, although a much smaller hammer is expected to be used.

11.6.53 Location S1 is potentially within 50 m of the nearest piling location and could experience vibration levels in the order of 5 to 10 mm/s. Such levels would be noticeable to human occupants and would normally result in adverse comments or complaints. In the absence of any information about effects on birds it has been assumed that birds would also perceive these vibrations and may be affected.

11.6.54 The predictions suggest that it is likely to be perceptible at the nearest sensitive receptors when piling activities approach within a distance of 125 m to 250 m based on 500 KJ hammer energy. As stated above it is likely that the main areas of intertidal mudflats which will be used by the birds during construction will be over 300 m from the works at their closest point. Hence ground vibration is not predicted to affect the birds.

Light

11.6.55 Light levels are relatively low along the Killingholme Marshes Foreshore with current lux levels measured at only 0.9 at the end of Station Road and up to 3.7 at the pump houses for the E.ON and Centrica power stations. These light levels are low in comparison to the wider area where light emissions are much higher at the Humber Sea Terminal, Immingham and further down towards Grimsby. At NKHP light levels were measured to be between 1.0 and 2.0 lux as a result of

the light emitted from the columns within the car storage area which is part of the AMEP site and unlikely to change following construction in terms of lighting. Light levels were also recorded at low levels across the Killingholme Fields between 0.2 and 1.1 lux encompassing the south-western edge of the MOD site, Station Road and down to the edge of Rosper Road. Visually disturbing activity in this area is in general low with farming being the main practice within the fields. Most activity is confined to the roads in this area.

11.6.56 With regard to light emissions it is currently understood that lighting column heights and lux levels (see *Chapter 19, Table 19.5*) for the area around the NKHP will not exceed those that are currently experienced. At the Killingholme Fields lighting will be erected around the edge of the site as well as close to the quay edge and these will increase the current lux levels from low levels currently experienced (lux of 0.3 to 0.9) to levels of up to 12 for the Killingholme Fields and between 30 lux to the North and 20 lux to the South of the Quay respectively. While these additional sources of lighting will illuminate the remaining mudflat adjacent to the Quay and the remaining Fields adjacent to the site it is thought that in the context of the heavily industrialised South Humber Bank these additional light sources are unlikely to significantly disturb remaining birds once they have become habituated to these new light sources. Furthermore evidence including before and after data from Santos *et al.*(2010) has shown that lighting of habitat used by foraging waders especially those who forage nocturnally can have a positive effect and for some species including dunlin, intake rate can be increased by an average of 83%. Examples where nocturnal feeding under lighting has been recorded in UK estuaries includes, the Tees Estuary, the Eden Estuary and more locally at the jetty at Saltend where no observable effect on bird use has been reported.

Impacts to Protected (Non-Qualifying) Species - Loss of Terrestrial Habitat

11.6.57 An area of arable, pasture and farmland mosaic habitat will be lost as a direct result of the proposed AMEP development. Green corridors will be maintained across the site as illustrated in the Indicative Masterplan (*Figure 4.2* in *Chapter 4*). However, the majority of the semi-naturalised habitat will be removed and replaced with gravel or hard standing. A brief summary of the habitat losses and their associated species is outlined below:

- permanent loss of 100.3 ha arable and semi-improved fields of site value (21.2 ha of this area is used by wintering and passage wader species as outlined above);

- permanent loss of ten ponds (three of which were confirmed to be dry);

- two of ponds to be permanently lost as a result of AMEP were found to support a medium population of great crested newts (which are European Protected Species)

- two of the ponds to be permanently lost as a result of AMEP were found to that support small populations of smooth newts;

- permanent loss of an neutral grassland and elm hedge, both of local value and included as part of a Local Wildlife Site;

- temporary loss of 4.8 km of water vole habitat within the AMEP site (see *Annex 11.12*);

- temporary loss of bat foraging and commuting habitat; and

- permanent loss of breeding bird habitat including the loss of species poor hedgerow network (see *Annex 11.12*), tall ruderal herb vegetation, sand and gravel area, arable/pasture fields and semi-natural woodland supporting 12 red listed bird species and one *Schedule 1* species.

11.6.58 The losses of the terrestrial habitats outlined above do not constitute significant losses within the context of the local or regional areas although some of these habitats are either BAP or LBAP listed. The only site of local value to be lost is the Station Road Local Wildlife Site (LWS) which consists of a neutral grassland strip, associated elm hedge and field ponds supporting great crested newts.

11.6.59 All other terrestrial habitats are only of site value (only valuable in the context of the site) although their importance is raised because they support a number of rare or protected species. As a result of this, species specific mitigation will be implemented to avoid significant effects.

Great Crested Newts

11.6.60 GCNs are present on the site and two ponds and all associated terrestrial habitat within 250 m will be lost as a result of the AMEP. GCNs are a BAP and LBAP species but are present throughout North Lincolnshire. The nearest other metapopulation is at East Halton to the North. This species is protected under European legislation,

appropriate mitigation will be required to reduce impacts to a negligible level (as described in *Section 11.9*).

Bats

11.6.61 All bats are protected under European legislation. In the absence of roosts however and with only low levels of activity within the site boundary, impacts on bats are unlikely to be significant, although some temporary loss of foraging area and disruption to commuting routes can be anticipated. Appropriate mitigation will be employed to reduce such impacts to a negligible level.

Water Voles

11.6.62 Water voles are protected under national legislation and are also BAP and LBAP listed. For this species impacts as part of the AMEP would include the temporary loss of 4.8 km of ditch habitat of which 2.6 km supports up to 5 breeding females within the AMEP site. While impacts to this species from this temporary habitat loss would be significant due to the protected status of the species under the *Wildlife and Countryside Act (1981)* as amended, mitigation will be employed so that impacts to this species are predicted to be negligible (see *Annex 11.12, Figure 11.2*).

11.6.63 Mitigation for this species was successfully implemented by Able on the AMEP site in 2005 and any works conducted as part of the AMEP would be expected to have a similar level of success and in fact enhance habitat for this species across the AMEP site.

Breeding Birds

11.6.64 Breeding birds will be affected throughout the AMEP site and as can be seen in *Table 11.12,* 48 species will potentially lose their breeding sites as a result of the works. Of these species 15 are BAP listed and 12 are red listed or are specifically mentioned on the Humber Estuary SSSI citation and include skylark, yellowhammer, song thrush, linnet, tree sparrow, turtle dove, cuckoo, grey partridge, willow tit, reed bunting, lapwing and yellow wagtail. Cumulatively for these 12 a total of 116 separate territories (taking each species peak from the 2007 and 2011 counts together) could be lost as a result of the AMEP development if no mitigation is undertaken. A change in crop regime has already reduced the number of territories for some species on the AMEP site (such as skylark from 44 to 28) and while most of these species are commonly present in North Lincolnshire and the wider Humber area, the loss of 116 territories of red listed species as well as others will constitute a permanent negative impact for breeding birds at Killingholme.

11.6.65 Little ringed plover was the only *Schedule 1* species recorded as breeding on the AMEP site (with two pairs present in the car storage compound). This species has also been recorded attempting to breed at the landward end of the Humber Sea Terminal immediately north of NKHP in 2011 *pers comm.* Tim Page, NE 2011. As shown by the choice of this species nest locations, industrial made ground habitat appears to be often preferred. In the context of the development it is expected that this type of habitat will be increased during construction and eventual habitat with potential for breeding will stretch across all the storage areas created for AMEP. While this species may be temporarily displaced during construction it is likely over the whole site that areas for breeding will still be present. Furthermore, as demonstrated by the breeding attempt outside of the AMEP site near the Humber Sea Terminal, birds displaced will still have other areas where they can potentially breed outwith the AMEP site. Barn owl was the only other *Schedule 1* species recorded on site and while this species has historically bred outside of the AMEP site no breeding has been recorded within AMEP and as such impacts to this species is thought to be unlikely.

11.6.66 Disturbance to Rosper Road Pool Local Wildlife Site is not currently believed to be a significant issue for the development. This site is located over 500 m from the proposed development and it is presently subject to raised noise levels due to its vicinity to the Rosper Road and the Immingham Dock (see *Chapter 16*). Regarding light impacts (see *Chapter 19*) lux levels at the pond are predicted to rise from 0.3 to 1 which is negligible and will make no difference to birds. Noise from construction is also predicted to be to a similar level to that currently experienced at the Rosper Road Pool (see *Chapter 16 Figure 16.1* for *receptor site S3*) and as such it is considered that impacts to this site will be negligible if generic mitigation is employed.

11.6.67 For the breeding birds listed above as impacts from habitat loss have already been addressed within the AMEP site it is thought unlikely that disturbance or displacement of species in the wider area will be significant. Construction works will be temporary and will be confined within the AMEP site meaning that impacts will be unlikely to significantly affect species in the wider area.

Operational Phase

11.6.68 Once constructed the main impacts from the development will be likely to result from operational activity causing disturbance or displacement to species including the prevention of access for foraging or roosting

sites. Operational activities with the potential to give rise to noise and visual impacts will include:

- movement of turbine structures;
- crane movement;
- boat movement to and from the new quay;
- train movements along railway line through NKHP;
- human activity;
- heavy plant noise from turbine assembly; and
- lighting across the site.

Impacts

11.6.69 No significant impacts are predicted from vehicle movement on or around the AMEP site. Majority of access route will be from Rosper road and hence deliveries to the site will predominantly be away from areas with bird interest. Subsequent movements on site will be by means of self propelled mobile transporters which do not, in normal operating conditions, generate significant noise and are very slow, therefore there will be no sudden movements which will reduce the risk of disturbance on birds in the vicinity of the AMEP site. Likewise crane movements will also be slow.

11.6.70 Vessel movements during operation will use identified navigation routes. The existing level of vessel movement in the Humber Estuary is high; the average number of vessel movements between 2005 and 2009 is estimated to be 27 825 vessels (see *Chapter 14*). Birds are present on mudflat and surrounding habitat in significant numbers despite existing boat traffic. This implies a degree of habituation to boat traffic. *Chapter 14* discusses levels of operational vessel movement and reports that these are only predicted to increase vessel movement on the Humber Estuary by 1.9 percent, therefore impacts to birds are not predicted.

11.6.71 Visual impacts from vehicle movements and site workers (which are most likely to cause disturbance to species) will be shielded from the site by the large bund as was the case during construction. During operation, the movement of turbine towers to the quay side could cause disturbance to species. However, the required slow pace of plant movement and the distance (over 200 m) from the Pits of the quay as well as the existing 2 m high screening from the bund will all mean impacts from this will be minimal to species. Implementation of good working practice would make it unlikely that additional disturbance to the roost site would occur, and no impact on conservation objectives or

favourable conservation status of species is therefore currently anticipated.

11.6.72 Impacts from train movement on the AMEP site will be restricted to NKHP. However, AMEP proposals for the train line which runs directly through NKHP do not include any additional usage beyond what is already consented, thus no additional direct impact is predicted on NKHP from the train line during operation.

11.6.73 Human activity will be restricted to quay area. Effects from the human activity will be no greater than construction and compensation has already provided for 6 ha of mudflat over which birds may be affected.

11.6.74 Operational noise levels have been assessed as described in *Chapter 16*. Predicted L_{Aeq} operational noise levels are within the range of existing baseline levels (see *Table 11.26*).

Table 11.26 Existing and Predicted LAeq Operational Noise Levels

Site	Existing L_{Aeq} Noise Levels (Db(A))		Predicted Operational L_{Aeq} Noise Levels (Db(A))	
	Day time	Night time	Day time	Night time
S1	49	46	46	46
S2	55	54	50	50
S3	58	57	38	38
ECO_1	53	48	53	48

11.6.75 Operational noise levels at each respective receptor are lower or equal to existing baseline levels recorded. Therefore, there will be no discernable change to the existing situation, and hence the effects on birds are not expected to be any greater than they are at present.

11.6.76 During the operational phase, the AMEP includes proposed lighting in the form of a 50 m towers fitted with directional light fittings to limit spill outside the working areas. Although there are a number of these towers, the extent of increased illumination is fairly restricted and confined to short distances from the site boundary. This is due to the fact that light levels drop off dramatically over distance. However, even though lux levels may reduce over distance, the apparent glow and possible glare may be observed at some distance by sensitive receptors. See *Chapter 19* for further details.

11.6.77 Operational light levels over Killingholme Marshes Foreshore are predicted to be higher than baseline levels (see *Paragraph 11.6.55* for baseline levels) local to the quay [cross ref to chapter 19]. Despite this rise in exposure to light impacts on birds utilising the remaining are of

mudflats during operation are not predicted to be significant given the context of the heavily industrialised South Humber Bank. In addition light sources are unlikely to significantly disturb remaining birds once they have become habituated to these new light sources.

11.6.78 Predicted operational lighting levels at the NKHP will be almost identical to baseline levels so impacts are not predicted, and light levels will remain the same from construction to operation as the quay will need lighting for safe working conditions as standard for an active dock. As stated previously it is thought that the lighting may in fact aid waterbird species (Santos *et al*. 2010), increasing their ability to forage along the remaining intertidal mudflat at night. Furthermore it is also thought that lighting will also create a safer high tide roost site in the area of saltmarsh predicted to form behind the new quay.

11.6.79 Light emissions at the remaining Killingholme Fields along the southern site boundary will be higher than the current baseline, ie from a baseline of 1.1 lux to predicted operational levels of 5 lux. Operation levels will be no higher than construction levels so it is unlikely that birds using the Killingholme Fields will be further affected during operation. As stated previously lighting may in fact be of benefit to species feeding on the fields at night. Further afield at the Rosper Road Pond, some 500 m away the increase in lux levels will be negligible from current baseline conditions and no impacts to species are predicted. In addition an operational buffer will avoid disturbance to birds on Killingholme Fields from AMEP. There will be strengthened planting of low shrubs / scrub around margins of mitigation area to further reduce the risk of disturbance from light emissions.

Protected Species (Non-Qualifying Features)

11.6.80 It is not considered that there will be any significant impacts on protected species from the operational phase of the Project.

11.7 MITIGATION

11.7.1 The following sections set out the mitigation measures which Able will implemented as part of the AMEP scheme.

Construction Phase – General

11.7.2 Contamination of habitats from spills or accidents during transportation of dangerous and/or contaminated wastes and goods during construction should be prevented. Best Practice Guidance

should be used including PPG 1 on storage and or use of hazardous materials.

11.7.3 In locations where works are likely to occur in or near watercourses particular care must be made to avoid contaminants entering the water column. Site compounds will be bunded, all chemicals stored in appropriate containers and the use of sediment or contaminant traps such as hay bales or booms in the water will be used if necessary. Wherever possible working in or near watercourses should be avoided, and where it cannot, work will be carried out using PPG 5 best practice.

11.7.4 Ecological awareness training will be provided in the form of a toolbox talk to all site contractors.

11.7.5 All vegetation removal should where possible be undertaken outside of the bird breeding season which, subject to local variation, is taken to run from 1 February to 31 August. If this is not possible, an Ecological Clerk of Works (ECoW) will supervise any vegetation removal and if an active nest is located it will have to be retained along with its associated vegetation until the end of the breeding season or the nest is vacated.

11.7.6 A daytime survey and assessment of trees will be undertaken prior to any felling to check for any use by roosting bats.

11.7.7 Dust suppression techniques as well as emission reduction Best Available Techniques (BAT) will be employed as outlined in *Chapter 17*.

11.7.8 Subject to monitoring verifying any need to do so, piling rigs will be fitted with noise shrouds to limit noise levels on the Killingholme Marshes Foreshore.

11.7.9 A mitigation area (Area A, see *Landscape and Ecology Masterplan, Annex 4.5*) which will comprise wet grassland to avoid impacts to foraging qualifying interest bird species from the European sites at high tides. This proposal is consistent with the South Humber Gateway Strategic Mitigation and has been agreed with NE. The area incorporates the key principles set out in the strategy.

- It is of suitable scale and identified as part of an overall strategic area in South Humber Bank.

- It is located in an area which is appropriate for the bird species based on the findings of the latest bird survey data.

- It is available and the management which relies largely on enhancements can be sustained.

- Access to the area is available from the Humber Estuary to the south and the east, as demonstrated by the flight lines from the surveys, and that the birds already access Area A directly from the Humber Estuary to the east was clearly recorded during the surveys (Catley, 2008). Whilst AMEP will lie to the immediate north birds will still be able to access from this side as there are large areas of open land for external storage within AMEP in the areas which immediately abut Area A.

- Able is committed to managing the land to retain the required type(s) of habitat as part of any consent.

- Able is committed to a programme of regular monitoring to confirm that the land functions for the birds in the way envisaged.

11.7.10 Mitigation Area A will be implemented in the southern part of the AMEP scheme, and will comprise a 16.7 ha core area with a 150 m surrounding buffer (including an operational buffer of 50m on the northern side adjacent to the working area within the AMEP site). Full details on the transformation of the existing arable habitats to grassland (taking account of available guidance(1)), the design and location of wader scrapes of variable depths, and the short and long term management and maintenance of the habitats to benefit wetland bird species and a monitoring programme will be agreed with NE. This habitat will be created prior to any significant area of existing terrestrial habitat of roosting and foraging value being lost. It is expected that Area A will provide suitable habitat for a range of other bird species. For example the scrapes will encourage a large amount of insects and are also good foraging habitat (especially when raising chicks) for some of the passerine species which are affected by AMEP including song thrush, yellow wagtail, tree sparrow, linnet and reed bunting (see *Table 11.12*).

11.7.11 Existing species poor hedgerows, some of which are gappy, are present in Area A. As the aim is to enhance the area for wetland birds any gaps in these hedgerows will not be in filled. If necessary the stretches that remain will be managed to keep them at a low level. Screen planting will be undertaken along the edge of Area A where it adjoins Rosper Road, to help reduce visual disturbance to wetland birds. However,

(1) White, G. (2006) RSPB *Information and Advice note, Arable reversion to wet grassland.*

only low level hedgerows/scrub will be used elsewhere around Area A to allow more open views.

11.7.12 Mitigation Area B comprises a small triangular shaped area of land between Chase Hill Wood and Rosper Road. Proposals have been drawn up by HINCA for the inclusion of this land into the Chase Hill Wood and Fox Covert Local Nature Reserve (LNR). The habitat enhancement and creation measures proposed as part of the AMEP scheme are in accordance with the aims set out by HINCA and would contribute to the inclusion of the Area within the LNR. Area B will provide mitigation for the terrestrial effects on terrestrial habitats and species affected by AMEP. In particular they will provide new pond habitat for great crested newts, the conversion of the existing arable habitat to future species rich grassland, enhancement of the hedgerow, scrub and ditch habitats and to provide nesting and foraging opportunities for bird species. Nest boxes for birds will be provided in the surrounding scrub / woodland habitats subject to approval of the landowners.

11.7.13 Further details about mitigation Areas A and B, the habitat to be retained on site and the new green corridors which will be created across the AMEP site, are shown on the *Landscape and Ecology Masterplan (*see *Annex 4.5*). All land within the mitigation areas is or will be, owned by Able.

Great Crested Newts

11.7.14 Six new ponds will be created to replace three ponds lost to AMEP in accordance with the guidance set out in the Great Crested Newt Mitigation Guidelines (English Nature, 2001). The new ponds will be located in Area B (approximately 1 km from the existing ponds) and will comprise two ponds of 400 m^2 and four ponds of 100 m^2. The six new ponds will be suitable to support great crested newts in advance of any translocation works and loss of the existing ponds, and will be developed a minimum of 6 months before they are to be used as breeding ponds by the newts to allow them to establish. They will be clay lined and after initial filling will get all additional water from rainwater and surface water run off. Plant species will include species which are present within the ponds to be lost and supplemented by other species local to Lincolnshire which are known to be used by great crested newts for egg laying. All proposals will be subject to consultation and agreement with Natural England as part of the licence application process, and implementation will be subject to the requirements of any licence granted by them.

11.7.15 The existing arable habitat within Area B will be converted to permanent grassland and improve the surrounding hedgerows and verges. In addition refugia (eg rock piles, rubble, wood piles) will be created within the core area (ie a 50 m radius of the pond) of the great crested newt's territory to supplement the terrestrial habitat. This will benefit newts in their terrestrial stages, and Area B also lies close to blackthorn thicket, which is in the process of succession into woodland. A permanent amphibian proof barrier around the woodland edge to the south, west and east extending up to 250 m from the new ponds in order to minimise the risk of great crested newt mortality on the adjacent roads to the south and east. The ponds will be separated from the current ditch watercourse system to avoid any fish entering the ponds as these could prey on the newt larvae.

11.7.16 It is unlikely that habitats within the LNR will be to subject to the degree of change than can result to habitats in agricultural environments and therefore the exclusion, capture and translocation of the GCN to this safeguarded long term receptor site, will result in the favourable conservation status of the species being maintained.

11.7.17 The location is connected by way of semi natural habitat northwards to the East Halton area where there is a further meta-population of GCNs. One meta-population was recorded in 2006 (grid reference, TA 14256 19390; around 1.6 km from the proposed new pond location) in a man made lake and two associated ponds by Just Ecology (2006).

11.7.18 Despite the more restricted area which is available to great crested newts in and around the new location, there is an equivalent if not greater area of favoured habitat within 500 m due to the more extensive areas of broad-leaved semi-natural woodland (0.002 ha), scrub (0.0005 ha), verge and hedgerow habitat.

11.7.19 The ponds will be monitored for four to six years as determined from the findings of the population size class assessment (undertaken during the spring of 2011) as required, following NE guidance (English Nature, 2001) including an annual population size class assessment survey. Habitat management both of the pond and surrounding terrestrial habitat will be undertaken where necessary.

11.7.20 A further two ponds which support smooth newts only (ponds 8 and 13) will be lost during construction of AMEP. The smooth newts from these ponds will also be trapped and moved to the location of the newly created ponds for the great crested newts in Area B.

Water Voles

11.7.21 The main stretches occupied by water voles are in the drains in the north west of the AMEP which were engineered by Able in 2005 as part of a previous development. These stretches of drain will be retained within the AMEP development.

11.7.22 A 3 km stretch of the central drainage feature will be realigned to the west of the existing north-south watercourse prior to the loss of the existing ditches supporting water voles.

11.7.23 The new realigned ditch system within the AMEP site will be created in advance of loss of existing habitat (up to 12 months). It will link in with unaffected parts of the existing north-south watercourse and via this into the other ditches which support water voles that will be lost. Habitat management (eg incremental strimming of vegetation) will be undertaken to displace water voles from the existing ditches and into the newly created habitats. Translocation under licence from NE (during spring and early summer (mid-March to mid-June) will only be used as a last resort (NE, 2008).

11.7.24 The approach to mitigation has taken account of current published best practice guidance (Strachan & Moorhouse, 2006), and the creation of the new habitat used successfully on the engineered drains in the north west of the AMEP by Able back in 2005. The drains that Able created in 2005 have been found to support more water voles than the habitat that was lost.

11.7.25 The main north-south ditch running through Area A already supports good numbers of water voles. Area B also contains a number of drains, and where these are not overshadowed they are quite species diverse, and the water quality appears reasonable (HINCA, 2010). The enhancement measures will include clearance of in water vegetation where areas of open water have been lost, and surrounding vegetation where it is resulting in overshading. However, vegetation surrounding the water which provides cover from predators (eg rough grassland) and food for water voles will be encouraged. As a result there will be a net increase of habitat created for water voles (approximately 450 m of water vole habitat) (see *Annex 11.12, Figure 11.2*).

Bats

11.7.26 The AMEP design includes the retention of green corridors across the site to encourage commuting and foraging bats, especially between NKHP, Burkinshaw's Covert, Area A and Rosper Road Pools, and the

creation of new corridors across both the AMEP site and Area A to improve habitat for bat foraging and commuting. The provision of trees will also provide roosting opportunities for bats in the long term as mature trees decay.

11.7.27 The Landscape and Ecology Masterplan Drawing (see *Annex 4.5*) shows the new tree corridors which will be created through the planting of new tree belts, avenues of trees, hedgerows, and realigned ditches and provision of new rough grassland strips. The new planted corridors also seek to link existing semi-natural habitat at Burkinshaw's Covert and habitat on the north side of Rosper Road, using hop-overs to facilitate crossing over the road (see *Figure 11.15*). As a key focus of the measures within Area A is to provide mitigation for wetland bird species which require more open areas, planted green corridors in Area A will be largely be around the margins.

11.7.28 Enhancement of drains and green corridors within Area B will provide further opportunities for bat species. Bat boxes suitable for use by the bat species identified during the surveys (common and soprano pipistrelles, brown long-eared, Noctule/Leislers', Myotis) will be erected on suitable trees in this area in agreement with NE and NLC.

11.7.29 Lighting across the AMEP will also be directed away from green corridors and where necessary be of a type that will reduce the risk of impacts on commuting and foraging bats.

Figure 11.15 Indicative Design of Hop-Over Planting to Aid Bat Commuting Across Roads

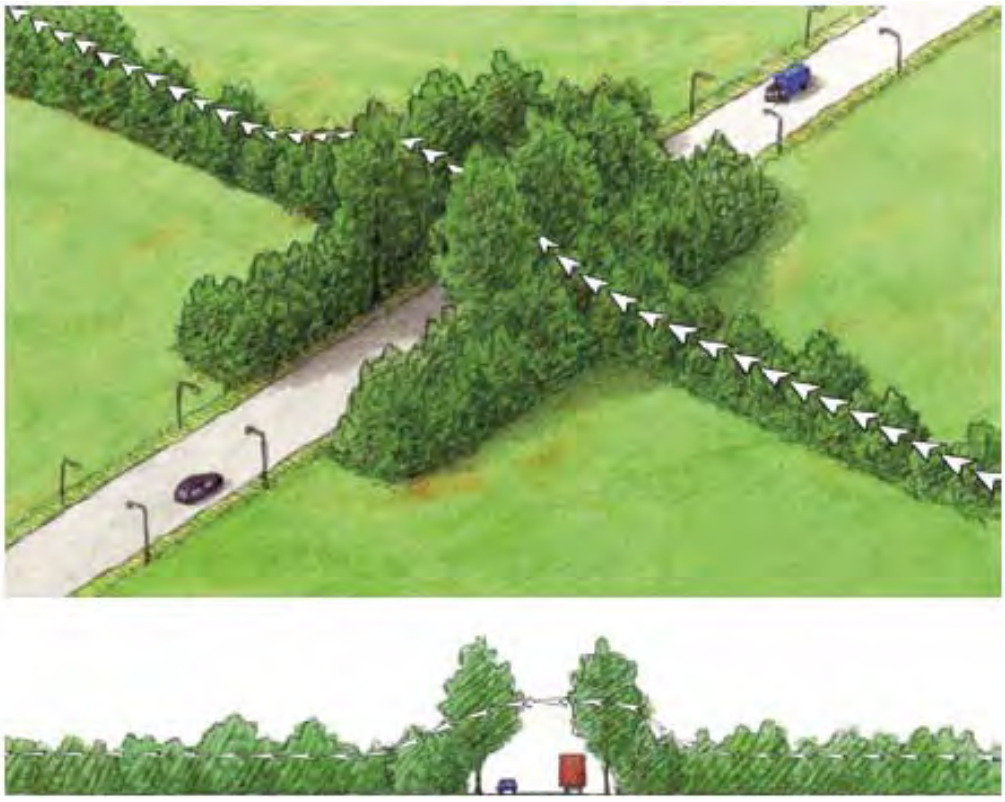


Figure taken from Limpens *et al.*(2005)

Breeding Birds

11.7.30 The mitigation for breeding birds within the developed areas of AMEP includes the creation of a number of edge habitats in the form of green corridors (see separate *Landscape and Ecology Masterplan in Annex 4.5*). These will include new tree belts, avenues of trees, hedgerows, scrub, rough grassland and enhanced ditch corridors which will be bordered by rough grassland and with hedgerow and trees in places at the outer edge of the rough grassland. Hedgerows will not be planted adjacent to the ditches in Area A as the aim is to maintain as much open habitat as possible in this area. The tree, scrub and hedgerow species planted will include berry producing trees to provide foraging opportunities for the birds over the autumn and winter months. These corridors will also provide nesting opportunities for many of the breeding bird species affected by the AMEP proposals in the medium to long term. In some areas semi-mature trees will be used in the planting to provide more immediate opportunities.

11.7.31 The focus of Area A is on the provision of wet grassland habitat for wintering waders (especially curlew), but this habitat type will also accommodate a number of the breeding bird species affected by AMEP, including breeding lapwing. The wader scrapes which will be created

in the wet grassland will attract insects which are important for many of the breeding bird species when they are feeding young. The wet grassland and ditch habitats will attract song and mistle thrush, yellow wagtail and reed bunting. Swallows will also forage on the insects which congregate around the wet scrapes. Skylarks will also use the open areas in grassland habitat, only tending to avoid areas within 10 m of the field boundaries. The grassland fields will be managed, to help create the tussocky swards that skylark and meadow pipit prefer for nesting. Area B will also include a small area where the existing arable fields will be converted into species rich grassland.

11.7.32 Where new hedgerows will be created along the eastern and southern edges of Area A, these will be managed to maintain them at a low height for the same reason. Low hedgerows will also avoid creating any obstacles to waders flying to these fields from the Humber Estuary and maintain the current routes that these birds use to the east. A tree belt will be planted along the western boundary of Area A adjacent to Rosper Road. This will comprise taller trees to help screen the birds from highway traffic.

11.7.33 Unmanaged strips of between two and six metres wide will be created in the edge of the fields adjacent to the inner side of the hedgerows. This will support species such as grey partridges, tree sparrows, linnets and reed buntings.

11.7.34 A range of measures will also be implemented in Area B which will enhance the foraging and nesting habitat for the breeding bird species affected by the scheme as listed below.

- Conversion of existing arable field to species rich grassland.
- Enhancement of the existing roadside and field drains.
- Enhancement of the existing hedgerows around Area B.
- Management in the western part of the Area B, especially the control of *Acer psuedoplatanus* (sycamore), where there is ongoing succession from thorn thicket to woodland.
- Creation of six new ponds in Area B to mitigate for the loss of two breeding ponds and one pond in close proximity that could potentially be used as a foraging site.

11.7.35 Nest boxes for tree sparrows will be erected on mature trees in or around the margins of the existing Chase Hill Wood LNR. A total of 10 boxes will be provided which will accommodate the four pairs lost and provide additional opportunities for expansion of the colony. Barn owls and kestrels have both been recorded within the Killingholme area, and nest boxes for these species will also be provided, as nest sites

are often the limiting factor for these species. The location of the nest boxes will be agreed with LWT and be subject to a prior survey to confirm current usage of the area by these species. Barn owls favour rough grassland habitat including that along watercourses, and a suitable location for the barn owl box could be the in Area A close to the rough grassy strips along the ditch margins, and in adjacent fields of Area A and to the south.

Station Road Fields Local Wildlife Site

11.7.36 The Station Road Fields Local Wildlife Site is situated within AMEP and as such this area will be completely lost during the proposed works. While initial plans were created to retain some of this site, following consultation with North Lincolnshire Council it was decided that within Mitigation Area A an area of equal size (at least 1.7 ha) would be managed to provide a neutral grassland of similar quality and function. This will be located to the south of the oil pipeline at the southern boundary of AMEP as well as around each of the pasture fields as grassy margins which will also be managed as neutral grassland. This habitat will be planted up with a seed mix either collected (if possible) from the existing station road fields) or from a specially chosen seed mix. As the primary aim for Mitigation Area A will be for wetland bird species, hedges in this area will not be enhanced. However, as the elm hedge which is part of the Wildlife site will be lost, standard elm trees will be planted within Area A (of a resistant cultivar) which will provide habitat for the locally BAP listed white-letter hairstreak.

Operational Phase Mitigation

11.7.37 Monitoring Surveys for wetland bird species (and intertidal benthic habitats) will be undertaken in accordance with an approach agreed with NE.

11.7.38 Directional luminaires to limit spill outside the working areas of the newly created quay will be employed so that as much light as possible is kept off the remaining intertidal mudflat and lower (30 m compared to 50 m) lighting towers will be retained in the existing car parking area closest to NKHP. These methods are currently employed by Able elsewhere on site and reflect continuation of established good practice. As stated previously it is not thought impacts to birds utilising mudflat will be significant, and any light spill may in fact improve feeding opportunities.

11.8 RESIDUAL IMPACTS

Construction Phase

Estuary Habitat

11.8.1 There will be direct and indirect loss of 55.5 ha of the Humber Estuary European Marine Site designated as an SAC, Ramsar Site and SSSI (a net loss of 61.3 ha of SPA habitat due to the additional functional loss of 6 ha) See *Paragraphs 11.6.9* to *11.6.12* and *Table 11.16* and *Table 11.17*. These losses cannot be mitigated and therefore residual impacts to the Killingholme Marshes intertidal and sub-tidal habitats will be significant and likely to affect the integrity of the site. As a consequence compensation will be required to offset this impact.

Wetland SPA Qualifying Bird Species and Assemblage

11.8.2 Wetland bird species will be affected in two ways during construction, firstly the direct loss of feeding, staging and loafing habitat at Killingholme Marshes Foreshore intertidal mudflat and feeding /roosting resource of wetland birds on the Killingholme Fields and secondly by way of disturbance and displacement of wetland birds utilising the remaining Killingholme Marshes Foreshore intertidal mudflat and the Killingholme Fields.

11.8.3 Mitigation such as using low noise and vibration equipment and directional lighting will reduce impacts. However, due to the loss of over 60 percent of the feeding resource used by individually qualifying and SPA assemblage species impacts are likely to remain significant.

11.8.4 In addition to the above impact from habitat loss, impacts from construction causing disturbance and displacement of species will be of importance. During construction it is predicted that birds will be temporarily displaced from a further 6 ha compensation will be required to maintain favourable conservation status for species.

11.8.5 At NKHP direct impacts from construction activity causing disturbance and displacement to species will be largely insignificant. Baseline studies of noise emissions have shown that species utilising the Pits are currently habituated to relatively high noise emission levels and those predicted during construction and especially during operation are well within the daily range experienced at the site.

11.8.6 However, indirect impacts associated with the loss of the Killingholme Marshes Foreshore intertidal mudflat may have the potential to affect

the usage of NKHP as a roost site. While some evidence exists which shows that birds do move between NKHP and other parts of the estuary, eg dunlin, it is possible that the loss of the link with Killingholme Marsh Foreshore may cause a decline in bird numbers at NKHP roost site. Given the large numbers of birds roosting at this site even small declines are likely to be significant and contrary to the conservation objectives. Numbers of black-tailed godwit and possible redshank may be lost from NKHP due to the loss of adjacent feeding resources on Killingholme Marshes Foreshore. Due to the fact that the loss of these species from NKHP is linked to the loss of Killingholme Marshes Foreshore it is not possible to mitigate for the potential residual impact in terms of the birds use of NKHP as a roost site. Therefore a significant residual impact is predicted. However, compensation habitat provided on the northern bank is expected to provide suitable foraging and roost sites for these species (see *Chapter 9* of the *HRA* for further details).

Terrestrial Habitat

11.8.7 On completion there will be the loss of 100.3 ha of semi-natural habitat within the AMEP site. This habitat is dominated by a number of arable and pasture fields. The majority of this habitat to be lost is only of site value and only the Station Road Fields LWS is of local value for the AMEP site. This area will be fully mitigated with the provision of an equally sized area managed and planted up in a similar fashion to negate the loss of the neutral grassland and associated hedgerow habitat. Following this mitigation and the further provision of Mitigation Area A and Area B as well as the greening of the AMEP site itself, it is thought that there will be no significant residual impacts associated with terrestrial habitat loss itself. This habitat does however support a number of protected species and residual impacts for these have been examined separately below.

Protected Species

11.8.8 A number of protected species have been recorded across the terrestrial site including GCNs, water voles, bats and breeding birds. Mitigation for most of these species has been fully provided within the AMEP site or within the dedicated Mitigation Area A and Area B. Of the protected species, residual impacts have been largely mitigated for. However, even after mitigation, due to the large extent of the AMEP site and the required 100.3 ha land take from terrestrial habitat it is likely that permanent negative impacts will remain for some breeding bird species including redlisted species such as skylark, linnet, tree sparrow and willow tit.

11.8.9 Mitigation plans for both GCNs and water voles will be created in order for any future translocation or trapping to be undertaken under licence and it is believed that provision of these plans will be adequate to reduce impact levels to a negligible level and water vole mitigation may in fact enhance habitat in the long term.

11.8.10 Overall it is not thought that there will be any residual impacts associated with protected species across the AMEP site other than for breeding birds.

Operational Phase

Estuary Habitat

11.8.11 Once operational and following mitigation and provision of the Compensation Site some further erosion or accretion of sub-tidal and intertidal sediments around the quay may occur over the life of the project. However, these potential losses will have been dealt with by prior mitigation and compensation for the construction phase of the Project.

Wetland Bird Species

11.8.12 Mitigation will have been put in place in terms of NKHP and the remaining Killingholme Marshes Foreshore intertidal habitat in terms of operational activities. In addition measures could include biodiversity enhancement to improve the management of NKHP as per NE's own management guidance (2004). It is not thought there will be any residual impacts associated with the operational phase of the Project to remaining wetland bird species.

Terrestrial Habitat

11.8.13 A conservation management plan will help ensure that ongoing mitigation is implemented across the AMEP site and it is considered unlikely that there will be significant residual impacts to terrestrial habitats as a result of operational activities.

Protected Species

11.8.14 During construction a number of thorough species specific mitigation measures will be implemented which will be on-going into the operational phase of the Project. This will ensure mitigation is continued and will also mean residual impacts will not be significant.

11.9 CUMULATIVE IMPACTS

11.9.1 The following section addresses the potential for the AMEP project to act cumulatively with other projects in the region to cause a significant impact on habitats and species. A full list of projects that have been considered in this assessment can be found in *Annex 2.3*.

European Designated Sites and Wetland Bird Species

11.9.2 This section considers the effects on the European sites from the development of the AMEP scheme acting cumulatively with other proposed developments in the area. The findings of the assessment show that AMEP will have a significant effect on the European sites of the Humber Estuary. As a result compensation measures or mitigation measures will be implemented to maintain the integrities of these European sites, and hence the Natura 2000 network of which they are part (see *Volume 2*). These measures will offset the impacts of AMEP on all habitats and species where adverse effects have been identified in this chapter.

11.9.3 The wetland bird species which are affected by AMEP occur in three locations, Killingholme Marshes Foreshore, NKHP and Killingholme Fields. At Killingholme Marshes Foreshore, the compensation measures have been agreed with NE that will provide new habitat to replace that which is lost from direct effects, indirect effects and where there will be a functional loss for birds. As a result there will be replacement habitat for all bird species that the surveys identified using the areas to be lost, including those species present in numbers <1 percent of their Humber Estuary population. Hence cumulative effects are not predicted. Similarly at Killingholme Fields a mitigation area has been agreed with NE which will provide a safe and secure area for the wetland bird species which are affected by AMEP. As a result cumulative effects are not predicted.

11.9.4 The only wetland bird species which are likely to be subject to cumulative effects are those at NKHP. The AMEP development, which is the subject of this application, borders NKHP on the southern and western sides, and the Humber Estuary adjoins NKHP to the east. The northern side of the NKHP is already dominated by existing industrial / commercial development. The proposed developments such as the IGCC Power Station, the Ursa Glass Wool Factory and the bio-ethanol plant will not have any direct effects on NKHP and on current information none appear to be located close enough to NKHP to result in any significant disturbance effects, and in-combination effects are not predicted. Other development in the northern area is being undertaken

by Able and is the subject of a comprehensive mitigation package that is consistent with the ecological mitigation strategy for the South Humber Gateway and has been agreed with NE and RSPB.

Terrestrial Habitats

11.9.5 The wide availability of similar farmland habitat in the region and the development of new habitats, especially grassland, as part of the mitigation plans will result in no significant cumulative impacts. In addition the AMEP proposal incorporates a number of enhancement measures including the provision of new green corridors within the AMEP site.

Breeding Birds

11.9.6 The AMEP scheme will seek to retain as many farmland bird species as possible by providing mitigation on site within AMEP as well as in the dedicated mitigation areas of Area A and Area B. Some cumulative loss may result on farmland species such as skylark, however this species is common in the local area and as Able are incorporating mitigation for this species in all of their schemes a significant impact is not predicted.

Bats

11.9.7 Due to the mitigation measures which will be implemented as part of the AMEP project it is unlikely that other projects will result in significant cumulative impacts (see *Paragraph 11.7.26* to *11.7.29* for mitigation details).

Great Crested Newts

11.9.8 Ponds lost to AMEP will be fully mitigated for by replacement of ponds on a two to one basis in Mitigation Area B. Further to this there will be enhancement of terrestrial habitat surrounding the new ponds and future safeguarding of these areas. Hence, the likelihood of significant cumulative impacts is not predicted.

Other Species

11.9.9 There will be no cumulative impact on other species such as badgers or reptiles, as none were recorded on the AMEP site.

Summary

11.9.10 Based on the above assessment no significant effects from AMEP acting cumulatively with other proposed developments are predicted.