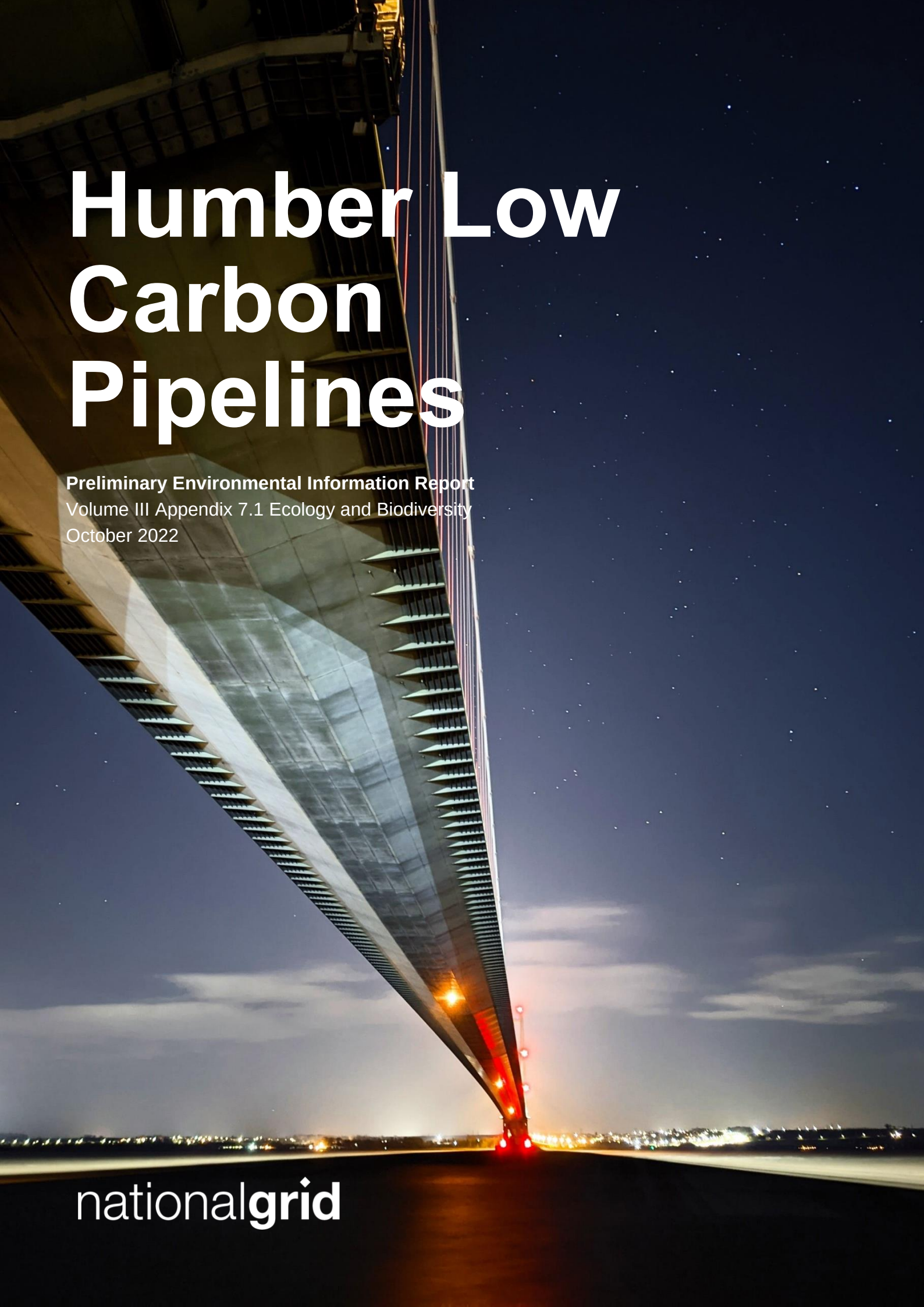


# Humber Low Carbon Pipelines

**Preliminary Environmental Information Report**
Volume III Appendix 7.1 Ecology and Biodiversity
October 2022

nationalgrid

# FOREWORD

The Humber Low Carbon Pipelines (HLCP) project (the 'Project') is being developed by National Grid Carbon Limited ('the Applicant'). It comprises the construction of dual pipelines to transport carbon dioxide (to facilitate carbon capture, utilisation and storage) and hydrogen between Drax in North Yorkshire to a landfall point at Easington in East Riding of Yorkshire together with associated above ground installations (AGIs).

This Conservation Strategy is a live document which may be subject to change as the Project develops and through consultation with stakeholders and strategic partners. It will also be informed as a greater understanding of the range of ecological features (habitats, species and ecosystems, including ecosystem function and processes) associated with the Project is achieved through survey and assessment.

The overarching objective of this Conservation Strategy is to drive landscape scale biodiversity enhancement i.e. striving for more, bigger, better and more joined up habitats, in line with *Making Space for Nature* (Ref 7.1.1), focusing on an area larger than the Proposed Order Limits through well-planned connectivity and design. It draws on recent guidance and policy changes (see Section 2 of Chapter 7: Ecology and Biodiversity) and focuses on creating a Net Gain package that demonstrates greater benefit to affected Important Ecological Features (IEFs), in return for proportionality of survey effort where the ecological impacts of development can be predicted with sufficient certainty.

The aims of this Conservation Strategy are to:

- Set out the Applicant's approach to net gain (in terms of biodiversity and natural capital) as part of the Project and maximise opportunities for biodiversity enhancement delivered by the Project;
- Identify habitats and species across the Proposed Order Limits that are of national, regional and local importance and outline a plan of action for their protection, management and enhancement in adherence to the mitigation hierarchy (i.e. firstly seeking to avoid effects etc.); and
- Demonstrate how the Applicant will measure their commitments to nature conservation throughout construction and aftercare by providing a framework for maintenance and monitoring.

The Conservation Strategy is separated into three separate Parts as follows:

**Part A – Biodiversity Enhancement Strategy**

The Applicant is committed to the delivery of Net Gain: Biodiversity Net Gain (BNG; calculated using Defra Biodiversity Metric) and the enhancement of Natural Capital Value (NCV). The Biodiversity Enhancement Strategy (BES) will include BNG calculations but also seeks to deliver biodiversity improvements beyond these with a focus on habitat and species-specific habitat enhancement and complementary habitat creation.

**Part B – Ecology Surveys: Scope and Methodology**

This part sets out the proposed scope and methodology for undertaking ecological surveys of fauna and flora associated with the Project, providing a standard for methodologies to ensure a

consistent approach in baseline ecological field surveys, facilitate a robust but proportionate Ecological Impact Assessment (EcIA), and inform the BES.

**Part C – Biodiversity enhancement and management plan**

This part details the mechanism to secure the protection, enhancement and provision of proposed biodiversity improvements, including maintenance and monitoring commitments. The biodiversity enhancement and management plan will include a Land Reinstatement Plan, which will record key changes to the habitats, biodiversity and key features impacted by delivery of the Project. Any commitments to ensure the delivery of the biodiversity enhancement and management plan would be documented in a Register of Commitments and submitted as part of the development consent order application to the Planning Inspectorate; however, the final biodiversity enhancement and management plan will be developed post development consent and in advance of construction. A Construction Environmental Management Plan (CEMP) will be developed as part of the Project and although the biodiversity enhancement and management plan may include some overlap of information, the CEMP will focus on mitigation of impacts from and during construction.

# GLOSSARY

| Term | Definition |
|---|---|
| Above Ground Installation (AGI) | Infrastructure sited above ground at or near emitter locations allowing safe and efficient operation and maintenance of the pipelines and/or for regional emitters to connect into the pipelines. |
| Baseline | The conditions that would pertain in the absence of the Project at the time that the Project would be constructed. |
| Biodiversity | The variability among living organisms from all sources, including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part: this includes diversity within species, between species and of ecosystems. |
| Biodiversity Enhancement and Management Plan | A document detailing the mechanism to secure the protection, enhancement and provision of proposed biodiversity improvements, including maintenance and monitoring commitments. |
| Biodiversity Enhancement Strategy (BES) | A document identifying strategic opportunities and targets to improve habitat quality, connectivity and ecosystem services, including the delivery of Net Gain. |
| Biodiversity Net Gain (BNG) | An approach to development and/or land management that aims to leave the natural environment in a measurably better state than it was beforehand. |
| Biotope | An area of uniform environmental conditions providing a living place for a specific assemblage of plants and animals. |
| Carrying capacity | The maximum number of organisms or amount of biomass that can be supported in a given area or by an ecosystem. |
| Compensation | Measures taken to offset the loss of, or permanent damage to, ecological features despite mitigation. Compensation addresses negative effects which are residual, after avoidance and mitigation have been considered. Depending on circumstances, compensation measures may be located within or outside of the Proposed Order Limits. |
| Connectivity | A measure of the functional availability of the habitats needed for a particular species to move through a given area. Examples include the flight lines used by bats to travel between roosts and foraging areas or the corridors of appropriate habitat needed by some slow colonising species if they are to spread. |
| Conservation status | The state of a species or habitat including for example, extent, abundance, distribution and their trends. |
| Construction Environmental Management Plan (CEMP) | A document detailing how the Project will mitigate potential construction impacts on the environment. |

| | |
|---|---|
| Derogation licence | A legally binding permit for activities that would otherwise be permitted under the Conservation of Habitats and Species Regulations 2010 (as amended). |
| Development Consent Order (DCO) | An order made under the Planning Act 2008 granting development consent for one or more Nationally Significant Infrastructure Projects (NSIPs). |
| Discretionary Advice Service (DAS) | An advisory service offered by Natural England for complex development proposals that affect the environment. The DAS offers tailored advice aiming to reduce potential risk, delay and added cost. |
| Ecological feature | Habitats, species or ecosystems. |
| Ecological Impact Assessment (EcIA) | The process of identifying, quantifying and evaluating potential effects of development-related or other proposed actions on habitats, species and ecosystems. |
| Ecosystem | A dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit. |
| Ecosystem services | The benefits provided by ecosystems that contribute to making human life possible and valuable. They include products or “goods” for example food, water and timber, and non-material benefits or “services” for example recreation and tourism. |
| Effect | Term used to express the consequence of an impact. The significance of an effect is determined by correlating the magnitude of the impact with the importance, or sensitivity, of the ecological feature in accordance with defined significance criteria. |
| Environmental Impact Assessment (EIA) Directive | European Union Directive 2011/92/EU of 13 December 2011 (as amended in 2014 by Directive 2014/52/EU). |
| EIA regulations | The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. |
| Enhancement | Improved management of ecological features or provision of new ecological features, resulting in a net benefit to biodiversity, which is unrelated to a negative impact or is ‘over and above’ that required to mitigate/compensate for an impact. |
| Environmental Statement (ES) | A document reporting the findings of the EIA and produced in accordance with the EIA Directive as transposed into UK law by the EIA Regulations. |
| European Protected Species (EPS) | Plant or animal species receiving full protection under the Conservation of Habitats and Species Regulations 2010 (as amended). |
| Extended Phase 1 habitat survey | A standardised system for classifying and mapping habitats. |

| | |
|---|---|
| Habitat | The place or type of site where an organism or population naturally occurs. Often used in the wider sense referring to major assemblages of plants and animals found together. |
| Habitats Regulations Assessment (HRA) | A process which helps determine likely significant effects and (where appropriate) assesses adverse impacts on the integrity of European sites, required under the Habitats Directive and Regulations. The process consists of up to four stages of assessment: screening, appropriate assessment, assessment of alternative solutions and assessment of imperative reasons of over-riding public interest (IROPI) and compensatory measures. |
| Impact | Actions resulting in changes to an ecological feature. For example, the construction activities of a development removing a hedgerow. |
| Impact Risk Zone (IRZ) | A GIS tool developed by Natural England to make a rapid initial assessment of the potential risks to SSSIs posed by development proposals. They define zones around each SSSI which reflect the particular sensitivities of the features for which it is notified and indicate the types of development proposal which could potentially have adverse impacts. |
| Important Ecological Feature (IEFs) | Ecological features requiring specific assessment within EcIA. Ecological features can be important for a variety of reasons (e.g. quality and extent of designated sites or habitats, habitat / species rarity). |
| Key Reptile Site | Sites meeting specified criteria characterising the importance of the reptile population/s present. |
| Keystone habitat | Habitat of high intrinsic ecological value and of principal importance for the conservation of biodiversity. Keystone habitats are central to the framework of the Conservation Strategy. |
| Macro-invertebrate | Invertebrate species large enough to see without a microscope and often with at least one aquatic life-stage. |
| Marine Conservation Zone (MCZ) | Offshore and coastal marine protected areas designated under the Marine and Coastal Access Act, 2009. |
| Mean Low Water Springs (MLWS) | Averaged lowest spring tidal level. Designates the boundary between the jurisdiction of the onshore and offshore projects. |
| Mitigation | Measures designed to reduce and/or eliminate Likely Significant Effects (LSEs), in EIA terms. |
| Nationally Significant Infrastructure Project (NSIP) | Major developments relating to, for example, energy, transport, water or waste, as defined in the Planning Act 2008. |
| Natural Capital Value (NCV) | The value of that part of nature which directly or indirectly underpins benefits to people, including ecosystems, species, freshwater, soils, minerals, the air and oceans, as well as natural processes and functions. |
| Net Gain | Measures which are over and above those implemented to reduce the effects arising from development activities. |

| | |
|---|---|
| Night Vision Aid (NVA) | Night vision, thermal imaging or infra-red cameras, used to assist with the visual identification of bat roosts during low light conditions |
| Non-Native Invasive Species (NNIS) | Species which have been introduced into areas outside their natural range through human actions and are posing a threat to native wildlife |
| Orthophoto | A large, map-quality image with high detail and resolution made by combining many smaller images called orthophotos. These orthophotos are aerial photographs that have been corrected for lens distortion, camera tilt, perspective, and topographic relief. |
| Patch quality | An approach to ecological management focusing on the quality of discrete habitat patches which contributes to the maintenance of the structure, function and dynamics of the wider ecosystem. |
| Potential Roost Feature (PRF) | A feature within a structure or tree that is suitable to be used by roosting bats. |
| Preliminary Ecological Appraisal (PEA) | A rapid assessment of the ecological features present, or potentially present, within a site and its surrounding area in relation to a specific project (usually a proposed development). A PEA normally comprises a desk study and a walkover survey.<br>The key objectives of a PEA are to identify the likely ecological constraints associated with a project, identify any mitigation measures likely to be required, following the 'Mitigation Hierarchy', identify any additional surveys that may be required to inform an EcIA and identify the opportunities offered by a project to deliver ecological enhancement. |
| Preliminary Roost Assessment (PRA) | A detailed inspection of a structure/tree to look for features that bats could use for entry/exit and roosting and to search for signs of bats. The aim of this survey is to determine the actual or potential presence of bats and the need for further survey and/or mitigation. |
| Primary mitigation | Modifications to the location or design of the development made during the pre-application phase that are an inherent part of the project, and do not require additional action to be taken. |
| Priority Habitat | Habitats listed in Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006. In England, there are 55 Priority habitats, recognised as being of 'principal importance' for the conservation of biological diversity. |
| Ramsar site | A wetland site of international importance designated under the criteria of the Ramsar Convention on Wetlands for containing representative, rare or unique wetland types of for their importance in conserving biological diversity. |
| Refugia | Artificial objects, primarily of corrugated metal or roofing felt, used in reptile surveys to increase the likelihood of |

| | |
|---|---|
| | discovering reptiles because they absorb and trap heat offering reptiles an excellent means to gain warmth, while also providing protection from predation and disturbance. |
| Significant Effect | An effect that either supports or undermines biodiversity conservation objectives for IEFs. |
| Special Area of Conservation (SAC) | Land designated under the Conservation of Habitats and of Species Regulations 2010 (as amended). |
| Special Protection Area (SPA) | Protected areas for birds in the UK designated under the Conservation of Habitats and Species Regulations 2010 (as amended). |
| Study area | Extent to which a particular survey or study applies. The study area is variable depending on which ecological feature is being studied. |
| Subtidal | Areas comprising a mosaic of seabed habitats of rock, sand, mud, and coarse and mixed sediments, supporting a diverse array of organisms. |
| Umbrella species | Species selected for making conservation-related decisions, usually because protecting these species indirectly protects and benefits the many other species that comprise the ecological community of its habitat (the umbrella effect). |
| Zone of Influence (ZoI) | The area over which ecological features may be affected by biophysical changes as a result of a proposed project and associated activities. The ZoI will vary for different ecological features depending on their sensitivity to an environmental change. |

# ACRONYMS

| Acronym | Definition |
|---|---|
| AGI | Above Ground Installation |
| BES | Biodiversity Enhancement Strategy |
| BNG | Biodiversity Net Gain |
| BTO | British Trust for Ornithology |
| CEMP | Construction Environmental Management Plan |
| CIEEM | Chartered Institute of Ecology and Environmental Management |
| DAS | Discretionary Advice Service |
| DCO | Development Consent Order |
| DLL | District Level License |
| EcIA | Ecological Impact Assessment |
| EIA | Environmental Impact Assessment |
| EPS | European Protected Species |
| ES | Environmental Statement |
| GCN | Great Crested Newt |
| HLCP | Humber Low Carbon Pipelines |
| HRA | Habitats Regulations Assessment |
| IACPC | Impact Assessment and Conservation Payment Certificate |
| IEFs | Important Ecological Features |
| IRZ | Impact Risk Zone |
| JNCC | Joint Nature Conservation Committee |
| LNR | Local Nature Reserve |
| LWS | Local Wildlife Site |
| NCV | Natural Capital Value |
| NNIS | Non-Native Invasive Species |
| NNR | National Nature Reserve |
| NSIP | Nationally Significant Infrastructure Project |
| NVA | Night Vision Aid |
| NVC | National Vegetation Classification |
| PEA | Preliminary Ecological Appraisal |
| PRA | Preliminary Roost Assessment |
| PRF | Potential Roost Feature |

| | |
|---|---|
| PRoW | Public Rights of Way |
| SAC | Special Area of Conservation |
| SNH | Scottish Natural Heritage |
| SPA | Special Protection Area |
| SSSI | Site of Special Scientific Interest |
| WeBS | Wetland Bird Survey |
| ZOI | Zone of Influence |

# CONTENTS

# PART A – BIODIVERSITY ENHANCEMENT STRATEGY

# 1. INTRODUCTION

## 1.1 Background

1.1.1 There are obligations on statutory undertakers and competent authorities with respect to BNG and other habitat improvement drivers. The Applicant is committed to adopting a sustainable approach to development by pro-actively taking measures to ensure that the HLCP project (hereafter, 'the Project') leaves the environment in a better condition than it was before development, i.e. Net Gain.

1.1.2 Net Gain measures are those which are over and above the measures which have been implemented to reduce the effects arising from development activities. There are two tools used to assess Net Gain: the Defra Biodiversity Metric calculates biodiversity units; and the Natural Capital Tool calculates the value of ecosystem services. This Project will use both these tools to create a baseline and quantify environmental impacts before and after the proposed works, informing landscaping and enhancement actions required to achieve a Net Gain in environmental value.

## 1.2 Overview of approach

1.2.1 This BES has been designed deliver biodiversity improvements beyond these with a focus on habitat and species-specific habitat enhancement and complementary habitat creation with consideration of the targets set out in the Environment Act 2021 which include halting decline in species abundance by 2030, ensuring that public authorities consider what action they can take to "*further the general biodiversity objective*" i.e. conserve and enhance biodiversity, and to deliver biodiversity gain.

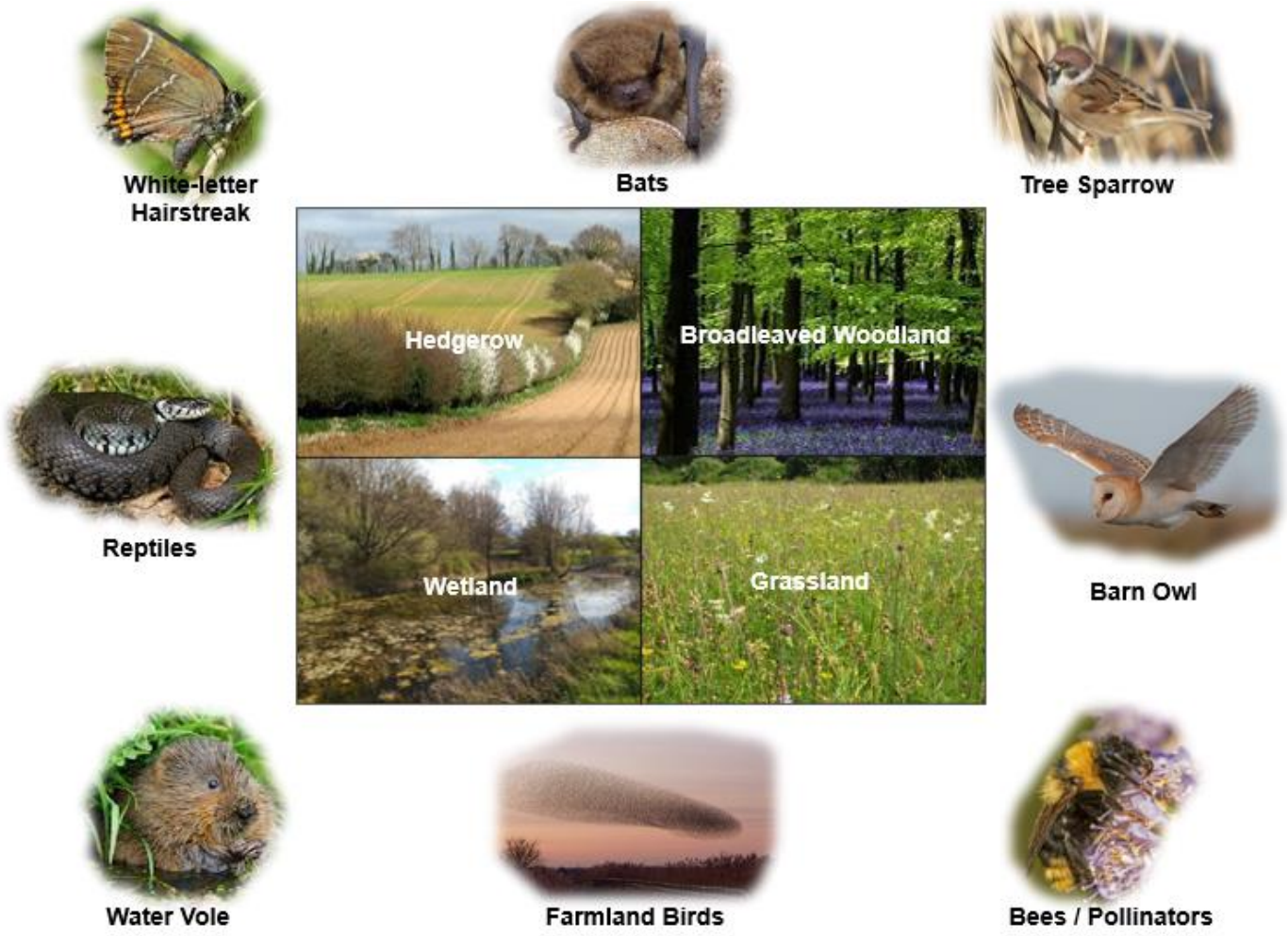
1.2.2 The above targets are not expected to be mandated in UK legislation until winter 2025 for terrestrial Nationally Significant Infrastructure Projects (NSIPs). However, the Applicant is mindful of the opportunities the Project offers to improve biodiversity and the wider environment and is committed to ensure the Project delivers a 10% net gain in biodiversity at permanent land take areas (i.e. AGI locations) (in line with anticipated net gain requirements of the Environment Act 2021) and that this is appropriately maintained post-construction. The Applicant will ensure no net loss throughout the rest of the Proposed Order Limits and is also seeking to deliver biodiversity improvements beyond this with a focus on strategic habitat and species-specific habitat enhancement and complementary habitat creation.

1.2.3 The BES aims to identify and implement strategic opportunities to improve patch quality and habitat connectivity in line with the document 'Making Space for Nature' (l) (i.e. more, bigger, better and joined up), aligning with national nature recovery objectives and projects including: Biodiversity 2020 (l) and the 2021 assessment (l); Nature Recovery Network (l); the National Pollinator Strategy (l), Buglife's B-lines project (l); and the creation of a Northern Forest (l).

1.2.4 Underpinning the BES are four 'keystone' habitats of conservation interest and an associated conservation target for the creation and/or enhancement of habitat; see Insert 1-1. In addition to these, eight species/species groups of conservation concern (also see Insert 1-1) have been chosen because they occur within one or more of the keystone habitats and because:

- The Project provides an opportunity to strategically enhance an extensive area of habitat associated with that species or species group (in line with national, region and/or local action plans); and
- Conservation efforts for these species indirectly protect many other species that make up the ecological community of their habitat (i.e. they are good umbrella species for improving biodiversity).

## Insert 1-1: Keystone habitats, associated actions and umbrella species included within the BES




1.2.5 The creation and enhancement of the keystone habitats will focus on the specific habitat requirements of associated umbrella species/species groups. However, each species and species group also have a series of conservation targets which are set out in Table 1-1 and will be developed further as a greater understanding of the local environment is achieved through survey and assessment.

1.2.6 The Applicant is committed to implementing improvements to wider ecosystem services through collaborative working both internally and with external stakeholders and utilising habitat data to inform decisions on improvement of NCV. The latter will be demonstrated by the Natural Capital Tool.

1.2.7 Stakeholder engagement will be critical to the success of the overall Conservation Strategy; the Strategy has been and will continue to be developed in collaboration with a range of external stakeholders and strategic partners[1] with the aim of driving tangible and sustainable environmental improvements.

**Table 1-1 Conservation status and proposed targets for umbrella species included within the BES**

| | |
|---|---|
| **White-letter Hairstreak** | The white-letter hairstreak (*Satyrium w-album*) is a small and elusive butterfly that is intimately associated with elm trees. Wych Elm (*Ulmus glabra*) is preferred but English Elm (*U. procera*) and Small-leaved elm (*U. minor*) are used. The butterfly breeds where elms occur in sheltered hedgerows, mixed scrub, edges of woodland rides and large isolated elms. The devastation of the elm population by Dutch Elm disease in the 1970s has led to concern for this species.<br><br>The conservation targets for this species seek to identify and safeguard existing elms within the Proposed Order Limits and extensively improve opportunities for this species through widespread planting of elms (with a particular focus on Wych Elm) within all hedgerows created or enhanced by the Project. |
| **Bats** | UK bat populations have declined considerably in the last century due to roost loss, habitat fragmentation and reduction in prey availability. East Riding of Yorkshire and Lincolnshire are among the least wooded counties in England (2.6% and 4% respectively) and patchy distribution of only 6 species of bat were identified within them from biological record data.<br><br>The conservation targets for this species group seek to improve the quality of hedgerows and plant broadleaved woodland for future use as a foraging and roosting resource. In addition to this, the Project proposes the creation of suitable artificial roosting sites through the installation of bat boxes and creating hollows and cracks in existing trees. |
| **Tree Sparrow** | The UK population of tree sparrow (*Passer montanus*) declined by 95% between 1970 and 1998. This is thought to have been driven by a reduction in seed and insect food source availability within farmland habitats and a lack of suitable nest sites.<br><br>The conservation targets for this species seek to improve insect food resource and suitable nest sites in strategic locations where seeds are already available within the landscape (such as areas that practice rotational set-aside, winter stubbles, root crops, etc.). Insect food resource will be improved through hedgerow enhancement and woodland planting which will also include the creation of a variety of habitat piles (created using arisings from construction vegetation clearance) with a focus of saprophytic species. Tree sparrows are |

[1] Stakeholders and strategic partners include Humber Nature Partnership, Royal Society for the Protection of Birds (RSPB), Natural England, Environment Agency, Buglife, North Lincolnshire Council, North Yorkshire County Council, East Riding of Yorkshire Council, West Lindsey District Council, Yorkshire Wildlife Trust, Lincolnshire Wildlife Trust and Greater Lincolnshire Nature Partnership

| | |
|---|---|
| | gregarious, and it is proposed that closely associated groups of tree sparrow nest boxes are placed across the Proposed Order Limits. |
| **Barn Owl** | Barn owl (*Tyto alba*) are widely distributed across the UK and although the species has suffered declines through the 20th century, numbers do appear to be steadily increasing in recent years.<br><br>The conservation targets for this species seek to improve the quality of foraging habitat/availably of prey though the conservation targets of all of the keystone habitats. In addition to this, the Project will commit to the creation of suitable artificial roosting and nesting sites through the installation of nest boxes on trees or buildings. |
| **Bees / Pollinators** | Establishing ecological networks to support the recovery of nature is a priority for UK government and also aligns with Buglife's B-Lines, which are a series of 'insect pathways' along which they are promoting the restoration and creation of a series of wildflower-rich habitat stepping stones. The B-Lines link existing wildlife areas together, creating a network that will weave across the British landscape with the aim of creating and restoring at least 150,000 hectares of flower-rich habitat across the UK.<br><br>The conservation targets for bees/pollinators seek to improve the quality and availability of ecological networks though the conservation targets of all of the keystone habitats. This could be achieved by:<br><br>• Ensuring that replacement planting comprises entirely native species with the emphasis on species that provide nectar, fruit or seeds to maximise foraging opportunities for a range of species (including but not limited to pollinators);<br><br>• Introducing the semi-parasitic Yellow Rattle (*Rhinanthus minor*) into ungrazed areas (such as fenced off field margins, access road verges, hedgerow bases, etc.) to reduce the quantity of grass growth and create space for other wild flowers to grow, directly increasing diversity;<br><br>• Seeking opportunities to introduce areas of bare ground (through raking, scarification or scalping with machinery) throughout the Proposed Order Limits to create a mosaic that will be beneficial for wildlife, especially invertebrates;<br><br>• Using arisings from construction vegetation clearance to create a variety of habitat piles in a range of shaded and unshaded places. This will include bug hotels, buried deadwood beetle boxes, refuge piles and compost heaps. In addition to these, 100 bee hotels will be installed across the Proposed Order Limits within suitable hedgerows, woodlands and patches of scrub; and<br><br>• The Proposed Order Limits includes approximately 8.9 km of B-Lines and any suitable habitat creation/enhancement within a B-Line will be registered on Buglife's map to contribute towards this national pollinator recovery network. |

| | |
|---|---|
| **Farmland birds** | The UK population of farmland birds fell by around 40% during the 1970s and 1980s and with continued declines, many farmland bird species are UK priority and red listed species of conservation concern.<br><br>The conservation targets for farmland birds seek to identify farmland bird distribution through survey and improve habitat quality and extent through the strategic creation/enhancement of wetland and species-rich grassland keystone habitats. Habitat creation will also avoid planting new trees or hedgerows in areas used by ground-nesting species. |
| **Water Vole** | The UK water vole (*Arvicola amphibius*) population has declined by 96% since 1950, which is largely thought to be due to predation by invasive non-native American mink (*Neovison vison*). This species is a species of principal importance under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006 and is a key biodiversity feature within Selby, East Riding and Lincolnshire.<br><br>The conservation targets for this species seek to identify and increase water vole distribution through survey and the improvement of habitat quality and extent through the strategic creation/enhancement of wetland that is suitable for species. In addition to this the Project could fund a widescale mink control programme. |
| **Reptiles** | All UK reptiles have seen declines in their numbers and habitats, and based on available biological records, only three species (grass snake *Natrix helvetica*, adder *Vipera berus* and common lizard *Zootoca vivipara*) with very patchy distribution are thought to be present within the Proposed Order Limits.<br><br>The conservation targets for this species group will include the widespread enhancement of habitats by creating a variety of habitat piles across the Project which will include a mixture of grass snake egg-laying heaps, hibernacula (that include completely and partially buried logs), buried deadwood beetle boxes, refuge piles, compost heaps and deadwood/brush piles. It is envisaged that patch quality for this species group will also be improved by the creation/enhancement of hedgerow and species-rich grassland habitat and ensuring that some of the proposed wetland creation (in areas of strategic importance) specifically includes habitat requirements for grass snake. Additional, species-specific targets may be identified following field survey. |

# 2. KEYSTONE HABITATS

**The following section is to be developed following agreement with stakeholders and will include a section on each of the Keystone habitats that provides the conservation status and justification for inclusion within the Conservation Strategy, and an action plan for the delivery of the associated conservation target/s.**

# 3. UMBRELLA SPECIES

**The following section is to be developed following agreement with stakeholders and will include a section on each of the umbrella species that provides the conservation status, an action plan for the delivery of the associated conservation targets and how these targets will also benefit other species. This section will also include a summary of the commitments and the proposed schedule for their delivery.**

# PART B – ECOLOGY SURVEYS: SCOPE AND METHODOLOGY

# 1. INTRODUCTION

## 1.1 Background

1.1.1 The HLCP ('the Project'), is defined as a NSIP as set out in the Planning Act 2008, Section 14 (1)(g) and Section 21. As such, to construct and operate the Project, a Development Consent Order (DCO) application will be made.

1.1.2 A suite of environmental studies will be required to support the DCO application, and this document details the framework for undertaking ecological survey and assessment for the range of ecological features (habitats, species and ecosystems, including ecosystem function and processes) associated with the Project. It provides a standard for methodologies and sets out the proposed survey programme.

1.1.3 The survey methodology and programme aims to be robust and proportionate. It will facilitate EcIA, and the production of a CEMP, BES (see Part A, above) and biodiversity enhancement and management plan (see Part C, below).

1.1.4 The Project will encourage a symbiotic relationship between design and survey/assessment, whereby survey/assessment information will influence design (in line with the mitigation hierarchy) and effective design will aim to minimise impacts, driving proportionate survey and reporting. Further, with the exception of permanent land take areas associated with the AGI's, habitat reinstatement will ensure the vast majority of impacts would be temporary. For habitats identified as IEFs, reinstatement will be to a condition of ecological value equal to or above the baseline. It is proposed that this approach will remove the need for some ecological survey/assessment, or delay the need for this information until pre-construction (i.e. post DCO consent), allowing adherence to legislative and welfare requirements whilst ensuring that there is sufficient time to apply for any licences required and undertake mitigation.

1.1.5 IEFs are habitats, species and ecosystems that may be affected, with reference to a geographical context in which they are considered important. They can be important for a variety of reasons and require specific assessment within EcIA (l). It is proposed that only ecological features considered to be of local importance for biodiversity or greater, and which could be affected by the Project, will be identified as IEFs. Effects on features of lower than local importance (i.e. site importance) for biodiversity will not be assessed within the biodiversity chapter of the Environmental Statement (ES); however, mitigation will be provided for such species where required to ensure adherence to legislative requirements. This document sets out the IEFs of relevance to this Project; however, it is intended to be a 'live' document that is updated (as necessary) throughout Project evolution as a greater understanding of IEFs associated with the Project is achieved through survey/assessment and consultation with stakeholders and strategic partners.

## 1.2 Overview of approach

1.2.1 The need for ecological survey and assessment is primarily driven by EcIA – a process of identifying, quantifying and evaluating the potential effects of development-related or other proposed actions on habitats, species and ecosystems and identifying mitigation requirements (l).

1.2.2 Application of the principles outlined in this document to the detailed design of ecological mitigation and compensation aims to ensure that adverse effects identified during EcIA are addressed.

1.2.3 To ensure that all likely significant effects of the Project will be identified, where baseline information comprises solely desk-based assessment, a precautionary approach of assuming a 'reasonable worst-case' valuation is to be adopted. This approach will assign precautionary values to both known and potential IEFs based on the currently available information.

1.2.4 As part of the DCO, EcIA will be applied during the production of the ecological component of the ES and for Habitats Regulations Assessment (HRA). Ecological survey and assessment will also be required pre-, during- and post-construction to:

- Ensure that the Project accords with DCO requirements, relevant planning policy and legislation;
- Inform derogation licences; and
- Demonstrate success of the BES and biodiversity enhancement and management plan.

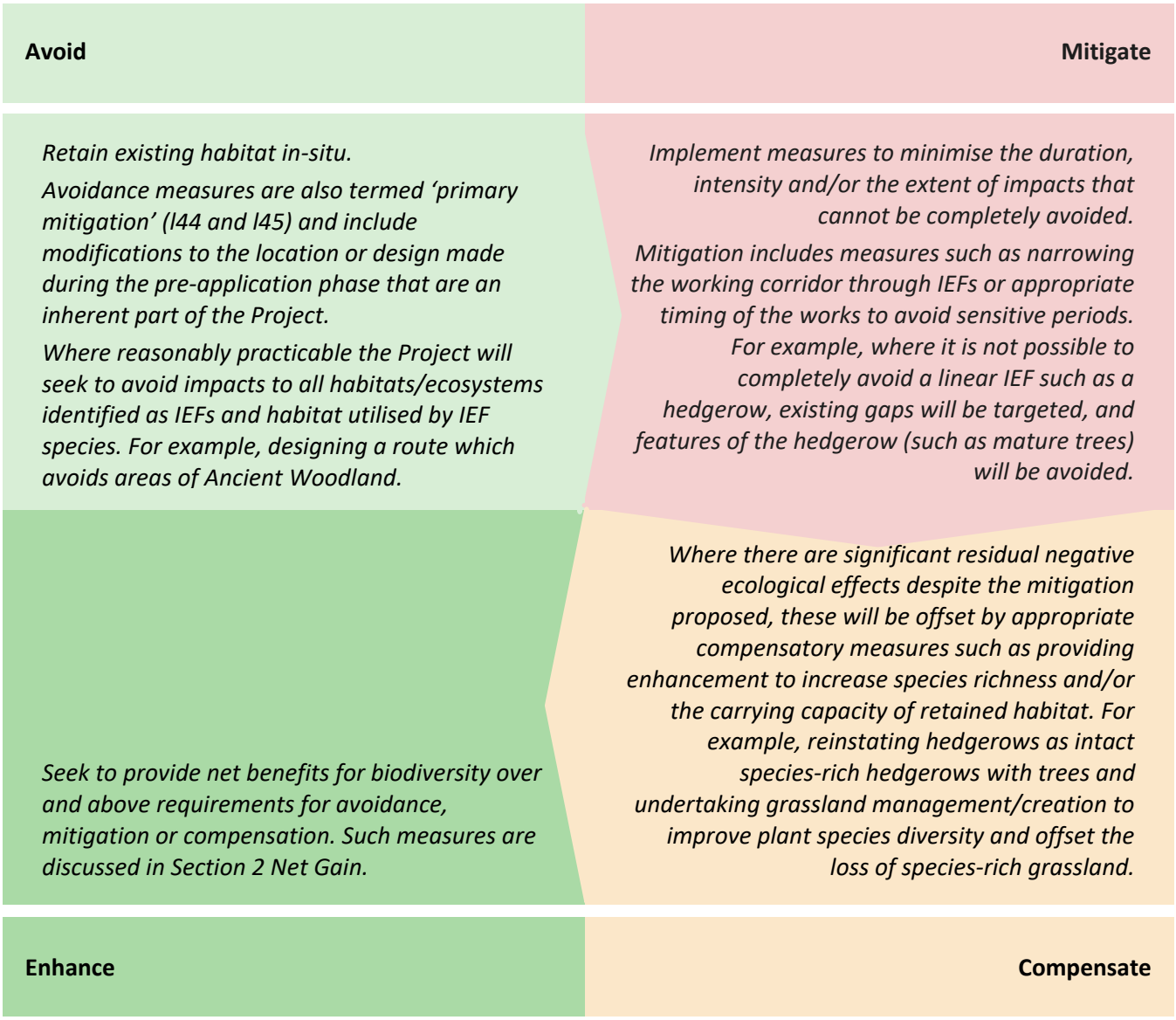
1.2.5 The survey and assessment programme is set out in Section 14. Following Chartered Institute of Ecology and Environmental Management (CIEEM) guidelines (l), the programme has been developed to be streamlined and proportionate, yet robust enough to support the consent application, thus minimising the collection of irrelevant/abortive information and the need for repeat surveys. Nevertheless, in the first instance, survey/assessment will be presumed to be required where:

- An IEF is confirmed, or it is thought there is a reasonable likelihood that an IEF may be present; and
- Significant effects on the ecological integrity or conservation status of an IEF may arise from the construction or operation of the Project.

1.2.6 A full range of ecological features have been (and will continue to be) considered during the production of this document and several have been discounted on the grounds that there was no likelihood of their occurrence on site (for example, due to geographical absence or an absence of suitable habitat) (see Section 13). Thus, only those considered relevant to the Project are identified below.

1.2.7 This Conservation Strategy seeks to ensure Project impacts will not result in significant adverse effects on the conservation status of IEFs and biodiversity in general. The Proposed Order Limits will be refined as the route of the pipelines, locations of AGIs and construction details are finalised. With regards to IEFs, the mitigation hierarchy (as shown in Insert 1-2) will underpin this process.

## Insert 1-2: Mitigation hierarchy approach to the Project




1.2.8 The commitment to biodiversity enhancement (as set out within the BES at Part A, above), along with the conservation targets for keystone habitats and umbrella species, aims to improve habitat quality and connectivity across the Project. This approach to strategic, landscape-scale habitat provision also has a direct bearing on the potential for significant effects and the need for survey, and a justification for this is provided for each IEF identified within this document.

## 1.3 Qualifications, experience and licencing

1.3.1 Where required, surveys will be led by surveyors holding appropriate licences. For example, where a survey/inspection has the potential to elicit disturbance to a European Protected Species (EPS), the lead surveyor will hold or be accredited under the appropriate Natural England survey licence. All other surveys will be led by surveyors approved under Arcadis' technical competency framework.

## 1.4 Biosecurity

1.4.1 All field surveyors will take reasonable measures to ensure compliance with species specific best practice guidelines for preventing the spread of disease and of invasive species of flora and fauna.

1.4.2 This is particularly true of work in water. Current best practice biosecurity measures (l) will be implemented, with disinfection of footwear and equipment between surveys, where they are used on more than one watercourse or water body.

# 2. NET GAIN

## 2.1 Introduction

2.1.1 The main aim of the Project (from a biodiversity perspective) will be to leave the environment in a better condition than it was before development. 'Net Gain' refers to measures which are over and above those implemented to reduce the effects arising from development activities.

2.1.2 To demonstrate Net Gain, a BES (see Part A, above) will be produced which includes a post-construction commitment to BNG. The mechanism to secure the protection, enhancement and provision of proposed biodiversity improvements, including maintenance and monitoring commitments are detailed within a biodiversity enhancement and management plan (Part C, below).

2.1.3 The Applicant is also seeking to deliver biodiversity improvements beyond this commitment, with a focus on habitat and species-specific enhancement and habitat creation and a Net Gain in NCV.

2.1.4 To inform BNG and NCV, field surveys and subsequent data analysis are required. These aim to establish:

- The current baseline regarding habitat types and condition within the Study Area;
- Opportunities for habitat and species-specific habitat enhancements;
- The proposed habitat types and condition post-construction within the Study Area;
- Change in biodiversity units pre- and post-construction, including percentage change; and
- Change in NCV pre- and post-construction.

## 2.2 Defining the Study Area

2.2.1 BNG and NCV will be measured across all habitats within the Proposed Order Limits. From a BNG perspective, this will include a minimum 10% BNG across permanent land take areas and 'no net loss' across temporary land take areas.

## 2.3 Proposed methodology

2.3.1 Net Gain will be assessed using DEFRA's Biodiversity Metric 3.1 (l.10) to calculate biodiversity units for BNG.

2.3.2 This tool uses information collected from BNG habitat condition assessments and create a baseline and quantify environmental impacts before and after proposed works. The units and values will be used to inform landscaping and enhancement measures required to achieve a Net Gain in environmental value.

2.3.3 This information will be used to inform the Register of Commitments which will be submitted in support of the DCO application and the biodiversity enhancement and management plan (Part C, below) which will be finalised pre-construction.

## 2.4 Survey programme and effort

2.4.1 Evaluation of Net Gain (which will include Biodiversity Net Gain survey and assessment) will be undertaken once the Proposed Order Limits have been finalised.

# 3. HABITAT SURVEY

## 3.1 Introduction

3.1.1 A draft Preliminary Ecological Appraisal (PEA) (Appendix 7.2 (Volume III)) has been prepared to present the results of a desk study and Phase 1 habitat survey (undertaken to date and illustrated on Figure 7.5 (Volume IV)) which describes the habitats within the Proposed Order Limits and assesses the potential for (or presence of) any protected, notable and invasive species.

3.1.2 The need for Phase 2 botanical survey will be confirmed following finalisation of the PEA. Specific botanical surveys may (for example) be required to assess habitat quality in detail, and may include, but not be limited to: National Vegetation Classification (NVC) survey, hedgerow survey[2], veteran tree assessment and habitat condition assessment.

3.1.3 An intertidal survey report (Appendix 7.4 (Volume III)) has been prepared to present the interim results of an intertidal walkover survey which describes the baseline information in relation to the intertidal environment and marine ecology.

## 3.2 Screening for survey and defining the survey area

3.2.1 Phase 2 botanical surveys are likely to be required where the PEA has identified a perceived/potential impact from the Project on the following:

- Statutory and non-statutory designated wildlife sites where botanical features (habitats or plants) are designated features;
- Priority Habitats recognised on the Priority Habitat Inventory (I.11) or identified during the PEA;
- Extensive wetland areas; and/or
- Other habitats considered to be particularly high quality/value examples of their type or likely to contain uncommon plant species.

## 3.3 Proposed methodology

3.3.1 Phase 2 botanical survey methodologies will follow published good practice guidance, including but not limited to Rodwell (I12) for NVC survey and DEFRA (Ref 7.1.13) for hedgerow survey.

[2] In accordance with the Hedgerows Regulations 1997, species-rich hedgerows in this part of England must contain 4 or more woody species within a 30 m section of hedgerow.

## 3.4 Survey programme and effort

3.4.1 The extent of field surveys undertaken between May-September 2022 is illustrated on Figure 7.5 (Volume IV). Survey of previously inaccessible areas is planned in advance of ES.

3.4.2 No surveys for subtidal marine ecology are anticipated as the current Project extends only to the mean low water springs (MLWS), which is considered the ecological boundary between intertidal and subtidal (marine) ecology. The offshore pipelines and associated works below MLWS forms part of a separate consent for which bp is the project proponent.

# 4. INVERTEBRATES

## 4.1 Introduction

4.1.1 The Project extends through a largely agricultural landscape of structurally poor arable and grazed pasture fields. Subsequently, large populations, or presence of protected invertebrates and/or notable invertebrate assemblages are considered to be restricted to distinct areas/habitats that will be identified during the PEA and that the Project will seek to avoid. Further, due to the largely temporary nature of the Project (see Section 1.1.4), adverse effects to most invertebrate populations are expected to be temporary and minor.

4.1.2 The general approach to EcIA for invertebrates is to ensure that the Project results in an increase in area of better-quality habitat (patch quality) than that affected by the Project and ensures that these habitats are well connected to the wider landscape. This will be achieved by minimising permanent impacts (from AGIs) to habitats of perceived value, reinstating habitats affected in areas of temporary habitat loss to equal or better condition than existing, and (in line with the BES; see Part A, above) improving the quality and availability of ecological networks across the Project (through the conservation targets for keystone habitats and invertebrate umbrella species (white letter hairstreak and bees/pollinators). It is proposed that the need for invertebrate surveys can largely be avoided by following this approach which is supported by the stakeholders of the Ecology Working Group (see Chapter 7: Ecology and Biodiversity (Volume II)).

## 4.2 Screening for survey and defining the survey area

4.2.1 The requirement for invertebrate surveys (terrestrial or aquatic) will be based on the results of the finalised PEA, focusing on suitable habitat within the Proposed Order Limits.

4.2.2 In accordance with Drake *et al*. (**Error! Reference source not found.**), there are several reasons for undertaking invertebrate survey and this could include areas:

- Where the presence of legally protected invertebrates has been identified;
- Within or adjacent to a statutory or non-statutory designated site where invertebrates are a notable feature;
- Identified as particularly botanically diverse and/or sensitive, or a habitat type restricted in the UK/Region; or
- Where there is a perceived and proportionate risk of invertebrate presence.

4.2.3 For watercourses, Environment Agency data (**Error! Reference source not found.**) will be reviewed to identify locations where an assemblage of aquatic macro-invertebrates indicative of good water quality[3] occurs within the same catchment as the Project.

4.2.4 Surveys may also be undertaken to inform the BES and/or biodiversity enhancement and management plan as part of a strategic plan for species recovery/action, to inform the management of certain habitats and/or to form the baseline of a monitoring programme. The need for such surveys will be identified following the production of the PEA and as these sections of the Conservation Strategy are developed.

4.2.5 Where surveys are required, the survey boundary will include an adequate and habitat/species specific Zone of Influence (ZOI).

## 4.3 Proposed methodology

4.3.1 Many invertebrate taxa are poorly understood in terms of their ecology and distribution. Although records of the presence of such species are a valuable addition to distributional knowledge, it is often not possible to accurately assess the value of a species record in a taxon which does not have a good database of distributional information. Even the first record of a species in a poorly known group does not necessarily confer significance to the site from which it was recorded without suitable contextual information.

4.3.2 It is therefore proposed that habitat surveys will use the recommended taxa for each habitat within Drake *et al*. (l), where the aim is to assess the value of an area of land for invertebrate conservation rather than focusing on individual species presence. Accordingly, where the need for survey has been identified, a two staged approach will be implemented:

- Stage 1 - a habitat-based classification of invertebrate assemblage or suitability assessment for specific species; and
- Stage 2 - species surveys carried out to identify assemblage types and their species richness, and the presence, distribution and population size of noteworthy species.

4.3.3 Where it is considered that detailed invertebrate surveys are required (terrestrial or aquatic), then the appropriate methods (including timing and number of survey visits) relevant to the taxa and/or habitats under consideration will be adopted, following guidance published by Drake *et al* (l). For terrestrial surveys, these methods could for example, include sweep netting, pitfall trapping, suction sampling and hand searches.

## 4.4 Survey programme and effort

4.4.1 The survey programme and effort will be determined following the PEA and based on the targeted species or species groups and the context of the local habitat. It is proposed that surveys are undertaken in the appropriate survey season prior to site enabling and establishment works.

[3] Evidenced by a Biological Monitoring Working Party score of 71 or more (Ref 7.1.43) occurring on a regular basis within the last 5-10 years.

# 5. FISH

## 5.1 Introduction

5.1.1 The requirements for fish survey are to be assessed following a review of existing data and an initial habitat assessment. Following the review of existing data, the most appropriate scope and method of survey will be agreed with the local Environment Agency team on a location-by-location basis for assessing the potential for significant impacts on fish.

## 5.2 Screening for survey and defining the survey area

5.2.1 Requirements for fish surveys will be influenced by the availability and quality of fisheries data from the Environment Agency. Where insufficient data exist to assess likely effects, surveys are more likely to be required for waterbodies meeting one or more of the following criteria:

- Bodies of water designated as a Special Area of Conservation (SAC) or Site of Special Scientific Interest (SSSI) for fish species or their water habitat; and/or
- Bodies of water likely to host protected fish species/fish species of conservation concern.

5.2.2 Bodies of water affected by the Project will be categorised for fish habitat quality and the potential for utilisation by fish. Surveys may be necessary for moderate and good quality habitats that could be directly or indirectly affected by the Project where no existing recent data are held by the Environment Agency. Further surveys are unlikely to be required for poor habitats.

5.2.3 Typical descriptors for good, moderate and poor quality habitats are as follows:

- **Good**: For running waters the habitats include varying flow types to include riffles pools, runs and glides. Substrate diversity is complex and there is good cover to provide refuge for juvenile and adult fish (both in-stream/waterbody and in marginal vegetation). Substrate is present for spawning salmonids. No evidence of pollution or other habitat degradation. No obvious barriers to migration (where applicable to species concerned);
- **Moderate**: For running waters the habitats include a number of flow types throughout the survey reach. Limited substrate diversity. Sparse cover for both juvenile and adult fish. Lower in-stream/waterbody and marginal vegetation diversity. Limited substrate present for spawning salmonids. No evidence of pollution; other habitat degradation (e.g. poaching) may be present. Potential barriers to upstream migration present (where applicable to species concerned); and
- **Poor**: Habitats with minimal variation. Substrate diversity limited. No bankside/marginal cover for fish. In-stream and marginal vegetation (where present) typically limited to single dominating species. No substrate available for spawning salmonids. Water body may receive diffuse, land-based pollution (run-off) and exhibit a high degree of other degradation such as poaching. Barriers to upstream

migration (e.g. debris/man-made dams) present (where applicable to species concerned).

5.2.4 The survey area will be determined on a site-by-site basis depending on habitat quality, upstream and downstream characteristics and likely effects on fish. Where access and seasonal constraints dictate, it may be necessary for fish habitat assessments to be undertaken in parallel with detailed survey work.

## 5.3 Proposed methodology

5.3.1 Detailed survey methods used will be dependent on the watercourse characteristics and will be agreed with the local Environment Agency team.

## 5.4 Survey programme and effort

5.4.1 Survey programme and effort are to be confirmed following discussion with local Environment Agency teams.

5.4.2 Where required, surveys are generally recommended to be undertaken from June to September depending on target species (**Error! Reference source not found.**.10). Where present, specific surveys may be required during spawning periods for salmonids (mid-November to the end of January) and Bullhead (*Cottus gobio*) (February to June).

# 6. REPTILES

## 6.1 Introduction

6.1.1 Widespread presence and large populations of reptiles are thought to be unlikely due to the unsuitable nature of the majority of the habitats (predominately structurally poor agricultural fields) within the Proposed Order Limits. Nevertheless, widespread presence of grass snake (*Natrix helvetica*) and common lizard (*Zootoca vivipara*) cannot be ruled out across suitable habitats and adder (*Vipera berus*) and slow worm (*Anguis fragilis*) may also be present within certain areas of suitable habitat. Reptiles are therefore assumed to be present in all suitable habitat and suitable precautionary working methods and mitigation will be developed to prevent death or injury during construction activities and to ensure an increase in area of better-quality habitat than that affected and that these habitats are well connected to the wider landscape.

6.1.2 A reptile Technical Appendix (Appendix 7.3 (Volume III)) has been prepared to present the results of a desk study and habitat suitability assessment and evaluation, which together provide the baseline for impact assessment. It also sets out the proposed location and timings for further reptile surveys which will be undertaken in the appropriate survey season prior to commencement of site enabling and establishment works.

6.1.3 This approach (which is supported by the stakeholders of the Ecology Working Group (see Chapter 7: Ecology and Biodiversity (Volume II)) has been taken to ensure that surveys are proportionate yet robust and provide up-to-date information, while minimising the collection of irrelevant/abortive information and the need for repeat surveys.

6.1.4 Proposed surveys target habitats identified from habitat suitability assessment and aim to inform the extent and method of measures necessary to mitigate for the risk of death or injury of individual reptiles during the construction period. The following sections set out the proposed methodology for these further surveys and the approach to impact assessment.

## 6.2 Proposed methodology

### Presence/Likely Absence Survey

6.2.1 Reptile presence/likely absence surveys will be conducted according to the below methodology which draws heavily upon Herpetofauna Groups of Britain and Ireland (HGBI) (l16), Froglife (l17 & l18) and Natural England (l19).

6.2.2 In each survey area, refugia (comprising a 50:50 ratio of corrugated metal/onduline and roofing felt measuring a minimum 0.5 m x 0.75 m in size) will be numbered and placed in suitable habitat.

6.2.3 In non-linear habitats, refugia will be placed at a density of at least 100/ha (for very small sites this density may be increased appropriately with a justification provided). In linear habitats of less than 10 m in width (e.g. hedgerows) refugia will be placed at a frequency of at least one every 10 m of suitable habitat. Where varying from the refugia

ratio and densities, a justification will be provided, based on the habitat type and target species concerned. Once placed, artificial refugia will be left to settle for at least 14 days prior to conducting the first survey (Ref 7.1.19).

6.2.4 Each survey area will be checked for reptiles on the required number of occasions (see Section 6.3.2), with binoculars used where appropriate to check for reptiles on and between refugia, as well as careful checks beneath each refugia. Each refugia check will be conducted during appropriate weather conditions (i.e. air temperature 10°C-20°C, still to moderate winds and no or very light rain).

6.2.5 During each check the surveyor will record details of all reptiles encountered during the survey including refugia number/location, species, number, life stage (adult, subadult, juvenile) and where possible, sex.

### Estimating Population Size Class

6.2.6 Population size class for each survey area will be assessed utilising the peak adult count for each species across all visits and population density will be calculated by dividing these figures by the survey area in hectares. Population densities will then be compared with the criteria outlined by HGBI (Ref 7.1.16) and also Froglife (Ref 7.1.17) to determine if any of the survey areas qualify as “Key Reptile Sites” which would trigger the requirement for further visits to provide a robust assessment to be considered.

## 6.3 Survey programme and effort

6.3.1 It is proposed that surveys are undertaken in the appropriate survey season prior to site enabling and establishment works.

### Presence/likely absence survey

6.3.2 Seven visits (during suitable weather conditions (see Section 6.2.4)) will be conducted to determine presence/likely absence with at least four of these visits conducted during the ‘optimum’ survey months of April, May, June and/or September. As a consequence, at sites where surveys commence during July or August, if no reptiles are found during the first three visits, then the remaining visits would be delayed until September.

6.3.3 Where access allows, surveys will be programmed to maximise the number of visits conducted during April, May, June and September. However, visits during July and August are not precluded assuming they are conducted according to the weather requirements specified in Section 6.2.4.

6.3.4 For survey areas with confirmed or high likelihood of presence of adder, survey visits may also be carried out during October/November when adders use areas in close proximity to potential hibernation habitats. Note that where a requirement for additional spring emergence visits is identified, these will be completed in the following April.

6.3.5 Surveys will also be planned to ensure that there is at least 30 days between the first and last survey visits and a minimum of two days between each visit.

### Population size class estimate

6.3.6 Where presence/likely absence survey confirms presence of one or more reptile species and all survey visits have been conducted during ‘optimum’ survey months (under suitable conditions) (see Section 6.3.2) then (unless the surveyor considers it necessary) no further visits will be required.

6.3.7 Where any presence/likely absence survey visits have been conducted during the sub-optimal months of July or August, additional visits will be required until at least seven visits (under suitable conditions) have been conducted during optimum months.

## Approach to impact assessment

6.3.8 Where reptile presence or likely presence has been identified, it will be necessary to mitigate for the risk of death or injury during the construction period and it is proposed that a combination of capture and exclusion methods (i.e. use of reptile proof fencing) and displacement by habitat manipulation will be used. A Reptile Method Statement document would be prepared (prior to construction) to detail the location where these methods are used and of receptor sites.

6.3.9 The Reptile Method Statement will be informed by the survey and assessment described above and will also develop a mitigation solution that ensures an increase in area of better-quality habitat than that affected by the Project and that these habitats are well connected to the wider landscape. This will be based on the habitat suitability assessment (described within the Reptile Technical Appendix (Appendix 7.3 (Volume III)) and measured as part of the BES, as reptiles are an 'umbrella' species (see Section 1.2).

6.3.10 In summary, the proposed mitigation involves:

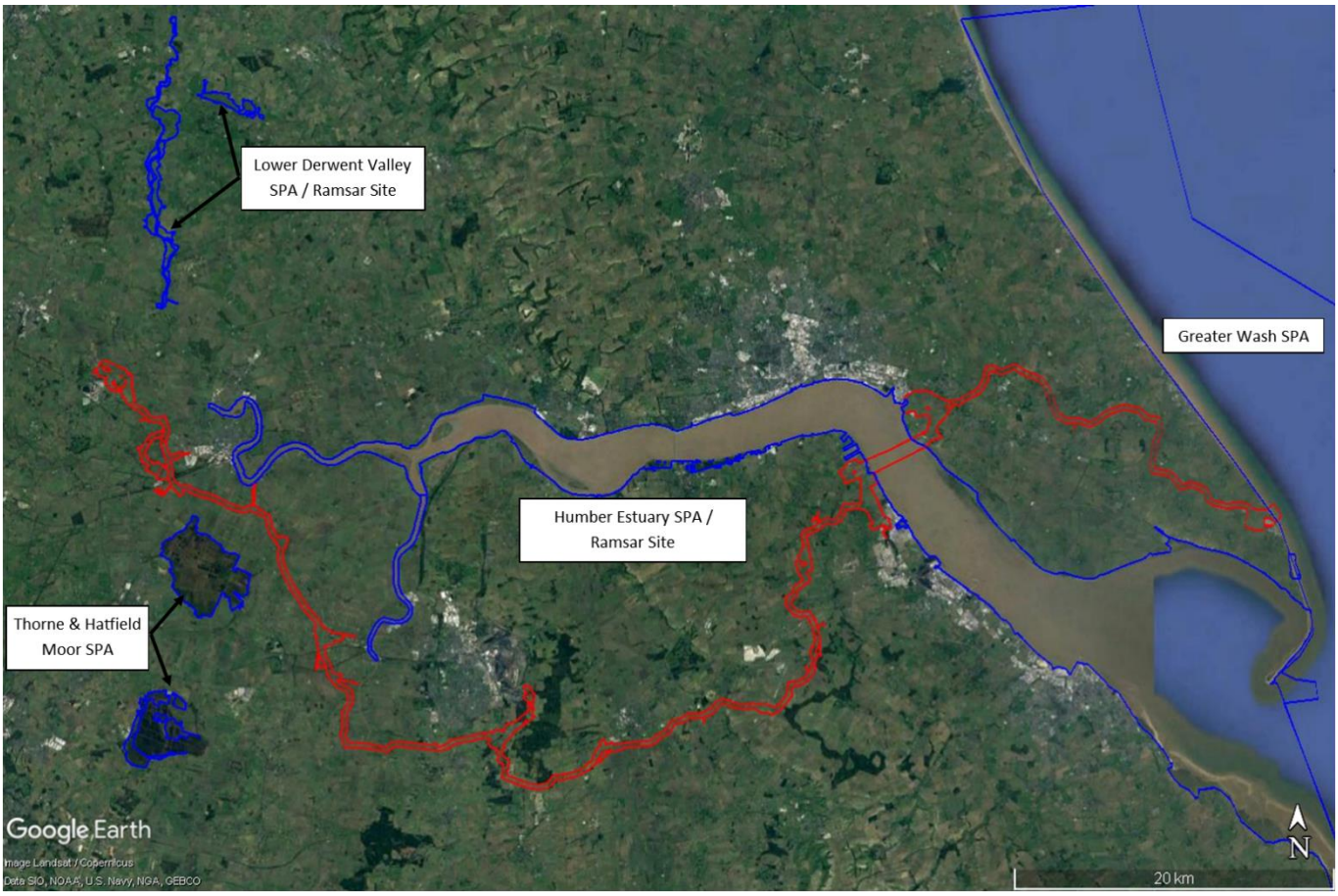
- The identification, preparation and management of a receptor site/s to receive translocated reptiles (if required). Note that the Project will largely require the temporary loss of sections of suitable habitat. Further, these habitats would be reinstated in equal or better quality for reptiles. It is proposed that the Reptile Method Statement targets retained (but enhanced) sections of these habitats and that reinstatement is used to deliver better quality habitat for reptiles;
- The capture/exclusion and/or manipulation of reptiles from the construction footprint (i.e., donor sites) to avoid incidental mortality; and
- Pre-, during- and post-construction monitoring of reptile populations. During- and post- construction monitoring will be detailed within the Reptile Method Statement.

# 7. ORNITHOLOGICAL SURVEYS

## 7.1 Introduction

7.1.1 The Proposed Order Limits in relation to European sites which include birds as a qualifying feature of the site is illustrated on Insert 7-1. The Project will cross beneath the Humber Estuary which is designated as a SPA, SAC and Ramsar site. The Greater Wash SPA is also located along the east of the Proposed Order Limits at the Holderness coast. Thorne & Hatfield Moor SPA is located approximately 1.25 km south of the Proposed Order Limits and the Lower Derwent Valley SPA and Ramsar site is located approximately 4.5 km north of the Proposed Order Limits. The text in Section 7.2 outlines the qualifying ornithological features for these European sites.

**Insert 7-1: Proposed Order Limits (red) in relation to European sites of Ornithological Importance (blue)**




7.1.2 A detailed assessment of impacts to wintering, passage and breeding birds will be carried out through HRA, informed by bird surveys undertaken in 2021/2022. The surveys aim to establish:

- The current baseline regarding how wintering, passage and breeding bird communities utilise the Study Area;

- A list of bird species encountered, estimate numbers of each species utilising the Study Area and surrounding areas and their breeding status where relevant; and
- A comparison of results with desktop data to identify any significant changes to the Site status.

7.1.3 The range of habitats within the Proposed Order Limits are anticipated to provide suitable habitat to support nesting birds and particularly those associated with farmland habitat.

7.1.4 The general approach to EcIA for breeding birds is to ensure that the Project results in an increase in area of better-quality habitat (patch quality) than that affected by the Project and to ensure that these habitats are well connected to the wider landscape. This will be achieved by avoiding permanent impacts (from AGIs) to habitats of perceived value, reinstating habitats affected in areas of temporary habitat loss to equal or better condition than existing, and (in line with the BES; see Part A above) improving the quality and availability of ecological networks across the Project through the conservation targets for keystone habitats and bird umbrella species (tree sparrow , barn owl and farmland birds). By following this approach, it is proposed that the need for breeding bird surveys can largely be avoided.

## 7.2 Screening for survey and defining the survey area

### Humber Estuary SPA

7.2.1 The site qualifies under Article 4.1 of the Directive (79/409/EEC) by regularly supporting populations of European importance of the following species listed on Annex I of the directive (% of the population in Great Britain):

- Over winter: bittern (*Botaurus stellaris*) (4%), hen harrier (*Circus cyaneus*) (1.1%), bar-tailed godwit (*Limosa lapponica*) (4.4%), golden plover (*Pluvialis apricaria*) (12.3%), avocet (*Recurvirostra avosetta*) (1.7%).
- On passage: ruff (*Philomachus pugnax*) (1.4%).
- Breeding: bittern (10.5%), marsh harrier (*Circus aeruginosus*) (6.3%), avocet (8.6%), little tern (*Sternula albifrons*) (2.1%).

7.2.2 The site also qualifies under Article 4.2 of the Directive by supporting populations of European importance of the following migratory species (% of the population in Great Britain):

- Over winter: dunlin (*Calidris alpina*) (1.7%), knot (*Calidris canutus*) (6.3%), black-tailed godwit (*Limosa limosa*) (3.2%), shelduck (*Tadorna tadorna*) (1.5%), redshank (*Tringa totanus*) (3.6%).
- On passage: dunlin (1.5%), knot (4.1%), black-tailed godwit (2.6%), redshank (5.7%).

7.2.3 The site also regularly supports a non-breeding assemblage of 153,934 waterbirds including dark-bellied brent goose (*Branta bernicla bernicla*), shelduck, wigeon (*Anas penelope*), teal (*Anas crecca*), mallard (*Anas platyrhynchos*), pochard (*Aythya farina*), scaup (*Aythya marila*), goldeneye (*Bucephala clangula*), bittern, oystercatcher (*Haematopus ostralegus*), avocet, ringed plover (*Charadrius hiaticula*), golden plover (*Pluvialis apricaria*), grey plover (*P. squatarola*), lapwing (*Vanellus vanellus*), knot, sanderling (*Calidris alba*), dunlin, ruff, black-tailed godwit, bar-tailed godwit, whimbrel

(*Numenius phaeopus*), curlew, redshank, greenshank (*Tringa nebularia*) and turnstone (*Arenaria interpres*).

### Humber Estuary Ramsar

7.2.4 Criterion 5: Regularly supporting a bird assemblage of international importance comprising 153,934 waterfowl during the non-breeding season.

7.2.5 Criterion 6: Supporting internationally important spring/autumn passage populations of golden plover, knot, dunlin, black-tailed godwit and redshank, and during the winter, populations of shelduck, golden plover, knot, dunlin, black-tailed godwit and bar-tailed godwit.

7.2.6 Breeding bird species occurring at national levels of importance (% of the Great British population): bittern (10.5%), marsh harrier (6.3%), avocet (8.6%), little tern (2.1%).

### Greater Wash SPA

7.2.7 The site qualifies under Article 4.1 of the Directive 2009/147/EC by regularly supporting populations of national importance of the Annex I species (% of the population in Great Britain):

- Over winter: red-throated diver (*Gavia stellata*) (3%), little gull (*Hydrocoloeus minutus*) (1,255 individuals).
- On passage: Common scoter (*Melanitta nigra*) (0.6%).
- Breeding: Sandwich tern (*Sterna sandvicensis*) (35%), Common tern (*Sterna hirundo*) (5.1%), Little tern (42%).

### Thorne & Hatfield Moor SPA

7.2.8 The site qualifies under Article 4.1 of the Directive 2009/147/EC by regularly supporting populations of national importance of the Annex I species (% of the population in Great Britain):

- Breeding: Nightjar (*Caprimulgus europaeus*) (1.9%)

### Lower Derwent Valley SPA

7.2.9 The site qualifies under Article 4.1 of the Directive 2009/147/EC by regularly supporting populations of national importance of the Annex I species (% of the population in Great Britain):

- Over winter: Bewick's swan (*Cygnus columbianus bewickii*) (1%), golden plover (2%), ruff (3.5%).
- Breeding: Shoveler (*Anas clypeata*) (3.5%)

### Lower Derwent Valley Ramsar

7.2.10 Criterion 4: The site qualifies as a staging post for passage birds in spring. Of particular note are the nationally important numbers of ruff and whimbrel (*Numenius phaeopus*).

7.2.11 Criterion 5: Assemblage of international importance – peak counts in winter: 31,942 waterfowl.

7.2.12 Criterion 6: Species/populations occurring at levels of international importance – peak counts in winter (% of the population in Great Britain: Eurasian wigeon (*Anas Penelope*) (2%), Eurasian teal (*Anas crecca*) (1%).

## Survey Scope – Wintering and Passage Bird Surveys

7.2.13 During the preparation of the wintering and passage bird survey methodology, consultation with Natural England was undertaken through the Discretionary Advice Service (DAS) and comments were provided via email on the 21st, 26th and 27th July 2021; a meeting was held on the 27th July 2021. The results of these consultations were used to inform the survey method as outlined below.

7.2.14 The proposed survey effort aims to screen and discount areas from survey where it is likely that the habitats support only low numbers of common birds whose conservation status would not be significantly affected by the Project. As proposed by Natural England, a study/survey area has been established which is defined as the area that meets the following criteria:

- Within the Proposed Order Limits;
- Within 3 km Impact Risk Zone (IRZ) of the Humber estuary SPA/Ramsar site; and
- Suitable habitat for wintering SPA/Ramsar birds i.e. open agricultural land identified through aerial photos etc.

7.2.15 The survey areas are shown in Insert 7-2. This shows the areas surveyed for passage and wintering birds using a combination of habitat assessments (supported by desk-study data), transects and vantage point (VP) surveys (described in the sections below). Option selection and route refinement continued throughout 2021 and into early 2022 and led to a reduction in the number of survey areas that met the criteria detailed above compared to the original scope.

## Survey Scope – Breeding Bird Surveys

7.2.16 The requirement for breeding bird surveys focused on suitable habitat within the Proposed Order Limits. The extent of survey was defined by the outcome of a two staged screening exercise as defined below.

7.2.17 Stage 1 – Sites of known importance for breeding birds

- Desk study was used to identify sites of known or perceived (based on association with ‘known’ sites) importance for birds where there is the potential for adverse effects because of the Project. Such sites include the European designated sites listed in Section 7.2, UK designated sites (SSSIs, National Nature Reserves (NNRs), Local Nature Reserves (LNRs)) and non-designated sites (Local Wildlife Sites (LWSs)).

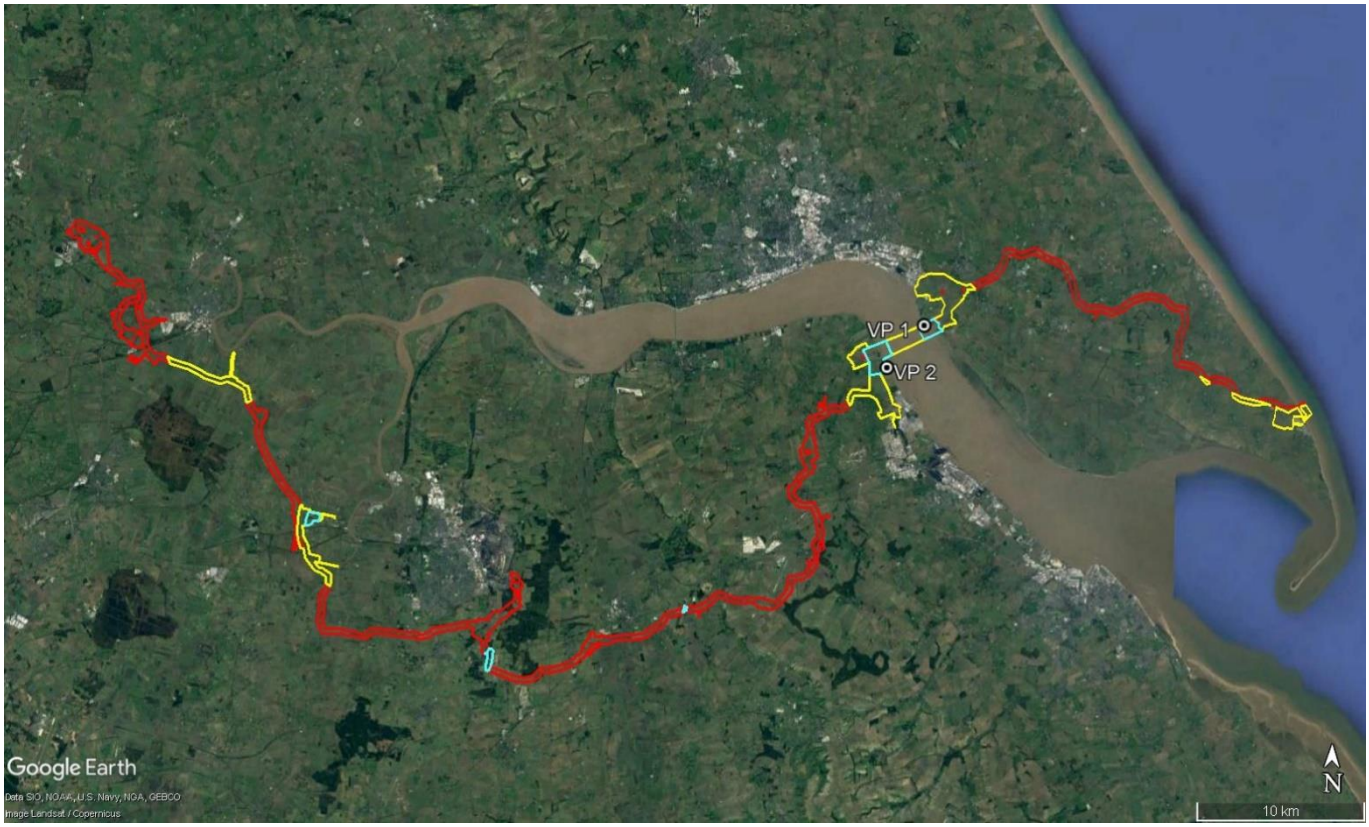
7.2.18 Stage 2 – Other areas identified as being of potential importance for breeding birds

- A review of the following information sources was undertaken to identify the locations of sites of potential importance for breeding birds (i.e. areas which are considered to have potential to support notable species such as those listed on Annex 1 of the Birds Directive, Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), or red or amber listed species on the Birds of Conservation Concern list; or which may support notable assemblages of common birds) within the Proposed Order Limits and that are potentially subject to adverse effects:
- Aerial photography and Ordnance Survey mapping;

- Habitat appraisal undertaken during Extended Phase 1 habitat survey and wintering bird surveys conducted during 2021/2022; and,
- Discussions with local consultees.

7.2.19 The survey areas are shown in Insert 7-2.

**Insert 7-2: Wintering and Passage Bird Survey Areas (Yellow), Breeding Bird Survey Areas (Blue) and VP survey locations (Black Point) in relation to Proposed Order Limits (Red).**




## 7.3 Methodology

7.3.1 A full suite of ornithological surveys (wintering, passage and breeding bird surveys) was undertaken between September 2021 to August 2022. The ornithological methodology and survey programme (Section 8.4) is therefore presented in the past tense to highlight that these surveys have been completed.

### Desk study and habitat assessments

7.3.2 In addition to the sources of information utilised for the desk study presented in Table 2-1 in the PEA, Wetland Bird Survey (WeBS) data has been obtained for all sectors/compartments within 5 km of the Proposed Order Limits (Ref 7.1.20); the locations of all sectors are illustrated on Insert 7-3. This data provides extensive information on the wintering bird species and numbers within the Humber Estuary and surrounding areas.

## Insert 7-3: WeBS sectors (yellow) for which data has been obtained, in relation to the Proposed Order Limits (red)


## Vantage Point Survey – Wintering, Passage and Breeding Birds

7.3.3 VP survey methodology has been adapted from Scottish Natural Heritage (SNH) guidance (Ref 7.1.21). This guidance pertains to the assessment of effects of wind farms on birds; however, for this Project it is being used to support the transect surveys and focus on bird movements between the Humber Estuary crossing location, the Proposed Order Limits and surrounding habitats (i.e. terrestrial habitats will also be surveyed along with the estuary/river).

7.3.4 Two VP positions were utilised for survey, as shown in Insert 7-2. The locations of these were selected from an assessment of aerial imagery and from the results of habitat assessments.

7.3.5 Bird movements were mapped during the VP surveys using British Trust for Ornithology (BTO) activity codes, which distinguish between birds coming into land, overhead flights and birds taking off. The recorded information with each referenced flight comprised; time, species, estimated number of birds and flight behaviour, as a minimum.

7.3.1 It is acknowledged that SNH guidance (Ref 7.1.21) outlines 36 hours of monitoring per season, with more regular surveying through the passage period when bird turnover is high; however, this methodology is designed to collate data on bird flight behaviour for windfarm collision risk. This Project is for two new buried pipelines, which would not cause a collision threat and (with the exception of the permanent AGI sites) habitats will be reinstated on completion of the work. Therefore, as agreed with Natural England (Ref 7.1.22), 36 hours of monitoring per season was not considered proportionate for this Project. Instead, the following was undertaken:

- For wintering and passage bird VP surveys, 2 survey visits per month (spaced approximately 2 weeks apart) were undertaken. VP surveys commenced 2 hours before high tide until 2 hours after high tide and thus were 4 hours in length; and
- For breeding bird VP surveys, 6 survey visits (spaced at least 1 week apart) during the breeding season (March to August, weather dependent) were undertaken. VP surveys commenced no later half an hour after sunrise and were 4 hours in length.

### Transect Survey – Wintering and Passage Bird Surveys

7.3.2 Surveys followed an adaption to the BTO WeBS methodology which is based on a 'look-see' approach (Ref 7.1.23 and Ref 7.1.24). Transects were walked across all suitable wintering bird habitat within the survey area. Aerial imagery suggested much of the survey area is arable, which is likely to provide foraging habitat to a range of species, particularly lapwing, golden plover, curlew (*Numenius arquata*) and geese. Any unsuitable areas identified through the initial habitat assessment were discounted from the transect route.

7.3.3 During the transects, fields were scanned using binoculars and scopes (where necessary). Details recorded included time, species, number of birds, location, behaviour and information regarding flights in or out of the survey area. BTO activity codes were used during the survey.

### Common Bird Census style survey – Breeding Bird Surveys

7.3.4 Methodology followed the guidelines presented by the Bird Survey & Assessment Steering Group (Ref 7.1.25) and included 6 survey visits (spaced at least 1 week apart) during the breeding season. Surveys were only undertaken during acclimate weather with no more than a strong breeze. The guidance permits survey during dawn mist but survey during dense fog were avoided. Surveys commenced no later than half an hour after sunrise and ended no later than mid-morning (11am). Where crepuscular or nocturnal species such as nightjar were suspected, evening survey visits were undertaken and represented 1 of the 6 survey visits. To reduce survey bias, the starting position of each survey was varied between visits and smaller survey areas with only one viable starting position were combined and the order in which they were completed varied between visits.

7.3.5 Where survey areas comprised a large expanse of open grassland or arable field, the boundaries were walked and all birds within the field recorded. In other habitat where access and views allow, efforts will be made to record all bird activity within 50 m of the survey route. Where no access is available, Public Rights of Way (PRoW) and local roads (where it is deemed safe to do so) will be utilised.

7.3.6 In all cases, all birds seen or heard will be identified and recorded on a suitable scale map to allow the information to be clearly recorded using standard BTO species and activity codes.

7.3.7 Large wetland areas will also be covered by a slightly modified Common Bird Census style survey to include recording the activity of individual birds and counts of birds on the water from the lake edge.

## 7.4 Survey programme and effort

### Vantage Point Survey – Wintering, Passage and Breeding Bird Surveys

7.4.1 Surveys followed an adaption of SNH guidance (see Section 7.3.1) and were completed as follows:

7.4.2 For wintering and passage bird VP surveys, 2 survey visits per month (spaced approximately two weeks apart) were undertaken from September 2021 to April 2022 and August 2022 (NB: as surveys were not commenced until September 2021, surveys were undertaken in August 2022)

7.4.3 For breeding bird VP surveys, six survey visits (at least one week apart) were undertaken during the core months of the breeding season (one visit in late April, three visits in early, mid and late May and two visits in early and late June).

7.4.4 All VP surveys commenced no later than half an hour after sunrise and were four hours in length.

### Transect Survey – Wintering & Passage Bird Surveys

7.4.5 As per WeBS methodology and incorporating Natural England advice (see Section 7.2.13 and Section 7.3.2), each transect was completed twice per month between September 2021 and April 2022 (inclusive) as well as August 2022 and completed in a period 2 to 3 hours either side of high tide.

### Common Bird Census style Survey – Breeding Bird Surveys

7.4.6 Six survey visits (spaced at least 1 week apart) were undertaken during the core breeding season (see Section 7.4.3 – one visit in late April, three visits in early, mid and late May and two visits in early and late June). Surveys commenced no later than half an hour after sunrise and ended no later than mid-morning (11am).

# 8. BADGER

## 8.1 Introduction

8.1.1 Presence of badgers within the Proposed Order Limits has been confirmed during non-target field surveys and based on the suitability of habitats and rural location of most of the Project, it is envisaged that badgers (*Meles meles*) are widespread throughout. Potential impacts on badgers are likely to be loss of setts within the land required for the construction of the Project and potential for disturbance of setts in close proximity to the land required. Survey for badgers will therefore need to identify sett locations only. Due to the temporary nature of the works, it is not considered necessary for surveys to identify the potential for severance/fragmentation of territories.

8.1.2 The badger is not a species of conservation concern nationally, and accordingly, is not considered a priority species for conservation in England. In an urban context and on the edges of its range, the species may be of local conservation concern, but in this context (i.e. when considering the widespread availability of suitable habitat and the largely temporary nature of the Project impacts), the presence of badger or setts within the Project Boundary is considered to be of less than local importance.

8.1.3 It is proposed that badger surveys are undertaken pre-construction to ensure adherence to legislation and animal welfare. Pre-construction surveys and sett classifications will follow Harris *et al*. (Ref 7.1.26) and are outlined below.

8.1.4 In compliance with the Protection of Badgers Act 1992, all information related to badgers (including survey methodology, baseline information, mitigation and residual effects and cumulative effects), will be presented in a Confidential Appendix. Release of the Confidential Appendix would only be to the Planning Inspectorate (PINS), and on request from suitably qualified professionals.

## 8.2 Screening for survey and defining the survey area

8.2.1 Utilising results from the non-target field surveys (chiefly, but not limited to the Extended Phase 1 and hedgerow surveys), desk study records and analysis of aerial photographs, areas will be identified within the Proposed Order Limits, or within a 50 m surrounding buffer that are likely to be used by badgers and where there is the potential for significant effects to occur. These areas will then be subject to badger survey.

## 8.3 Proposed methodology

8.3.1 The badger survey will comprise a systematic walkover to obtain records of the following field signs:

- Setts;
- Badger hair;
- Mammal/badger pathways;
- Foraging signs;

- Latrines;
- Footprints;
- Bedding material; and
- Evidence of rabbit (*Oryctolagus cuniculus*) and fox (*Vulpes vulpes*).

8.3.2 Identified setts will be mapped on a Global Positioning System (GPS) and categorised following Harris *et al*. (Ref 7.1.26) as ‘main’, ‘annex’, ‘subsidiary’ or ‘outlier’. These will be classified as ‘active’, ‘partially active’, or ‘disused’. The number of sett entrances will be noted alongside the direction of each entrance hole. Where necessary, further badger surveys will be undertaken to confirm if there are additional setts within the territory.

## 8.4 Survey programme and effort

8.4.1 Badger surveys can be undertaken at any time of the year but, where possible, will be undertaken in winter or early spring (to minimise survey limitations from dense vegetation typically associated with summer months).

# 9. BATS (ROOSTS)

## 9.1 Introduction

9.1.1 In the instance the loss of a tree(s) and/or structure(s) with potential to support roosting bats cannot be avoided, then these will be inspected/surveyed in accordance with current guidelines (Ref 7.1.27 and Ref 7.1.28), described below.

9.1.2 Negative impacts to roosting bats from construction activities are expected to be minor as impacts to woodland will largely be avoided and the removal of standard trees and structures will be minimised. There are no European sites identified within 25 km of the Proposed Order Limits which are designated for bats and species diversity within/close to the Proposed Order Limits is low and restricted to species which are most common and widespread (i.e. common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*P. pygmaeus*), Nathusius' pipistrelle (*P. nathusii*), brown long-eared (*Plecotus auritus*), *Myotis* and *Nyctalus* species (see Section 10.1.3)).

9.1.3 Where bat roosts need to be removed to facilitate construction, this will be done under a development licence issued by Natural England, a condition of which will be the provision of replacement bat roosting features. The Conservation Strategy will ensure the provision of additional bat roosting features beyond minimum licensing requirements. This means that post-construction there will be a net increase in roosting sites for bats.

## 9.2 Screening for survey and defining the survey area

9.2.1 During the Extended Phase 1 habitat survey, trees, woodland blocks and structures with potential roost features (PRFs) were highlighted. Those with PRFs which cannot be avoided by the Project will subsequently receive further bat roost surveys including preliminary roost assessment (PRA), inspection and/or emergence/re-entry surveys.

## 9.3 Proposed methodology

### Preliminary roost assessment

9.3.1 Trees/structures identified for PRA will be highlighted during the Extended Phase 1 habitat survey. Where PRFs are present on or within a tree/structure, these will be assessed to determine suitability for roosting bats alongside professional judgement. Trees/structures will be classified as outlined in Table 9-1.

**Table 9-1 Bat roost suitability (based on Collins (l))**

| Bat roost suitability | Tree | Structure |
|---|---|---|
| **Negligible** | Negligible features likely to be used by roosting bats. | |
| **Low** | A tree of sufficient size and age to contain PRFs but with none seen from the ground or features seen with only very limited roosting potential. | A structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e. unlikely to be suitable for maternity or hibernation). |
| **Moderate** | A structure/tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost type of high conservation status. | |
| **High** | A structure/tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat. | |
| **Confirmed** | A tree/structure with PRF(s) that have been shown to have been definitively used by bats, either through the presence of bats or the presence of conclusive evidence, such as droppings or bat-specific parasites. | |

9.3.2 All trees/structures with potential to support roosting bats will be recorded on a GPS to provide accurate referencing and trees will be tagged using a numbered tree tag to facilitate future identification on the ground. Trees will be classified as high on a precautionary basis when PRA can only take place in full foliage and from the ground.

9.3.3 Trees/structures assessed as high or moderate roost suitability will be subject to further inspection (see below). Trees classified as low or negligible roost suitability will be soft-felled/pruned under supervision of a bat licenced ecologist during site enabling works with no further surveys required.

### Tree/structure inspections

9.3.4 Trees/structures with high or moderate roost suitability will be inspected using an endoscope and high powered torch. Where a ladder cannot be used to inspect PRFs at height, trees will be climbed by a licenced bat ecologist with tree climbing qualifications.

9.3.5 For trees/structures with moderate roost suitability, two separate surveys are required spaced at least 14 days apart between May and September. For trees/structures with confirmed roost or high roost suitability, three surveys are required under the same conditions.

9.3.6 Trees/structures affected by the Project that are down-graded to low roost suitability following inspection will be soft-felled/pruned/removed under ecological method statement during site enabling works with no further surveys required.

9.3.7 Trees/structures affected by the Project that are down-graded to negligible roost suitability following inspection will be felled/pruned/removed during site enabling works with no further bat surveys/mitigation required.

9.3.8 Where trees/structures cannot be inspected at height due to safety or other constraints, emergence/re-entry surveys (see below) will be undertaken.

### Emergence/re-entry

9.3.9 For trees/structures with moderate roost suitability, two separate surveys are required spaced at least 14 days apart between May and September. For trees/structures with confirmed roost or high roost suitability, three surveys are required under the same conditions.

9.3.10 Surveys will comprise dusk emergence surveys, undertaken from 15 minutes before sunset until two hours after sunset. Surveyors will use echolocation detectors that will record bat activity during surveys. Recorded data will subsequently be analysed using appropriate software to identify species and inform mitigation requirements where necessary. Where practical, Night Vision Aids (NVAs) will also be used to assist with visual identification of bat roost locations.

9.3.11 Where NVAs are not used, at least one of the surveys will comprise a dawn re-entry survey undertaken from two hours before sunrise until 15 minutes after sunrise.

9.3.12 All surveys will be undertaken in appropriate weather conditions.

## 9.4 Survey programme and effort

9.4.1 PRAs will aim to take place before or after trees are in full foliage, i.e. between October and March.

9.4.2 Inspections of trees with high or moderate roost suitability will take place during the bat ‘active’ period of May to September (unless a PRF has been identified as having hibernation roost suitability).

9.4.3 Emergence/re-entry surveys will be undertaken between May and September, in line with current guidelines (Ref 7.1.27 and Ref 7.1.28).

# 10. BATS (ACTIVITY)

## 10.1 Introduction

10.1.1 The Project extends through a largely agricultural landscape of structurally poor arable and grazed pasture fields, bordered by hedgerows and ditches. There are no European sites identified within 25 km of the Proposed Order Limits which are designated for bats and the Proposed Order Limits has been sensitively located to minimise direct permanent impacts (from AGI's) to habitats likely to be of most value to bats (e.g. by avoiding woodlands).

10.1.2 Hedgerows and watercourses are likely to be used by bats for commuting and/or foraging and severance during construction is unavoidable. However, as the length of severance will be minimised (e.g. gaps of less than 20 m for hedgerows), the works are unlikely to devoid bats of locally important linear features and negative impacts to foraging/commuting bats from construction activities are expected to be temporary and minor.

10.1.3 Desk study information and a review of bat activity reports covering parcels of land within and immediately adjacent to the Proposed Order Limits indicates that bat activity is low (Ref 7.1.29; Ref 7.1.30; Ref 7.1.31 and Ref 7.1.32) with a limited species diversity (predominantly common pipistrelle, with low numbers of soprano pipistrelle, Nathusius' pipistrelle, brown long-eared, *Myotis* and *Nyctalus* species (Ref 7.1.29; Ref 7.1.30; Ref 7.1.31; Ref 7.1.32; Ref 7.1.33; Ref 7.1.34 and Ref 7.1.35).

10.1.4 Based on the information above, the Proposed Order Limits is considered unlikely to support large numbers or a wide diversity of foraging or commuting bats and mitigation and enhancement will be designed on this basis.

10.1.5 The general approach to EcIA for bat activity is to ensure that the Project results in an increase in area of better-quality habitat (patch quality) than that affected by the Project and to ensure that these habitats are well connected to the wider landscape. This will be achieved by reinstating all watercourses and hedgerows post-construction to equal or better condition than existing, and (in line with the BES; see Part A, above) improving the quality and availability of ecological networks across the Project (through the conservation targets for keystone habitats and bats as an umbrella species). By following this approach, the Project will provide new and enhanced commuting corridors and foraging habitat for bats post-construction and it is proposed that the need for detailed bat activity surveys can be avoided.

10.1.6 Nevertheless, targeted bat activity surveys will be undertaken on features of landscape-scale significance to support/evidence the assumption of low bat diversity and abundance and establish the ecological baseline of bat activity associated with the Project. The survey aims to establish:

- The current baseline regarding bat species, importance and relative abundance within the Study Area;
- The likely ecological constraints to the Project including the presence of key commuting or foraging habitat within the Study Area; and
- Opportunities for ecological enhancement.

## 10.2 Screening for survey and defining the survey area

10.2.1 The proposed survey effort has screened and discounted watercourses and hedgerows from survey as these are widespread throughout the Study Area and will be reinstated post-construction.

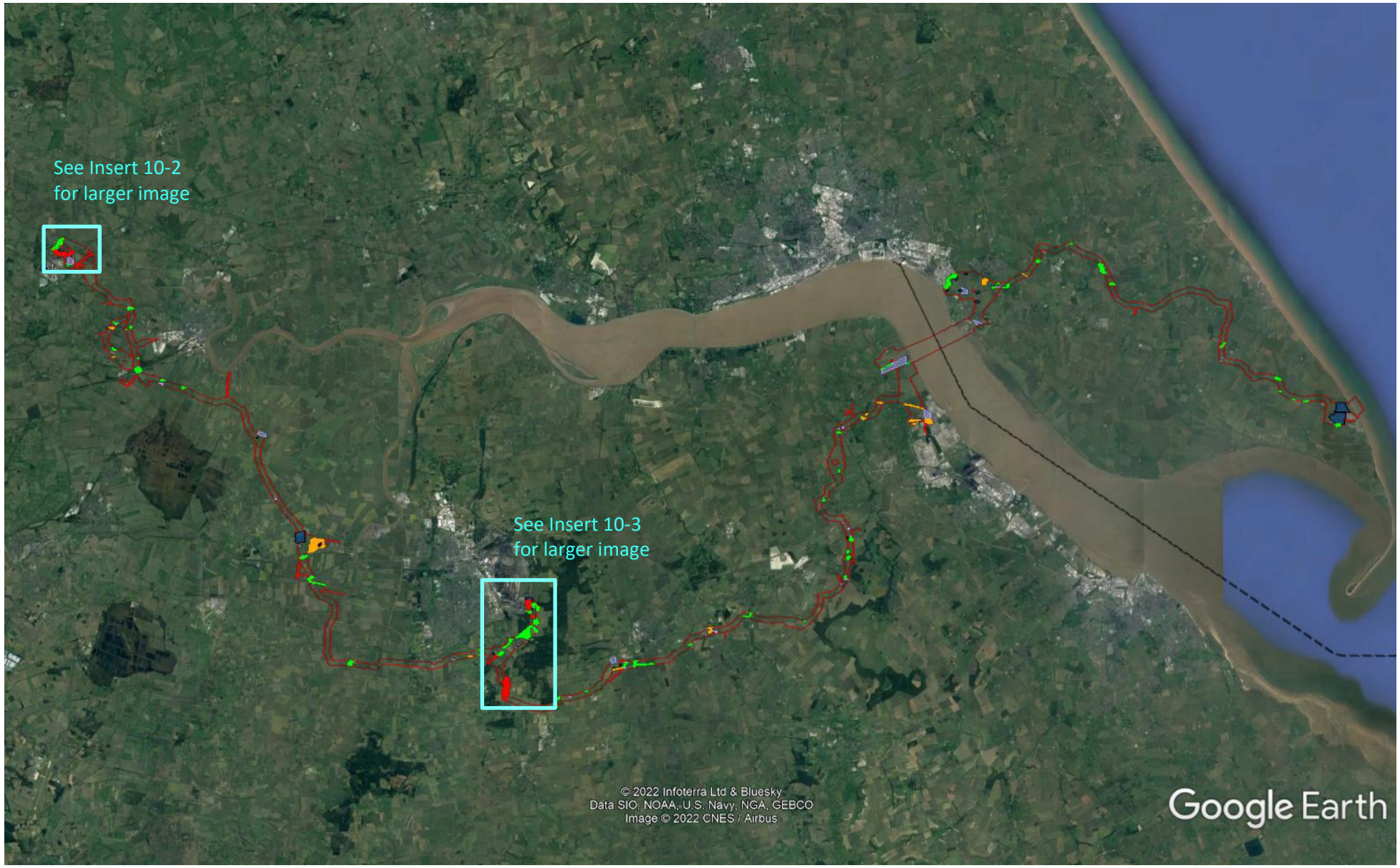
10.2.2 Survey effort instead focuses on woodland and mosaic habitat which occurs less frequently within the Study Area and the removal of which is likely to result in a greater impact on bat activity - compensatory woodland planting will take many years to reach maturity and, in some locations, easement restrictions may prevent compensatory woodland planting resulting in long-term fragmentation of foraging and/or commuting habitat.

10.2.3 Insert 10-1 shows Red-Amber-Green (RAG) ratings for woodland habitats within the Proposed Order Limits based on the following:

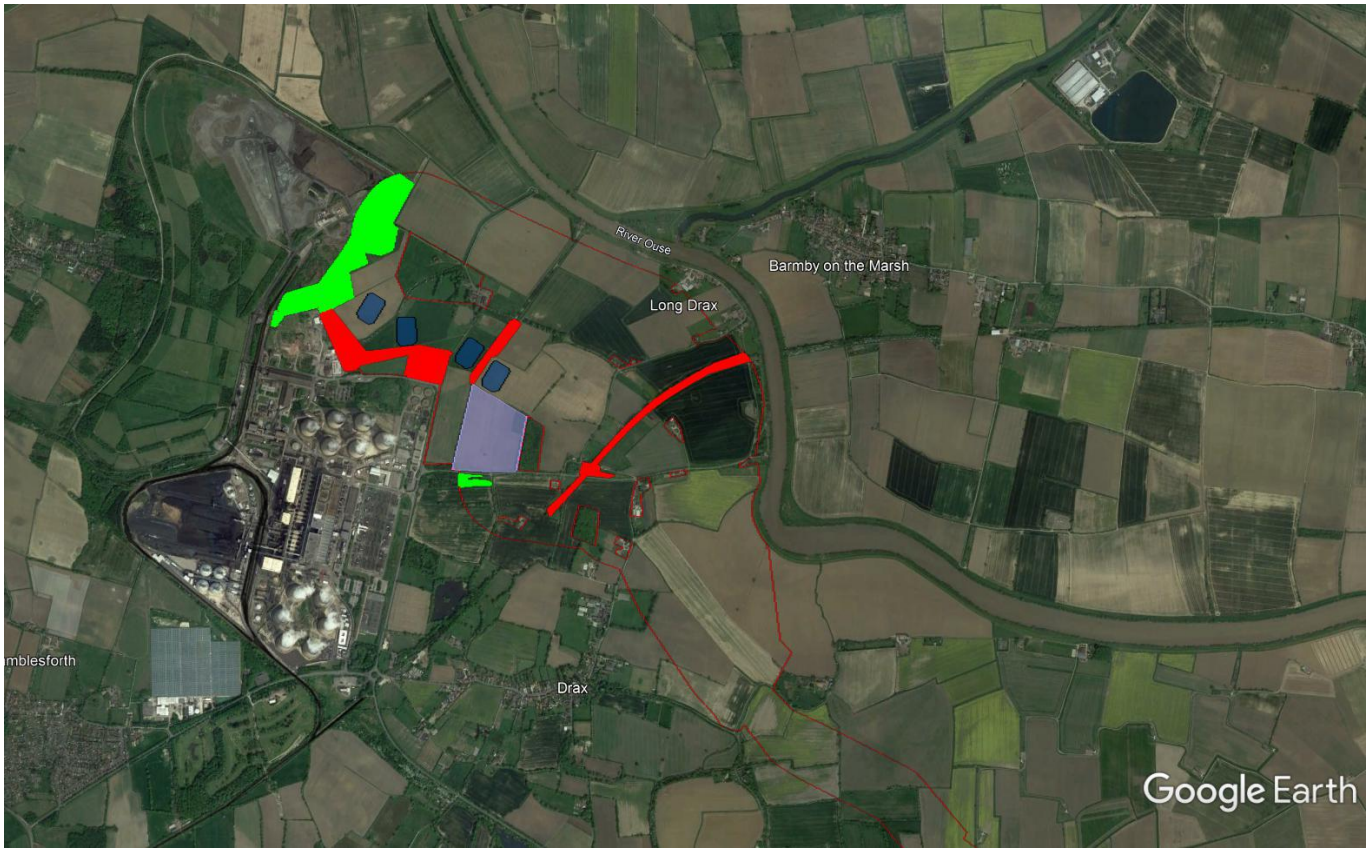
- Green – woodland habitat avoided by the route (i.e. no construction proposed, or construction will use trenchless techniques to avoid habitat loss);
- Amber – woodland/mosaic habitat where open-cut construction methods (and therefore habitat loss) cannot be ruled out but which are considered low-risk with regard to impacts on foraging/commuting bats. These areas are relatively isolated in the wider landscape and/or are limited in size and therefore unlikely to support large numbers of bats; and
- Red – woodland/mosaic habitat where open-cut construction methods (and therefore habitat loss) cannot be ruled out and which are considered high-risk with regard to potential impacts on foraging/commuting bats. These areas have good connectivity to woodland or other optimal foraging habitat in the immediate and wider landscape.

10.2.4 The screening exercise has identified six Red-rated areas as shown in Insert 10-2 and Insert 10-3.

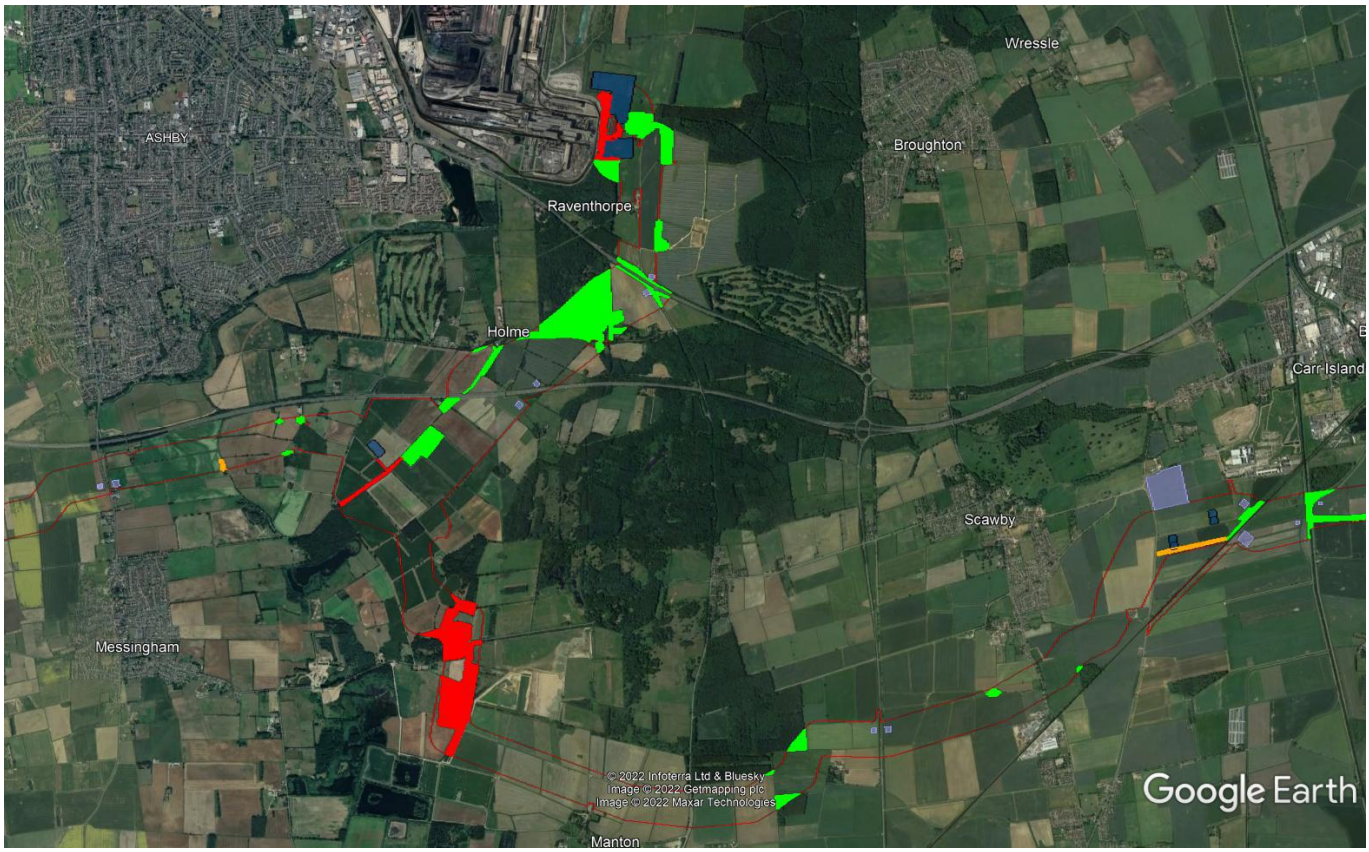
## Insert 10-1: Areas screened for survey (Red, Amber and Green) in relation to the Proposed Order Limits (red), AGI locations (dark blue) and temporary compounds (purple)



## Insert 10-2: Red-rated areas at the western end of the Proposed Order Limits



### Insert 10-3: Red-rated areas in the centre of the Proposed Order Limits




## 10.3 Proposed methodology

10.3.1 As bat activity and species diversity within the Study Area is low (see Section 10.1) it is not proposed to undertake any bat activity transect surveys.

10.3.2 Survey effort will instead focus on static surveys which provide greater understanding of variability in bat activity. Static surveys are also more objective, consistent and repeatable than transect surveys, providing a more robust baseline against which future monitoring can be undertaken and compared.

### Bat activity (static) survey

10.3.3 Bat static surveys will be undertaken for each of the Red-rated areas identified in Section 10.2. The habitats within the Proposed Order Limits have been assessed as being of overall “low” suitability for bat activity based on the habitat types present and limited species diversity identified in the desk study and through activity surveys undertaken for other infrastructure projects in the area.

10.3.4 In line with current guidelines (Ref 7.1.27), a single SM4 bat detector will be deployed at each Red-rated location once per season (spring, summer and autumn) to collect five consecutive nights of data on each deployment (i.e. 15 nights of data for each location in total). All surveys will be undertaken in appropriate weather conditions.

10.3.5 The locations of the static detectors have been determined according to a ‘judgemental’ sampling protocol with detectors placed at (or as close as possible to) likely points of habitat severance/fragmentation (based on the current design) as this is where impacts on bat activity are likely to be greatest.

10.3.6 The detectors will use omni-directional microphones to maximise the number of bat calls detected. Microphones will be positioned at 1-2 m above the ground, attached to landscape features (e.g. fence posts, trees, structures) with the microphones in a 45 degree downwards position.

10.3.7 The detectors will be programmed to commence recording 30 minutes prior to sunset and continue recording throughout the night until 30 minutes after sunrise, in line with current good practice guidelines (Ref 7.1.27).

10.3.8 Data collected will be analysed using automated bat call analysis software (Kaleidoscope Pro) to identify species with manual verification of a sample of calls for quality assurance.

## 10.4 Survey programme and effort

10.4.1 Bat static surveys will be undertaken between April and October, in line with current guidelines (Ref 7.1.27) with one five-night deployment during each of the following periods:

- Spring (April or May);
- Summer (June, July or August); and
- Autumn (September or October). (NB: as surveys at the “disused railway line” were not commenced until August 2022, surveys at this location will extend into April 2023 unless otherwise agreed with stakeholders).

10.4.2 This survey effort is considered proportionate in relation to the likelihood of bats being present, the likely species concerned, numbers of individuals, type of habitat affected, and predicted impacts of the development.

# 11. OTTER

## 11.1 Introduction

11.1.1 Adverse effects on otter (*Lutra lutra*) from construction activities could occur near to watercourses where underground (holts) or above-ground (couches) resting sites may be located, or along watercourses that otter use as corridors.

11.1.2 The Proposed Order Limits extends across multiple watercourses of various size and desk study information suggests that otter are widespread throughout the local area (occurring on several watercourses bisected by the Proposed Order Limits). For the purposes of EcIA, otter are assumed to be present on all suitable watercourses.

11.1.3 Construction activities will seek to avoid impacts to watercourses and time works to avoid disturbance to resting sites whilst occupied. Nevertheless, temporary impacts to habitats utilised by otter are anticipated during construction.

## 11.2 Screening for survey and defining the survey area

11.2.1 Desk based information, including local environmental records centre data and PEA results, will be reviewed to highlight watercourses and waterbodies suitable for otter or where presence has been historically recorded. Watercourses crossed by the Project will be assessed during the desk-based screening exercise.

11.2.2 A walkover of each site selected for survey will be conducted, and a decision taken on the need for subsequent detailed otter survey. This assessment should include consideration of each site against the following criteria:

- Proximity to the land required for construction of the Project;
- Presence of significant barriers to dispersal and movement through the territory;
- Habitats present and suitability for use by otter (including terrestrial habitats);
- Adjoining land use;
- Level of disturbance;
- Features of watercourse/water body (estimated depth, level of flow, width of channel);
- Connectivity with other areas of suitable or sub-optimal habitat; and
- Pollution.

## 11.3 Proposed methodology

11.3.1 Otter surveys will be undertaken in accordance with Chanin (Ref 7.1.36) and taking account of best practice guidance (Ref 7.1.37; Ref 7.1.38; and Ref 7.1.39) and CIEEM competencies for undertaking otter surveys (Ref 7.1.40).

11.3.2 Surveys focus on the identification of holts/resting places that could be impacted during construction.

### Aquatic/riparian habitats

11.3.3 Watercourse and waterbody banks which have been identified as having the potential to support otter and will potentially be affected by the Project will be surveyed for evidence, within a 200 m buffer of construction. This will also include riparian habitats such as reedbeds. Otter evidence includes footprints, spraints, anal jelly, feeding remains, slides, resting sites and breeding holts. Otter surveys can be undertaken at any time of year. Evidence of water vole and American mink will additionally be recorded.

### Terrestrial habitats

11.3.4 Woodland, scrub and derelict man-made features within 200 m of construction or 100 m of a watercourse or waterbody (which has been identified as having the potential to support otter – see Section 11.2) and identified as suitable for otter, will be surveyed for potential otter breeding holts. A holt will be classified as active where any of the following signs are present:

- Spraints or footprint within tunnel or immediate ground outside;
- Scratch marks and/or body rubbing against tunnel wall; or
- Otter hair within tunnel or immediate ground outside.

11.3.5 If a resting site or breeding holt is recorded, the location will be recorded on a GPS and suitably sized buffer zones will be identified to ensure no works that could otherwise elicit disturbance take place. Disturbance buffer zones will be classed as 30 m for an active otter resting place and, depending on the magnitude of works and local topography, 100-200 m for an active breeding holt.

11.3.6 In the unlikely event that any otter resting places are unavoidable, the temporary loss will be mitigated for under licence from Natural England.

## 11.4 Survey programme and effort

11.4.1 It is proposed that surveys are undertaken prior to site enabling and establishment works.

11.4.2 Survey should not be conducted during or following periods of heavy rainfall, as field signs will have been washed away. Where possible, survey visits should be timed to avoid survey when water levels are high.

# 12. WATER VOLE

## 12.1 Introduction

12.1.1 Based on desk study information, water voles are known to be widespread throughout the Proposed Order Limits with particular (known) 'hot spots' to the west and south-west of Scunthorpe and around the Humber at Goxhill and Paull.

12.1.2 The Project extends through a largely rural landscape, crossing multiple watercourses of various size. Construction activities will seek to avoid impacts to watercourses but temporary impacts to sections of field drains/ditches are anticipated and therefore temporary and minor impacts to water vole and their burrows are expected during construction.

12.1.3 The general approach to EcIA for water voles is to ensure that the Project results in an increase in area of better-quality habitat (patch quality) than that affected by the Project. This will be largely achieved by avoiding permanent impacts (from AGI's) to habitats of perceived value and reinstating habitats affected in areas of temporary habitat loss to equal or better condition than existing.

12.1.4 Water voles are also identified as an umbrella species within the BES (see Part A, above). The conservation targets for this species seek to identify and increase water vole distribution through the strategic creation and/or enhancement of wetland that is suitable for species and a mink control programme.

12.1.5 By following this approach, it is proposed that detailed water vole survey information is not required for EcIA and providing surveys are undertaken with sufficient time to apply for any licences required and undertake mitigation, they can be delayed until pre-construction (i.e. post DCO consent).

## 12.2 Screening for survey and defining the survey area

12.2.1 Desk based information, including local environmental records centre data, PEA results and other incidental water vole evidence, will be reviewed to highlight habitats which may be suitable for water vole. Habitats include ditches, streams, rivers, ponds and lakes.

12.2.2 Where potentially suitable habitat is identified and cannot be avoided by the Project, a habitat walkover survey will be undertaken in order to appraise the potential suitability of the habitat present for water vole in more detail and determine the scope of detailed survey.

12.2.3 The habitat assessment will be based on consideration of the following factors:

- Bank profile, channel profile and characteristics, and water levels;
- Availability of food sources;
- Vegetation structure (in particular the extent of suitable marginal vegetation);
- Level of shading;
- Disturbance levels;

- Bordering land use; and
- Connectivity with other areas of suitable or sub-optimal habitat.

12.2.4 Based on the above factors and any others which the surveyor considers to be important in the local context, habitat areas requiring detailed survey are to be determined, as well as areas that can be discounted from further investigation.

## 12.3 Proposed methodology

12.3.1 Survey methodology will follow the Water Vole Mitigation Handbook (l1). Two survey visits will be undertaken at each selected site to collect evidence of water vole presence, including latrines, burrows, runs, footprints, feeding remains and stashes, droppings and sightings. Additional information on the habitat will be collected during the first water vole survey, including water flow direction, bank substrate, existing disturbance, bank vegetation type and structure and adjoining land use.

12.3.2 Where there is uncertainty over droppings and additional field signs are inconclusive, dropping samples will be collected and sent away for DNA analysis. Once survey data has been obtained, the relative population size in each stretch of watercourse or surveyed habitat will be calculated using the methods in Dean *et al.* (l1).

12.3.3 Survey results will be used to inform a licence application to Natural England (where appropriate), with a method statement outlining the steps that would be taken to minimise impacts during construction and to improve the conservation status of water vole in the locality upon project completion.

## 12.4 Survey programme and effort

12.4.1 Two survey visits will be undertaken at each selected site spaced at least two months apart, with one survey between mid-April and the end of June, and the other between July and September. Surveys will avoid heavy rainfall or periods immediately thereafter.

# 13. ECOLOGICAL FEATURES NOT REQUIRING FURTHER SURVEY

## 13.1 White-Clawed Crayfish

13.1.1 The Project and its ZoI are perceived to be outside the current natural range for white-clawed crayfish (*Austropotamobius pallipes*). There is a 2021 record of a single individual approximately 1.7 km west (upstream) of the Project although this is currently considered an anomaly (Environment Agency, personal communication). Absence is therefore currently assumed and no surveys are proposed at present; however, it is acknowledged that the Environment Agency are planning to further investigate presence along that stretch of watercourse during 2022 and the situation may change in the future.

## 13.2 Great Crested Newt and Other Amphibians

13.2.1 Great crested newts (*Triturus cristatus*; GCN) are widespread throughout the region (I2) and therefore licensing and mitigation will be required to minimise impacts to this species.

13.2.2 District level licensing (DLL) is a type of strategic mitigation licence for GCN granted in certain areas at a Local Authority or wider scale with the aim of improved conservation outcomes for GCN. Where a DLL scheme is in place, developers can make a financial contribution to strategic, off-site habitat compensation instead of applying for a separate licence or carrying out individual detailed surveys.

13.2.3 DLL is currently available in North Lincolnshire and Yorkshire (excluding Calderdale, City of Bradford and Kirklees). It is currently unavailable in Lincolnshire but consultation with Natural England has been undertaken and given the proximity of the Project to DLL schemes in this area, it is proposed that the DLL approach to GCN conservation can be taken forward for the Project in its entirety.

13.2.4 Once the proposed route has been finalised, an application will be made to Natural England under the DLL scheme which will include the results of the desk study undertaken during the PEA.

13.2.5 By demonstrating that a DLL scheme for GCN will be used, GCN can be scoped out of detailed assessment in the EcIA. This is because, the DLL approach includes strategic area assessment, the identification of risk zones and strategic opportunity area maps, and a mechanism to ensure adequate compensation is provided.

13.2.6 The outcome of this assessment is documented within the Impact Assessment and Conservation Payment Certificate (IACPC) which will be appended to the EcIA to identify what the impacts associated with the Project equate too (in terms of compensatory ponds that will be created by Natural England within strategic locations) and confirm that, as a minimum, the impact to GCN associated with the Project is unlikely to be significant.

13.2.7 It is also proposed that the DLL approach, coupled with the temporary nature of the Project and the commitment to habitat improvements is also satisfactory to scope out other amphibians from consideration within the EcIA.

## 13.3 Pine Marten and Polecat

13.3.1 A single pine marten (*Martes martes*) record was returned from the data search, dated 2003, located within Messingham Sand Quarry SSSI, approximately 1.2 km west of the Proposed Order Limits. Although the SSSI will not be directly impacted by the works, the record of pine marten is an indication the species could be present in the wider area.

13.3.2 One record of polecat (*Mustela putorius*) was returned from the data search, dated 2015, located within the Proposed Order Limits north of Messingham.

13.3.3 Predominantly woodland species, pine martens and polecats use hedgerows for commuting. Construction activities will seek to avoid woodlands and minimise impacts to hedgerows but temporary impacts to hedgerows are anticipated and therefore temporary and minor impacts to both species are possible during construction.

13.3.4 The general approach to EcIA for pine marten and polecat is to ensure that the Project results in an increase in area of better-quality habitat (patch quality) than that affected by the Project. This would be largely achieved by avoiding permanent impacts (from AGIs) to habitats of perceived value and reinstating affected hedgerows to equal or better condition than existing, and (in line with the BES; see Part A, above) improving the quality and availability of ecological networks across the Project (through the conservation targets for keystone habitats).

13.3.5 It is proposed that both species are considered IEFs within the EcIA as a result of their rarity within the region, but that species-specific surveys are not required for EcIA given the patch quality approach described above.

## 13.4 Other Notable Mammals

13.4.1 The Project is situated outside the natural range of the dormouse (*Muscardinus avellanarius*) and there is no publicly available information that indicates that there are any nearby release sites. Absence is assumed and no dormouse surveys are proposed.

13.4.2 Brown hare (*Lepus europaeus*) and hedgehog (Erinaceus europaeus) are widespread across the Proposed Order Limits. Nevertheless, impacts are temporary and as habitats will be reinstated (to equal or better condition than existing), no significant impacts are envisaged. Typical best practice development measures (to minimise disturbance and entrapment within excavations for example) will be included within the CEMP but it is not proposed that these species are specifically identified as an IEF within the EcIA.

13.4.3 Five harvest mouse (*Micromys minutus*) records were returned from the data search. The records were spread across the Project, with the majority located within or adjacent to statutory or non-statutory designated sites. Impacts to designated sites would be minimised and, where they cannot be avoided, would be temporary. As habitats would be reinstated (to equal or better condition than existing), no significant impacts to this species are envisaged. As described above, typical best practice development measures will be included within the CEMP but it is not proposed that these species are specifically identified as an IEF within the EcIA

# 14. SURVEY AND ASSESSMENT SUMMARY AND PROGRAMME

**Table 14-1 Summary of survey and assessment requirements for DCO**

| Species | Survey and/or assessment required (yes/no/unknown) |
|---|---|
| Net Gain | Yes – Net Gain assessment (including BNG and Natural Capital commitments) |
| Preliminary Ecological Appraisal | Yes – surveys are ongoing |
| Phase 2 Botanical Surveys | Yes – Hedgerow Surveys – surveys are ongoing.<br>It is envisaged that the need for other Phase 2 botanical surveys will be largely avoided but this will be confirmed following PEA. |
| Intertidal and marine | Yes – Intertidal walkover, intertidal infauna and sediment sampling – undertaken 15 – 16 June 2022. |
| Intertidal and marine | Yes – Intertidal walkover, intertidal infauna and sediment sampling – undertaken 15 – 16 June 2022. |
| Invertebrates | Unknown – it is proposed that the need for survey will be avoided but this will be confirmed following PEA. No specific survey is proposed to inform the DCO application. Ad hoc findings will be recorded and assessed with desk study information and patch quality. Where required, detailed survey only planned to be undertaken to inform construction activities. |
| Fish | Unknown – it is envisaged that the need for survey will be largely avoided but this will be confirmed following completion of PEA. |
| Reptiles | No – no specific survey is proposed to inform the DCO application. Ad hoc findings will be recorded and assessed with desk study information and patch quality. Detailed survey only planned to be undertaken to inform construction activities. |

| Species | Survey and/or assessment required (yes/no/unknown) |
|---|---|
| Great Crested Newts and common amphibians | No – DLL approach being taken forward for GCN. |
| Birds | Passage and wintering: Yes – surveys are complete (methodology agreed with Natural England in November 2021).<br>Breeding: Yes – surveys are complete. |
| Badger | No – no specific survey is proposed to inform the DCO application. Ad hoc findings will be recorded and assessed with desk study information and patch quality. Detailed survey only planned to be undertaken to inform construction activities. |
| Bats | Roosts: Yes – further surveys to establish the presence of roosting bats (climbed inspections and/or dusk/dawn emergence/re-entry surveys) are ongoing.<br>Activity: Yes – static detector surveys to establish the potential impacts on commuting/foraging bats are ongoing. |
| Otter | No – no specific survey is proposed to inform the DCO application. Ad hoc findings will be recorded and assessed with desk study information and patch quality. Detailed survey only planned to be undertaken to inform construction activities. |
| Water Vole | No – no specific survey is proposed to inform the DCO application. Ad hoc findings will be recorded and assessed with desk study information and patch quality. Detailed survey only planned to be undertaken to inform construction activities. |
| Pine Marten | No – no specific survey is proposed to inform the DCO application. Ad hoc findings will be recorded and assessed with desk study information and patch quality. |
| Polecat | No – no specific survey is proposed to inform the DCO application. Ad hoc findings will be recorded and assessed with desk study information and patch quality. |

| Species | Survey and/or assessment required (yes/no/unknown) |
|---|---|
| Pine Marten | No – no specific survey is proposed to inform the DCO application. Ad hoc findings will be recorded and assessed with desk study information and patch quality. |
| Polecat | No – no specific survey is proposed to inform the DCO application. Ad hoc findings will be recorded and assessed with desk study information and patch quality. |

## Table 14-2 Survey schedule to support ES

| Survey type and dates | Survey/assessment period[4] | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2021 | | | | 2022 | | | | | | | | | | | | 2023 | | | |
| | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr |
| Desk study and habitat assessment **Sep 2021 – Dec 2022** | | | | | | | | | | | | | | | | | | | | |
| Phase 1 habitat survey & condition assessment **May – Sep 2022** | | | | | | | | | | | | | | | | | | | | |
| Phase 2 botanical survey (hedgerows)[5] **July – Sep 2022** | | | | | | | | | | | | | | | | | | | | |
| Intertidal and marine surveys **Apr – July 2022** | | | | | | | | | | | | | | | | | | | | |
| Fish surveys (if required) (survey timing is species dependent) **Sep 2022** | | | | | | | | | | | | | | | | | | | | |
| Breeding birds: Common birds census style survey **April – June 2022** | | | | | | | | | | | | | | | | | | | | |

[4] Dark colour months are within the optimum period, paler colour months are sub-optimum and white coloured months are not recommended for survey/assessment.

[5] Additional Phase 2 botanical surveys may be undertaken following review of extended Phase 1 habitat survey data.

| Survey type and dates | Survey/assessment period[4] | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2021 | | | | 2022 | | | | | | | | | | | | 2023 | | | |
| | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr |
| Wintering/passage birds: VP surveys (2 visits per month to each of the 2 VPs) **Sep 2021 – Apr 2022 and Aug 2022** | | | | | | | | | | | | | | | | | | | | |
| Wintering/passage birds: Transect surveys (2 visits per month to each transect). **Sep 2021 – Apr 2022 and Aug 2022** | | | | | | | | | | | | | | | | | | | | |
| Bats: Preliminary Roost Assessment **May – Sep 2022** | | | | | | | | | | | | | | | | | | | | |
| Bats: Roost inspection and/or emergence survey **Jul – Sep 2022** | | | | | | | | | | | | | | | | | | | | |
| Bats: Activity survey **May – Oct 2022 and April 2023[6]** | | | | | | | | | | | | | | | | | | | | |

[6] 'Disused railway line' only.

## Table 14-3: Recommended months to undertake each pre-construction survey/assessment

| Survey type and anticipated survey dates | Recommended survey/assessment period[7] | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| Invertebrate survey (if required) (timing is species/taxon dependent) **Jun – Sept** | | | | | | | | | | | | |
| Reptile survey (if required) **April – Jun and Sept** | | | | | | | | | | | | |
| Badger survey **Nov – Mar** | | | | | | | | | | | | |
| Otter survey (if required) **All year round** | | | | | | | | | | | | |
| Water vole survey **Survey 1: mid-April – June** **Survey 2: July – Sep** | | | | | | | | | | | | |

[7] Dark colour months are within the optimum period, paler colour months are sub-optimum and white coloured months indicate no surveys taking place.

# PART C – BIODIVERSITY ENHANCEMENT AND MANAGEMENT PLAN

**Draft to be completed in advance of DCO application**

# REFERENCES


- Ref 7.1.1 Lawton, J.H., Brotherton, P.N.M., Brown, V.K., Elphick, C., Fitter, A.H., Forshaw, J., Haddow, R.W., Hilborne, S., Leafe, R.N., Mace, G.M., Southgate, M.P., Sutherland, W.J., Tew, T.E., Varley, J., & Wynne, G.R. (2010) *Making Space for Nature: a review of England's wildlife sites and ecological network. Report to Defra*. [online]. Available at: https://webarchive.nationalarchives.gov.uk/ukgwa/20130402170324/http:/archive.defra.gov.uk/environment/biodiversity/documents/201009space-for-nature.pdf [Accessed September 2022].
- Ref 7.1.2 Defra (2011). *Biodiversity 2020: A strategy for England's wildlife and ecosystem services*. [online] Available at: https://www.gov.uk/government/publications/biodiversity-2020-a-strategy-for-england-s-wildlife-and-ecosystem-services [Accessed September 2022].
- Ref 7.1.3 Defra (2021). *A strategy for England's wildlife and ecosystem services, Biodiversity indicators: 2021 assessment revised*. [online] Available at: https://www.gov.uk/government/statistics/england-biodiversity-indicators [Accessed September 2022].
- Ref 7.1.4 Defra (2022a). *Nature Recovery Network*. [online] Available at: https://www.gov.uk/government/publications/nature-recovery-network/nature-recovery-network [Accessed September 2022].
- Ref 7.1.5 Defra (2022b). *National Pollinator Strategy: Pollinator Action Plan, 2021 to 2024*. [online] Available at: https://www.gov.uk/government/publications/pollinator-action-plan-2021-to-2024 [Accessed September 2022].
- Ref 7.1.6 Buglife (2022). *B-Lines*. [online] Available at: https://www.buglife.org.uk/our-work/b-lines/ [Accessed September 2022].
- Ref 7.1.7 Woodland Trust (2022). *The Northern Forest*. [online] Available at: https://www.woodlandtrust.org.uk/about-us/what-we-do/we-plant-trees/the-northern-forest/ [Accessed September 2022].
- Ref 7.1.8 CIEEM (2019). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine – version 1.1. Chartered Institute of Ecology and Environmental Management, Winchester.
- Ref 7.1.9 ARG UK (2017). Advice Note 4 – Amphibian Disease Precautions: A Guide for UK Fieldworkers.
- Ref 7.1.10 Panks, S., White, N., Newsome, A., Nash, M., Potter, J., Heydon, M., Mayhew, E., Alvarez, M., Russell, T., Cashon, C., Goddard, F., Scott, S. J., Heaver, M., Scott, S. H., Treweek, J., Butcher, B., and Stone, D (2022). *Biodiversity metric 3.1: Auditing and accounting for biodiversity – User Guide*. Natural England.
- Ref 7.1.11 Natural England (2020). *Priority Habitat Inventory (North) (England)*. [online] Available at https://naturalengland-defra.opendata.arcgis.com/datasets/priority-habitat-inventory-north-

england/explore?location=53.726357%2C-0.465401%2C12.31 [Accessed January 2022].

- Ref 7.1.12 Rodwell, J.S. (2006). *National Vegetation Classification: User's Handbook*. Joint Nature Conservation Committee, Peterborough.
- Ref 7.1.13 Defra (2007). Hedgerow Survey Handbook – A standard procedure for local surveys in the UK. (2nd edn).
- Ref 7.1.14 Drake, C. M., Lott, D. A., Alexander, K. N. A. and Webb, J. (2007). *Surveying terrestrial and freshwater invertebrates for conservation evaluation*. Natural England Research Report NERR005. Natural England, Peterborough.
- Ref 7.1.15 Environment Agency (2021). *Ecology and Fish Data Explorer*. [online] Available at https://environment.data.gov.uk/ecology/explorer/ [Accessed February 2022].
- Ref 7.1.16 HGBI (1998). *Evaluating local mitigation/translocation programmes; Maintaining Best Practice and lawful standards*. Herpetofauna Groups of Britain and Ireland (HGBI) advisory notes for Amphibian and Reptile Groups (ARGs). HGBI, c/o Froglife, Halesworth.
- Ref 7.1.17 Froglife (1999). Advice Sheet 10 – An introduction to planning, conducting and interpreting surveys for snake and lizard conservation. Froglife, Peterborough, UK.
- Ref 7.1.18 Froglife (2015). Surveying for reptiles; tips, techniques and skills to help you survey for reptiles. Froglife, Peterborough, UK.
- Ref 7.1.19 Natural England (2011). *Natural England Technical Information Note TIN102: Reptile Mitigation Guidelines*. Natural England, Peterborough. (Note this guidance was published and subsequently withdrawn in September 2011).
- Ref 7.1.20 BTO (2021). *WeBs data for Humberside*.
- Ref 7.1.21 Scottish Natural Heritage (SNH) (2017). *Guidance: Recommended bird survey methods to inform impact assessment of onshore wind farms*. [online] Available at: https://www.nature.scot/doc/recommended-bird-survey-methods-inform-impact-assessment-onshore-windfarms, [Accessed November 2021].
- Ref 7.1.22 Natural England (2021). Email communication between Susan Wilson (Natural England Senior Adviser for the Coast (Northern England)) and Neil Madden (Arcadis Associate Technical Director) to discuss Humber Low Carbon Pipelines passage/wintering bird survey methodology (September 2021).
- Ref 7.1.23 Bibby, C.J., Burgess, N.D., Hill, D.A. & Mustoe, S. (2000). *Bird Census Techniques*. Second Edition. Academic Press, London.
- Ref 7.1.24 Gilbert, G., Gibbons, D. W. & Evans, J. (1998). *Bird Monitoring Methods*. RSPB.
- Ref 7.1.25 Bird Survey & Assessment Steering Group. (2022). *Bird Survey Guidelines for assessing ecological impacts, v.0.1.6*. [online] Available at: https://birdsurveyguidelines.org [Accessed March 2022].
- Ref 7.1.26 Harris, S., Cresswell, P., and Jefferies, D. (1989). *Surveying Badgers*. Mammal Society.

- Ref 7.1.27 Collins, J. (2016). *Bat Surveys for Professional Ecologists*. Good Practice Guidelines (3rd edn). The Bat Conservation Trust. London.
- Ref 7.1.28 Bat Conservation Trust (2022). *Interim Guidance Note: Use of night vision aids for bat emergence surveys and further comment on dawn surveys*. [online] Available at: https://cdn.bats.org.uk/uploads/pdf/Interim-guidance-note-on-NVAs-May-2022-FINAL.pdf?v=1653399882 [Accessed May 2022].
- Ref 7.1.29 SSE Thermal (2021). *The Keadby 3 Low Carbon Gas Power Station Project. Environmental Statement Volume 2 – Appendix 11E: Bat Survey Report.* [online] Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010114/EN010114-000291-K3%20-%20Document%206.3.16%20-%20ES%20Appendix%2011E%20Bat%20Survey%20Report.pdf [Accessed June 2022].
- Ref 7.1.30 Clarkson and Woods (2020). *Little Crow Solar Park, Scunthorpe. Environmental Statement: Technical Appendices – Appendix 7.4 – Bat Activity Survey.* [online] Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010101/EN010101-000266-Document%20Ref%207.25%20LC%20TA7.4%20BAS.pdf [Accessed June 2022].
- Ref 7.1.31 WSP (2020). *North Killingholme Power Project – Bat Survey Report.* [online] Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010038/EN010038-001965-Environmental%20Report%20Appendix%205.2%20-%20Bat%20Survey%20Report.pdf [Accessed June 2022].
- Ref 7.1.32 Drax Power Limited (2018). *The Drax Power (Generating Stations) Order. Supplemental Environmental Information – Bat Activity Survey.* [online] Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010091/EN010091-000850-Drax%20Power%20Limited%20-%208.4.4%20Supplemental%20Environmental%20Information%20-%20Bat%20Activity%20Survey%20-%20Deadline%202%20Submission.pdf [Accessed June 2022].
- Ref 7.1.33 Jacobs (2015). *Keadby Windfarm Extension – Environmental Impact Assessment Scoping Report.* [online] Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010070/EN010070-000040-Scoping%20Report.pdf [Accessed June 2022]
- Ref 7.1.34 White Rose Carbon Capture and Storage Project (2014). The Proposed White Rose CCS Order. Drax Power Station, Selby, North Yorkshire. ES Volume 2 Chapter 1 – Ecology Technical Report. [online] Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010048/EN010048-000445-6.3.13%20ES%20Volume%202%20Chapter%20I%20-%20Ecology%20Technical%20Report.pdf [Accessed June 2022].
- Ref 7.1.35 Applied Ecology Ltd (2010). *South Killingholme Protected Species.* [online] Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR030001/TR030001-000387-11.3%20-%20South%20Killingholme%20Protected%20Species.pdf [Accessed June 2022].

- Ref 7.1.36 Chanin, P., Troughton, G., (2013) Otters – The British Natural History Collection 2. Whittet Books Ltd
- Ref 7.1.37 Chanin, P. (2003). *Monitoring the otter Lutra lutra*. Conserving Natura 2000 Rivers Monitoring Series No 10. Peterborough, English Nature.
- Ref 7.1.38 Liles, G. (2003). *Otter Breeding Sites: Conservation and Management*. Conserving Natura 2000 Rivers Conservation Techniques Series No. 5. English Nature, Peterborough.
- Ref 7.1.39 Chanin, P. (2005). *Otter surveillance in SACs: Testing the protocol*. English Nature, Peterborough.
- Ref 7.1.40 CIEEM (2013). *Competencies for Species Survey: Eurasian Otter*. Chartered Institute of Ecology and Environmental Management, Winchester.
- Ref 7.1.41 Dean, M., Strachan, R., Gow, D. and Andrews, R. (2016). *The Water Vole Mitigation Handbook* (The Mammal Society Mitigation Guidance Series). Eds Fiona Matthews and Paul Chanin. The Mammal Society, London.
- Ref 7.1.42 Natural England (2021). GCN Risk Zone modelling maps for South and East Yorkshire (and North Lincolnshire), North East Yorkshire and North West Yorkshire.
- Ref 7.1.43 Bourne Stream Partnership (2012). *BMWP Scoring – Measuring Freshwater Quality*. [online] Available at https://www.bournestreampartnership.org.uk/bmwp_scoring.htm [Accessed February 2022].
- Ref 7.1.44 IEMA (2015). IEMA Environmental Impact Assessment Guide To Shaping Quality Development.
- Ref 7.1.45 IEMA (2016). IEMA Environmental Impact Assessment Guide To Delivering Quality Development.

National Grid plc
National Grid House,
1-3 Strand,
London.
WC2N 5EH United Kingdom

Registered in England and Wales
No. 4031152
nationalgrid.com