NORTH LINCOLNSHIRE GREEN ENERGY PARK

Planning Act 2008

Infrastructure Planning (Applications Prescribed Forms and Procedure) Regulations 2009

APFP Reg. 5(2)(a)

Infrastructure (Environmental Impact Assessment) Regulations 2017

North Lincolnshire Green Energy Park

Volume 6

Environmental Statement

6.2.10 Ecology and Nature Conservation

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Acronyms and Abbreviations

Name	Description
AGI	Above Ground Installation
BBS	Breeding Bird Survey
BCT	Bat Conservation Trust
BNG	Biodiversity Net Gain
BoCC4	Birds of Conservation Concern 4
BTO	British Trust for Ornithology
CBMF	Concrete Block Manufacturing Facility
CoCP	Code of Construction Practice
DHPWN	District Heat and Private Wire Network
EcIA	Ecological Impact Assessment
ECoW	Ecological Clerk of Works
EIA	Environmental Impact Assessment
EMP	Ecological Management Plan
ERF	Energy Recovery Facility
ES	Environmental Statement
EV	Electric Vehicle
GCN	Great Crested Newt
GLNP	Greater Lincolnshire Nature Partnership
HPI	Habitats of Principal Importance
HRA	Habitats Regulations Assessment
HSI	Habitat Suitability Index
INNS	Invasive Non-Native Species
LDF	Local Development Framework
LBMMP	Landscape and Biodiversity Management and Monitoring Plan
LGS	Local Geological Sites
LNR	Local Nature Reserve
LWS	Local Wildlife Sites
MAGIC	Multi-Agency Geographic Information for the Countryside

Name	Description
NERC	Natural Environment and Rural Communities
NLGEP	North Lincolnshire Green Energy Park
NPPF	National Planning Policy Framework
PEIR	Preliminary Environmental Information Report
PRF	Plastic Recycling Facility
RGS	Regionally Important Geological Sites
RHTF	Residue Handling and Treatment Facility
SAC	Special Area of Conservation
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
WeBS	Wetland Bird Survey
W&CA	Wildlife and Countryside Act

1. INTRODUCTION

1.1.1.1 This chapter presents the Ecological Impact Assessment (EcIA) for the Project as described in Chapter 3 of the Environmental Statement (ES) (**Document Reference 6.2.3**). It deals with relevant ecological and nature conservation issues; provides details of the findings of desk studies and field surveys that have been completed up to and including April 2022; and presents an assessment of potential ecological impacts that may arise from the construction and operation of the Project.

1.1.1.2 The EcIA includes:

- summarised survey methodologies;
- the identification and description of existing ecological features within the Order Limits;
- an assessment of the significance of the effects of the Project on these ecological features;
- an assessment of the likely effects of predicted emissions to air on designated sites (Appendix A);
- appropriate mitigation measures (designed into the Project and general good practice measures);
- habitat and species-specific compensation measures for impacts on ecological features;
- an evaluation of biodiversity net-gain based on the Defra Biodiversity Metric 3.0 to assess habitat loss and gains (Appendix I); and
- an assessment of residual effects.

1.1.1.3 Potential cumulative effects with other developments during construction and operation are considered in Chapter 18: Cumulative Effects Assessment (**Document Reference 6.2.18**).

1.1.1.4 A Report to inform Habitats Regulations Assessment (HRA) (**Document Reference 5.9**) has been prepared to meet the requirements of the Conservation of Habitats and Species Regulations (2017) (as amended). This considers likely significant effects on the qualifying features of the Humber Estuary SAC, SPA and Ramsar Site.

1.1.1.5 For the purposes of this ES, the land within the Order Limits (the Application Land) has been split into four subsections:

- the Energy Park Land;
- the Railway Reinstatement Land;
- the Northern District Heat and Private Wire Network (DHPWN) Land; and
- the Southern District Heat and Private Wire Network (DHPWN) Land.

1.1.1.6 This Chapter contains updates to the version (Revision Number 0, APP-058) from March 2022, to take account of further written representations by and engagement with Natural England and other stakeholders as part of the Examination process. The updates take account of revised air

dispersion modelling based on a Reasonable Operating Case (ROC), rather than the previous modelling that was based on multiple worst-case scenarios. The ROC is intended to provide an understanding of the likely impacts from air quality to designated sites. Further explanation of the ROC is provided in Appendix A (Appendix 1 of Effects of Air Quality on European, Nationally and Locally Designated Sites).

2. POLICY CONTEXT, LEGISLATION, GUIDANCE AND STANDARDS

2.1 Introduction

2.1.1.1 This assessment takes account of key legislation and policy. The key documents considered relevant to the Project are discussed in Chapter 2: Policy and Legislative Context of the ES (**Document Reference 6.2.2)**. Legislation and policy specifically relating to ecology and nature conservation are outlined below.

2.2 National Policy

2.2.1.1 Section 4.3 of the Overarching National Policy Statement for Energy (EN-1) requires the consideration of possible effects from a project (either alone or in combination with other plans and proposals) on a European protected site. Where this is a possibility, an applicant should provide sufficient information to determine if an Appropriate Assessment is necessary under the Habitats etc Regulations, and if an Appropriate Assessment is required an applicant should then provide the Planning Inspectorate with sufficient information to make the assessment, including mitigation measures to minimise or avoid likely effects.

2.2.1.2 Section 5.3 (Biodiversity and geological conservation) of NPS EN-1 requires that EIA development clearly sets out any effects on internationally, nationally and locally designated sites of ecological or geological conservation importance, on protected species and on habitats and other species of principal importance for the conservation of biodiversity. An applicant should show how a project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests (paragraphs 5.3.3/4).

2.2.1.3 Paragraphs 5.3.9 to 5.3.14 note the 'hierarchy' of protected and important habitats from International protected sites, through national, local and irreplaceable habitats such as ancient woodland.

2.2.1.4 Paragraph 5.3.15 sets out how development proposals provide opportunities for biodiversity enhancement that should where possible be incorporated into a project design.

2.2.1.5 The protection of species and other habitats is addressed in paragraphs 5.3.16 and 5.3.17, noting that many individual wildlife species are protected under a range of other legislation.

2.2.1.6 NPS EN-3 (Renewable Energy Infrastructure) at paragraph 2.5.84 notes the need to consider biodiversity impacts associated with water use and discharge where biomass/waste to energy facilities are concerned.

2.2.1.7 On 6 September 2021, BEIS published for consultation a suite of five draft National Policy Statements to guide energy development proposals. The new NPSs were subject to consultation until the end of November. The House of Commons BEIS Committee reported on the Revised (Draft) National Policy Statement for Energy on 22nd February 2022, providing recommendations in relation to the suite of revised draft NPSs. The

expectation is that the suite of revised NPSs will be designated by Summer 2022.

2.2.1.8 The draft NPS EN-1 reiterates many of the considerations contained in NPS EN-1 but also introduces some additional policy considerations of relevance to assessing effects on biodiversity.

2.2.1.9 Section 4.5 (also paragraph 5.4.4) of the draft NPS EN-1 introduces biodiversity net gain. While noting that net gain is not an obligation for projects under the Planning Act 2008, an applicant "should seek opportunities to contribute to and enhance the natural environment by providing net gains for biodiversity where possible".

2.2.1.10 Paragraph 5.4.5 of the draft NPS EN-1 refers to the need for the Secretary of State to have regard to the aims and goals of the government's 25 Year Environment Plan in determining an application.

2.2.1.11 The National Planning Policy Framework (NPPF) sets out in paragraph 179 how the planning system is required to contribute to and enhance the natural and local environment by Identifying, mapping and safeguarding: components of local habitats and wider ecological networks (including the hierarchy of international, national and locally designated sites of importance for biodiversity); wildlife corridors and stepping stones that connect them; areas identified by national and local partnerships for habitat management, enhancement, restoration or creation.

2.2.1.12 The NPPF also sets out how the planning system is required to contribute to promoting "the conservation, restoration and enhancement of priority habitats, ecological networks and the protection and recovery of priority species; and identify and pursue opportunities for securing measurable net gains for biodiversity".

2.2.1.13 Paragraph 180 sets out several principles to be applied in determining applications for planning consent, including the need to avoid significant harm on biodiversity, protected sites and irreplaceable habitats as well as to seek to include measures as part of a project design to improve biodiversity in and around a project.

2.2.1.14 The following should be given the same protection as habitats sites:

a. potential Special Protection Areas and possible Special Areas of Conservation;

b. listed or proposed Ramsar sites; and

c. sites identified, or required, as compensatory measures for adverse effects on habitats sites, potential Special Protection Areas, possible Special Areas of Conservation, and listed or proposed Ramsar sites.

2.2.1.15 Paragraph 182 sets out how a presumption in favour of sustainable development does not apply where a project is likely to have a significant effect on a 'habitats site' (Special Protection Areas, Special Areas of Conservation, and Ramsar sites (either alone or in combination with other plans or projects), unless an appropriate assessment has concluded that a project will not adversely affect the integrity of the site. Similar

considerations apply for habitats sites where the Government has initiated public consultation on the scientific case for designation.

2.2.1.16 The National Planning Practice Guidance, NPPG, accompanies the NPPF, providing guidance on its interpretation. The NPPG includes guidance on how biodiversity should be considered when preparing a planning application. This makes clear that local planning authorities should only require ecological surveys where clearly justified and that ecological assessments should be proportionate to the nature and scale of development proposed and the likely effect on biodiversity. The Guidance provides further information on the interpretation of the mitigation hierarchy (avoid – mitigate – compensate) and suggests ways in which new development can include enhancements for biodiversity.

2.3 Local Policy

2.3.1.1 The North Lincolnshire Local Development Framework sets out the strategic policy framework for the North Lincolnshire region and is used to make decisions on planning applications. The Core Strategy (adopted 2011) is an important element of the development framework and Chapter 11, Environment and Resources, provides a detailed approach for managing the environment in spatial terms.

2.3.1.2 North Lincolnshire Council's Core Strategy (at policy CS17) states that the Council will promote effective stewardship of North Lincolnshire's wildlife through seven identified actions. In respect to habitats and species, the Lincolnshire Biodiversity Action Plan (LBAP) for Greater Lincolnshire was published in 2011 by the Lincolnshire Biodiversity Partnership (LBP). The Lincolnshire BAP seeks to meet the needs of UK BAP priority habitats found in Lincolnshire, while addressing local needs. The Plan ensures biodiversity is recognised as an essential element of life in the historic county of Lincolnshire and relevant policies are aimed at safeguarding, managing, monitoring and enhancing the biodiversity resources of the region.

2.3.1.3 The EcIA also takes account of key policies and strategies within the other Local Development Plan documents:

- the North Lincolnshire Local Plan (2003) Saved Policies (2007); and
- the Emerging North Lincolnshire Local Plan (Publication Draft) (2021).

2.4 Key Legislation

2.4.1.1 As well as addressing policy considerations, the EcIA is based on the following key legislation, policy and associated guidance:

- The Conservation of Habitats and Species Regulations (2017) (as amended) (known as the Habitats Regulations). The 2017 regulations transposed terrestrial and marine aspects of the Habitats Directive (Council Directive 92/43/EEC) and certain elements of the Wild Birds Directive (Council Directive 2009/147/EC) into UK law;
- The Wildlife and Countryside Act (W&CA) (1981) (as amended);
- the EU Birds Directive (2009/147/EC);

- the Natural Environment and Rural Communities (NERC) Act (2006);
- the Hedgerow Regulations (1997);
- the Protection of Badgers Act (1992);
- guidance from Defra / Natural England on protected sites and species;
- the Ecological Impact Assessment Guidance by CIEEM (2018); and
- the Environment Act (2021).

3. CONSULTATION

3.1.1.1 Table 1 and Table 2 below respectively present excerpts from the scoping opinion received from the Planning Inspectorate and consultation responses on the PEIR specific to the Ecology and Nature Conservation assessment. The tables describe how each response has been addressed, and, as appropriate where more information can be found in the ES.

Table 1: Scoping Consultation Responses

PINS ID	Issue	Inspectorate's comments	Response / Action	Reference within this document
4.6.1	N/A	No matters have been proposed to be scoped out of the assessment.	Proposals which will directly affect the River Trent have been removed from the scope of the Project.	N/A
4.6.2	Invasive Non-Native Species (INNS)	An INNS management plan should be included within the ES that describes the removal, management and potential destruction of INNS, with regard to the relevant legislation.	INNS recorded during surveys of the Application Land include occasional areas of Himalayan balsam (*Impatiens glandulifera*), Japanese knotweed (*Fallopia japonica*) and cotoneaster (*Cotoneaster* sp.). This matter has been further addressed in the ES. Measures to be detailed within the Construction Environmental Management Plan (CEMP) (as outlined in the Code of Construction Practice, CoCP) include pre-construction walkover surveys, Reasonable Avoidance Measures, and biosecurity protocols to prevent the spread of INNS in accordance with the relevant legislation and guidance	Paragraph 7.2.3.2 CoCP Annex 7 **(Document Reference 6.3.7)**
4.6.3	Likely significant effects	In addition to the likely significant effects listed in Scoping Report paragraph 11.4.1.1, the potential for noise impacts associated with the construction of the wharf and additional movements within the River Trent should be included	The proposals for the construction of a wharf extension and the requirement for dredging within the channel of the River Trent have been removed from the Project. As such, scoping of noise impacts regarding these matters will not be required. Additional movements within the River Trent are not anticipated to exceed the existing limits to which Flixborough Wharf is subject to. As there will be no change, impacts regarding additional movements have been scoped out.	N/A

		within the assessment. Cross references to the noise assessment should be made where relevant.		
4.6.4	Scope of the Habitat Regulation Assessment (HRA)	The spatial scope of the HRA should also include a 30 km radius for Special Area of Conservation (SAC) where bats are a qualifying feature, due to bat foraging distances.	The spatial scope for the HRA is discussed in the report to inform Habitats Regulations Assessment.	Report to inform Habitats Regulations Assessment (**Document Reference 5.9**)
4.6.5	Benthic ecology	An assessment of the impact that construction of the proposed wharf and of dredging activities (if required) on benthic ecology should be included within the ES.	The scope of the Project has changed, with no hard engineering works within or directly adjacent to the River Trent. As such, a detailed assessment of benthic ecology is no longer deemed necessary.	N/A

3.1.1.2 In addition to the formal consultation responses, email correspondence and meetings with Natural England have included use of the Discretionary Advice Service and matters related to bird surveys and biodiversity net-gain calculations. The purpose of the Discretionary Advice meeting, conducted on the 6th May 2021, was to update Natural England on the Project and ecological surveys carried out. The scope of surveys and approach to net-gain was confirmed and no major actions were arising. Following consultation on the PEIR, further correspondence was sought with Natural England to agree the scope of migratory bird surveys and to confirm that the full Order Limits should be included for all biodiversity net-gain calculations.

Table 2: Pre-application Consultation Responses

Consultee type	Consultee	Comments	Response / Action	Reference within this document
S42(a)	Burton upon Stather Parish Council	There are concerns about more light pollution and how this will affect the local bat colonies and wildlife.	We have carefully considered impacts on landscape and visual amenity, human health and wellbeing and ecology in developing our Indicative Lighting Strategy – Annex 4 of the Environmental Statement (**Document Reference 6.3.4**). Impacts from lighting in each of these cases are considered in Chapter 10: Ecology and Nature Conservation of the Environmental Statement (**Document Reference 6.2.10)** - in no cases do we expect there to be a significant adverse impact.	N / A
S42(a)	Environment Agency	Please be aware that if roosting bats are found and direct impacts cannot be avoided through appropriate timing, works will not be able to proceed until a Protected Species Licence has been obtained from Natural England.	This is noted. Bat surveys have a short lifespan and a further survey is usually required 1 year in advance of works; this form of mitigation is secured by a Construction Environmental Management Plan (CEMP) and will be applied to the small number of features which have suitability for roosting bats. The need for pre-works ecological checks is also outlined in the Code of Construction Practice (CoCP) in Annex 7 of the Environmental Statement (**Document Reference 6.3.7**).	Code of Construction Practice (CoCP) **(Document Reference 6.3.7)**
S42(a)	Environment Agency	Additional measures to enhance the biodiversity value of the Project could also include utilising raingardens alongside road verges to create pollinator habitat whilst simultaneously filtering out pollutants from surface water runoff before entering the drainage and river system.	Rain gardens could potentially be feasible within the Project, alongside naturalistic swale creation and enhancement of existing ditches. The Applicant is working with the Lincolnshire Wildlife Trust to identify what elements could be supported, to be developed as part of the detailed design stage.	N / A

Consultee type	Consultee	Comments	Response / Action	Reference within this document
			Ditch enhancements are proposed in the current landscaping masterplan - a wide buffer is recommended to optimise habitat connectivity.	
S42(a)	Environment Agency	Consideration should be given to the potential to enhance the ditches currently on and adjacent to the site to extend the habitat availability for otter and water vole. This includes a suitable long term maintenance plan.	Enhancement of the Lysaght drain will target habitat improvements for water vole. Ponds and associated wetland habitat will be created within the Order Limits and their management outlined in the Outline Landscape and Biodiversity Management and Monitoring Plan (LBMMP) submitted with the application **(Document Reference 5.7)**	Outline Landscape Biodiversity Management and Monitoring Plan (LBMMP) **(Document Reference 5.7)**
S42(a)	Flixborough Parish Council	The Parish Council strongly oppose the development and the environmental impact it will have. The use of the railway will decrease the biodiversity of the area as the habitat along the railway will be disturbed, plus the use of agricultural land for the Park will also decrease biodiversity.	The Project will deliver a biodiversity net gain (BNG). Minimising biodiversity impacts as well as creating new ecological habitats/landscapes is an important part of our approach to enhancing biodiversity at the site and we are committed to providing a minimum of 10% net-gain for biodiversity and the environment. Details of this are set out in the Biodiversity Net Gain Report in Appendix I of Chapter 10: Ecology and Nature Conservation in the Environmental Statement (**Document Reference 6.2.10**). Whilst the proposed new access road primarily crosses arable land which has a low habitat value, we intend to minimise the loss of valuable habitats as much as possible and are committed to fully offsetting habitat loss through the creation of valuable habitats and enhancement of lower quality habitats in the surrounding landscape.	N / A

Consultee type	Consultee	Comments	Response / Action	Reference within this document
			This is set out in Chapter 10: Ecology and Nature Conservation of the Environmental Statement (**Document Reference 6.2.10**)	
S42(a)	Flixborough Parish Council	It is also felt that the wetlands would be a welcome addition to help increase biodiversity and a safe haven for wildlife.	This is a key objective of the creation of new wetland landscapes, and we note this comment.	N / A
S42(a)	Natural England	Consideration of the Habitat Regulations is presented in Annex 5 of the PEIR. Annex 5 focusses solely on the potential effects of operational air quality. Paragraph 1.1.1.6 indicates that the screening matrices will include other potential effects arising from construction. Presumably this will be included with the Development Consent Order (DCO) submission. This should also consider other potential effects arising from operation. Natural England advises that the screening test should be carried out before the detailed assessment. Stage 1 of the Habitats Regulations Assessment (HRA), the Likely Significant Effect (LSE) test, should identify the potential for all construction and operational impacts of the proposed development on each interest feature of the European sites in question, both alone and in-combination with other plans and projects. We will provide our advice on the HRA when the relevant information for this stage in the application has been provided.	This is noted.	N / A

Consultee type	Consultee	Comments	Response / Action	Reference within this document
S42(a)	Natural England	SACs are designated for rare and vulnerable habitats and species, whilst SPAs are classified for rare and vulnerable birds. Many of these sites are designated for mobile species that may also rely on areas outside of the site boundary. These supporting habitats may be used by SPA/SAC populations or some individuals of the population for some or all of the time. These supporting habitats can play an essential role in maintaining SPA/SAC species populations, and proposals affecting them may therefore have the potential to affect the European site. It should be noted that some of the potential impacts that may arise from the proposal relate to the presence of SPA interest features that are located outside the site boundary. Natural England advises that the potential for offsite impacts should be considered in assessing what, if any, potential impacts the proposal may have on European sites.	This is noted. The potential for disturbance to qualifying interest bird species on functionally linked land is now considered in the HRA, as set out in Report to inform Habitats Regulations Assessment **(Document Reference 5.9)**	NA
S42(a)	Natural England	Should highly disturbing works, such as piling close to the River Trent, be scheduled for between October and March, Chapter 10, paragraph 7.1.2.2 outlines mitigation measures to be included within a Construction Ornithological Monitoring Plan (COMP). Mitigation measures should be agreed and	Chapter 10: Ecology and Nature Conservation of the Environmental Statement **(Document Reference 6.2.10)** lists mitigation actions required in respect of wetland birds and functionally linked land impacts to the Humber Estuary Ramsar/SAC and SPA. An ecological clerk of works is recommended to oversee and monitor levels of disturbance during construction activities.	Code of Construction Practice (CoCP) **(Document Reference 6.3.7)**

Consultee type	Consultee	Comments	Response / Action	Reference within this document
		implemented before construction work begins and Natural England advises against reliance on a 'monitor and manage' approach which we have found to be very difficult to implement.	Mitigation measures will be secured by the CEMP. However, a Construction Ornithological Monitoring Plan (COMP) is no longer required. The possible need for the COMP was initially identified to address construction works close to the River Trent undertaken during the wintering bird season (October to March), such as piling close to the river bank, which could cause high levels of disturbance and impacts on birds which are qualifying features of the Humber Estuary SPA. On further analysis, including as part of the HRA, it was assessed that such significant effects were unlikely to occur and that standard measures contained in the CEMP and the provision of an ecological clerk of works would be adequate mitigation.	
S42(a)	Natural England	Chapter 10, Appendix E Ornithology Surveys recorded a peak count of 42 mallard roosting and feeding along the banks of the River Trent. Mallard are an assemblage species of the Humber Estuary SPA/ Ramsar and this represents 4% of the Humber Estuary population (based on a five year average from 2015/16 – 2019/20). The River Trent therefore is considered functionally linked land and the potential for bird disturbance should be a key consideration within the HRA.	This is noted. The potential for disturbance to qualifying interest bird species on functionally linked land is considered in the HRA, as set out in the Report to inform Habitats Regulations Assessment (**Document Reference 5.9)**.	NA

Consultee type	Consultee	Comments	Response / Action	Reference within this document
S42(a)	Natural England	When identifying the potential for significant effects, we recommend that the seasonality of species designations be considered; for instance, whether there are records of a species during the season when it is identified as a designated site feature (e.g. during the breeding season). Although it is also worth considering impacts to those species at any time of year.	This is agreed and is considered as part of the HRA, as set out in the Report to inform Habitats Regulations Assessment (**Document Reference 5.9).**	NA
S42(a)	Natural England	As well as wintering waterbirds, the Humber Estuary provides safe feeding and roosting sites for species migrating between breeding sites in the arctic and subarctic, and wintering grounds in southern Europe and Africa. The Humber Estuary is therefore important for waterbirds on passage in spring and autumn as well as those species that stay all winter. Natural England therefore requires bird surveys to determine the population status of both wintering birds and passage birds. Chapter 10, Appendix E, paragraph 2.11 indicates that wintering bird surveys did not commence until November, missing the passage birds in September and October. Natural England do not agree that the site does not offer significant habitat for passage birds and we recommend that surveys be undertaken to cover the period August	Migratory bird surveys are being undertaken within the Order Limits now covers the period recommended by Natural England and the results will be available during the Examination. A walkover of the Southern DHPWN is programmed to assess potential for migratory birds are not considered necessary along this linear element of the scheme which is located immediately west of the A1077 and M181 roads and will be subject to temporary impacts only. The Northern DHPWN Land does not provide suitable habitats for migratory and overwintering birds so is exempt from these surveys. The Railway Reinstatement Land is a narrow corridor lined with woodland, scrub and grassland and will not be subject to migratory bird surveys given the low level of impacts. Breeding bird surveys covered the Energy Park Land and the Railway Reinstatement Land; no breeding bird surveys of the DHPWN land are considered necessary given the temporary and localised impacts.	N / A

Consultee type	Consultee	Comments	Response / Action	Reference within this document
		through to April. Weekly visits between September and November inclusive, and March and April inclusive, are recommended due to high turnover of birds during migration. The surveys should cover open arable land within the Order Limits, as well as land adjacent to the development that could be affected and provides the potential to support designated site species. The survey results should also provide some understanding of how the birds use the site as well as presence/ absence. Breeding bird surveys should cover the area within the Order Limits.		
S42(a)	Natural England	Finally, Table 5 and Table 6, within Chapter 10, Appendix E, identify SPA species. Although the Humber Estuary SPA stops further downstream, this section of the river is still part of the SSSI, which is designated for numerous bird interest features. Tables 5 and 6 should also identify SSSI species.	This is noted and is included in Chapter 10: Ecology and Nature Conservation of the Environmental Statement **(Document Reference 6.2.10).**	N / A
S42(a)	Natural England	Chapter 10, Appendix D Otter and Watervole Survey Report found evidence of water voles through the drains on the Energy Park Land and Railway Reinstatement Land. It is not yet fully understood what works to watercourses are being proposed. Natural	As set out in Chapter 10: Ecology and Nature Conservation of the Environment Statement (**Document Reference 6.2.10**), no water vole signs were found in areas where works will directly impact ditches. Evidence of water vole was found along the main Lysaght's drain, however this was at the eastern end, over 0.7 km from the Energy	Section 5.2.3, Section 6 and Appendix D.

Consultee type	Consultee	Comments	Response / Action	Reference within this document
		England recommends that water vole displacement should be implemented where work will impact sections of watercourse used by water vole. The developer should also ensure adjacent areas provide suitable water vole habitat prior to displacement. A license for this activity should be secured from Natural England prior to commencement of development.	Park. Repeat surveys will be undertaken in line with water vole guidance and if there is a risk of impacting water vole, displacement will be undertaken under a class licence.	
S42(a)	Natural England	Chapter 10, Appendix D Otter and Water vole Survey Report found evidence of otter using the River Trent. The survey found no evidence of otter using the watercourses within the Order Limits. However, otter territories may extend up to 12 km along water courses, so survey of the area within the Order Limits an 0.1 km buffer could miss signs of otter.	The River Trent will not be directly impacted by the Project. Ditches within the site were assessed as suboptimal for otter and highly unlikely to support otter holts/resting places, therefore a 0.1 km survey buffer is considered appropriate. Chapter 10: Ecology and Nature Conservation of the Environment Statement (**Document Reference 6.2.10**),outlines measures to minimise impacts to foraging and commuting otter.	Section 7.2.3
S42(a)	Natural England	Chapter 10, Appendix C outlines the results of ongoing great crested newt (GCN) surveys. Surveys to date have included ponds and suitable ditches within the Order Limits and within a 0.25 km buffer. Natural England expects, as a minimum, any and all waterbodies within 250 m of a potential development site be included within the survey, and normally up to 0.5 km as well. Suitable water bodies should be included within the survey	Although great crested newt may use suitable terrestrial habitat up to 0.5 km from a breeding pond, in this instance a 0.25 km search radius was considered appropriate due to the likely small scale habitat loss in close proximity to pond/ditches within 0.25 km of the Order Limits. The district level licensing scheme will be taken into consideration for any impacts to suitable habitats within 0.25 km of great crested newt ponds.	N / A

Consultee type	Consultee	Comments	Response / Action	Reference within this document
		unless there are clear barriers to GCN movement, obviously unsuitable habitat, or another valid reason for discounting ponds beyond 0.25 km from the Order Limits. If there is clear habitat connectivity and no obvious barriers stopping GCN reaching more distant waterbodies, then survey effort to 0.5 km should be undertaken. Surveys have found evidence of great crested newts in ponds within the Order Limits and 0.25 km buffer of the Railway Reinstatement Land and the Southern DHPWN Land. It is Natural England's opinion that habitats within and immediately surrounding the rail corridor are likely to provide good terrestrial habitat for GCN. Any works within these areas will likely need to be covered by an appropriate licence. You may wish to consider the district level licensing scheme. Further information about the scheme, and how to join, can be found here.		
S42(a)	Natural England	Badgers - Should any piling and/ or blasting work be proposed, Natural England recommends that the survey buffer should be extended to 0.1 km around the area where such works are to be carried out.	The existing survey covered the majority of areas that would be located within 0.1 km of any high noise/vibration activities. Repeat surveys and monitoring of known setts will be informed by the need for blasting and piling and will ensure any areas not previously surveyed are covered.	N / A

Consultee type	Consultee	Comments	Response / Action	Reference within this document
S42(a)	Natural England	In addition, Natural England notes Chapter 10, Appendix E Ornithology Surveys have identified a breeding population of Cetti's warbler. The developer is advised to speak to the ecologist at the local authority to ensure there is no net loss of habitat for this species due to the development.	This is noted. Discussions have taken place with NLC's Ecologist regarding creation of wetland habitat with areas of wet woodland and reedbeds, which provide suitable compensation for Cetti's warbler.	N / A
S42(a)	Natural England	We welcome mitigation measures proposed in Chapter 10, Section 7. The specifics of these measures should be detailed in the Code of Construction Practice (CoCP) and Ecological Management Plan (EMP) which will need to be agreed with Natural England. Potential for noise, vibration and visual disturbance as a result of the construction and operation of the development should be a key consideration of the HRA process. Chapter 13 (Traffic and Transport), paragraph 8.2.5.3 indicates that there will be an additional 580 vessel movements per annum at Flixborough Wharf as a result of the proposed development. This represents a significant increase of 200% (when compared to 305 vessel movements in 2019) and should be considered within the HRA. As the development includes new access routes close to the designated site boundary, the HRA and SSSI assessment should also	The potential for disturbance (noise/vibration/visual) to qualifying interest bird features during construction and operation of the scheme, which is considered in the Report to inform the Habitats Regulations Assessment **(Document Reference 5.9)**. It is noted that the potential for recreational disturbance will also be included. The potential for disturbance (noise/vibration/visual) to qualifying interest bird features of the Humber Estuary SPA and Ramsar during construction and operation has been considered in the Report to inform the Habitats Regulations Assessment **(Document Reference 5.9)** – including the potential effect of vessel movement on birds using the River Trent. The potential for recreational disturbance has also been considered.	

Consultee type	Consultee	Comments	Response / Action	Reference within this document
		consider the potential for recreational disturbance impacts.		
S42(a)	Natural England	Natural England notes that the application site is in close proximity to a number of SSSIs. Based on the plans submitted, Natural England considers that the proposed development could have potential significant effects on the interest features for which the sites have been notified. Chapter 10 correctly identifies SSSIs for assessment. Our advice regarding the potential impacts upon the Humber Estuary SSSI coincides with our advice regarding potential impacts upon the Humber Estuary SAC/SPA/Ramsar as detailed above. In addition, it is worth noting that environmental benchmarks for air quality emissions at Risby Warren SSSI are already exceeded and this should be a key consideration when undertaking the in-combination assessment.	Chapter 10: Ecology and Nature Conservation (**Document Reference 6.2.10)** and Chapter 5: Air Quality of the Environmental Statement **(Document Reference 6.2.5)** provide an assessment of the likely significant effects on surrounding SSSIs and their designated interest features.	Section 8.2, Appendix A and Chapter 5 **(Document Reference 6.2.5)**.
S42(a)	Natural England	Large areas of land within the Order Limits will remain undeveloped, although it is unclear whether any works are proposed. Natural England would welcome clarification about current and future plans for the eastern part of the Energy Park Land (referred to as “F - Site East” in the	Please refer to the Environmental Statement Project Description and layout figure in Chapter 3: The Project Description and Alternatives of the Environmental Statement (**Document Reference 6.2.3**) for further information on areas of land to be disturbed for construction purposes, those areas to be enhanced through biodiversity measures, and those areas which will remain in their current	Project Description (**Document Reference 6.2.3**), Flood Risk Assessment **(Document Reference 6.3.3)** and Chapter 14

Consultee type	Consultee	Comments	Response / Action	Reference within this document
		Flood Risk Assessment, Annex 3 of the PEIR). Soil is a finite resource that fulfils many important functions and services (ecosystem services) for society, for example as a growing medium for food, timber and other crops, as a store for carbon and water, as a reservoir of biodiversity and as a buffer against pollution. It is therefore important that the soil resources are protected and used sustainably. The assessment should consider the following issues as part of the Environmental Statement: 1. The degree to which soils are going to be disturbed/harmed as part of this development and whether 'best and most versatile' agricultural land is involved. This may require a detailed survey if one is not already available. For further information on the availability of existing agricultural land classification (ALC) information see www.magic.gov.uk. Natural England Technical Information Note 049 - Agricultural Land Classification: protecting the best and most versatile agricultural land also contains useful background information. 2. If required, an agricultural land classification and soil survey of the land	form as agricultural land in accordance with the Flood Risk Assessment (FRA) in Annex 3 of the Environmental Statement **(Document Reference 6.3.3).** Please also refer to Section 6.8, Chapter 14: Economic, Community and Land Use Impacts of the Environmental Statement (**Document Reference 6.2.14**) for further information on agricultural land classification.	(**Document Reference 6.2.14**).

Consultee type	Consultee	Comments	Response / Action	Reference within this document
		should be undertaken. This should normally be at a detailed level, e.g. one auger boring per hectare, (or more detailed for a small site) supported by pits dug in each main soil type to confirm the physical characteristics of the full depth of the soil resource, i.e. 1.2 metres. 3. The Environmental Statement should provide details of how any adverse impacts on soils can be minimised. Further guidance is contained in the Defra Construction Code of Practice for the Sustainable Use of Soil on Development Sites.		
S42(a)	Natural England	Natural England welcomes preparation of a detailed EMP to include details of the creation and ongoing management of mitigation habitat, alongside the enhancement of existing habitat. We fully support and encourage plans to deliver Biodiversity Net Gain (BNG) on site. As per previous correspondence, we recommend you get in touch with North Lincolnshire Council's Natural Environment Policy Specialist to discuss the matter and help shape the detail of your approach to BNG. As a Nationally Significant Infrastructure Project (NSIP), the project does not fall directly within the remit of the national policy requirement within The Environment	Although there is not currently a policy requirement to provide a minimum percentage of BNG, a BNG assessment has been completed, which shows at least a 10% net-gain in habitat areas. This can be found in Appendix I: Biodiversity Net Gain Report of Chapter 10: Ecology and Nature Conservation in the Environmental Statement **(Document Reference 6.2.10)**. Details of the enhancement and habitat creation methods and ongoing management will be discussed in correspondence with NLC and final details will be submitted to NLC (as the relevant planning authority) for approval in order to discharge the relevant requirement in the DCO. It is recognised that the Defra metric does not consider, override or undermine any existing planning policy or legislation, including the	N / A

Consultee type	Consultee	Comments	Response / Action	Reference within this document
		Bill to deliver 10% BNG. However, the Government has committed to amending the Environment Bill to include mandatory BNG for NSIPs down to mean low water. Please be advised that the Defra metric should not be used to assess impacts and calculate compensation for habitat damage or loss in designated sites or irreplaceable habitats. Any impacts on such habitats and sites should be assessed in accordance with planning policy and via environmental assessments, such as an Appropriate Assessment where European sites are concerned, with any necessary mitigation or compensation requirements dealt with separately from BNG provision.	mitigation hierarchy. The assessment of likely significant effects on ecological features, and the need for mitigation/compensation, have been undertaken independently of the Defra metric.	
S42(b)	North Lincolnshire Council	The submitted Screening information deals only with ongoing air pollution impacts on the Humber Estuary and records a finding of no likely significant effect on the European Sites. In due course, screening matrices will also consider construction impacts and other effects. It is agreed that this is necessary.	This is noted.	N / A
S42(b)	North Lincolnshire Council	Chapter 10 of the PEIR records that details surveys have been carried out for various protected and priority species, including: ▪ Great Crested Newts (GCN) ▪ Water Vole ▪ Otter ▪ Wintering Birds	This is noted.	N / A

Consultee type	Consultee	Comments	Response / Action	Reference within this document
		▪ Breeding Birds ▪ Bat Activity and Tree Assessments ▪ Badger ▪ Terrestrial Invertebrates ▪ Reptiles The survey methods used and the survey effort deployed are appropriate for the site in question and for the target species. To varying degrees and in different locations, evidence was found for most of the surveyed taxa. Appropriate mitigation measures and sensitive working methods have been proposed for the species concerned. Where necessary, the appropriate licences are specified."		
S42(b)	North Lincolnshire Council	With this application, section 10.1.2 of the Ecology chapter sets out proposals to achieve at least a 10% net gain in biodiversity value. This is welcomed. Along with colleagues from the RSPB and Lincolnshire Wildlife Trust, the Council's ecologist has been involved in discussions with the applicant's ecologists to discuss appropriate habitats and locations for the biodiversity net gain. In order to make sure that biodiversity net gain is quantified and deliverable, the applicant is advised to make use of Defra's Biodiversity Metric Version 3.0. Section 10.1.3 of the Ecology chapter sets out appropriate enhancements for	The Defra Biodiversity Metric Version 3.0 has been used to carry out a net-gain assessment, as set out in the Biodiversity Net Gain Report in Appendix I of Chapter 10: Ecology and Nature Conservation in the Environmental Statement (**Document Reference 6.2.10**)	Appendix I

Consultee type	Consultee	Comments	Response / Action	Reference within this document
		protected and priority species that have been recorded. Requirements will be needed to secure sensitive working methods, mitigation and biodiversity enhancements.		
S47	Local Community	I applaud the wetland, woodland landscapes but it would need to be substantial to have a positive environmental impact and be part of the mitigation plans and I can't see that it will be. cycle and walking routes are always a benefit to peoples wellbeing.	As set out in the Design Principles and Codes document **(Document Reference 5.12)** one of the Design Principles is to 'respect, restore and promote the rich biodiversity and ecology of local terrestrial ecosystems'. The creation of new wetland and woodland landscapes is an important part of our approach to delivering this principle and enhancing biodiversity at the site and we are really pleased that these proposals are being positively received. The exact size and nature of these habitats will be informed and guided by our ongoing ecological surveys which have been underway since 2018, as well a detailed biodiversity impact assessment, using the latest Defra biodiversity net-gain metric to deliver a minimum of 10% net-gain for biodiversity and the environment. The Biodiversity Net Gain Report can be found in Appendix I of Chapter 10: Ecology and Nature Conservation of the Environmental Statement **(Document Reference 6.2.10).** We are committed to providing this net gain to ensure habitat losses are offset and retained habitats are appropriately enhanced to improve their condition. We are in regular dialogue with the Lincolnshire Wildlife Trust, North Lincolnshire Council and the	Section 7

Consultee type	Consultee	Comments	Response / Action	Reference within this document
			Royal Society for the Protection of Birds (RSPB) to ensure that all habitats are appropriate and sensitive to the local area. We have set out the full results of our assessment of potential effects on ecology and nature conservation, as well as updated mitigation proposals, in Chapter 10: Ecology and Nature Conservation of the Environmental Statement **(Document Reference 6.2.10).**	
S47	Local Community	this looks very good as long as the artist's designs come to fruition and nothing is downgraded to save money	The ability for the Project to be resilient and retain the ability to respond to change was one of the Project Principles that has shaped the Project as a whole to date. Technology is changing all the time; therefore, it is important that a level of flexibility is retained within the design that ensures the Project has the flexibility to utilise the latest technology on the market. The Project Principles set out a number of guiding principles which have shaped the Project to date and will continue to shape the detailed designs. We have prepared and submitted a Design Principles and Codes (**Document Reference 5.12**) document that will be used to secure the principles of the indicative designs of the project. The Design Principles and Codes will be secured through the DCO and will guide the detailed design. We will therefore need to comply with these principles and codes.	NA
S47	Local Community	The Environmental Impact - on the surrounding land what about the protection	We have assessed potential impacts on ecology, landscape and visual impacts and the public rights	Section 8.2 (also Chapter 11,

Consultee type	Consultee	Comments	Response / Action	Reference within this document
		of the woodlands, green fields, wildlife, bridle ways, public footpaths and walkways. Not to mention all the valuable eco systems and habitats that will be destroyed should this go ahead. Also, the River Trent and the River Humber are sites of special interest and conservation areas, what happens when there are any waste spillages including plastics which has been highlighted on the news recently for how damaging this in both in water and on land for wildlife.	of way as part of the Environmental Statement**.** This has included designated sites for ecology. We believe that the Project will make a positive contribution to people's enjoyment of the local environment. The new woodland and wetland landscapes will create new routes for walking and cycling, provide better access to the River Trent and the countryside and improve local biodiversity. The Project will also create a net gain in biodiversity, as set out in Chapter 10: Ecology and Nature Conservation of the Environmental Statement **(Document Reference 6.2.10**). The Project will be a well-managed facility and we do not expect to create spillages of the kind described.	**Document Reference 6.2.11**, and Chapter 14, **Document Reference 6.2.11**)
S47	Local Community	We have plenty of nature reserves & wetlands already, How will this affect the protected species we have on this side of the river in Amcotts?	Ecological desk study information has identified the presence of the following protected species within the wider area, including land to the west of the river: bats; great crested newt; water vole; otter; badger; wintering birds; breeding birds; reptiles; terrestrial invertebrates. Chapter 10: Ecology and Nature Conservation in the Environmental Statement **(Document Reference 6.2.10)** concludes that there are to be no significant effects on all species, except for birds and badger. Badger impacts are localised only and do not pose wider effects on any populations west of the river. Bird impacts are associated with a loss of habitat; however, once proposed habitat creation and enhancement measures become established, the Project aims to create more	Table 13

Consultee type	Consultee	Comments	Response / Action	Reference within this document
			valuable and diverse habitats for birds in the long-term.	
S47	Local Community	I am concerned for the surrounding natural habit, such as Alkborough Flats.	Alkborough Flats is located to the north of the proposed scheme, and as for all surrounding sites of local and national value for the environment and biodiversity, necessary mitigation is incorporated into the project design and will be implemented during the working practices related to both construction and operational phases of the Project. This extends to addressing potential impacts arising from pollution, dust, surface water management, noise emissions, vibration disturbance, light pollution and biosecurity, all of which will be detailed within the CEMP which is secured through a requirement of the DCO.	NA
S47	Local Community	You have a great opportunity to put in the surrounding area a public orchard using fruit trees that are fully sized and not dwarf varieties that take longer to mature but will stand the test of time ,people will attracted to visit especially if there if free produce for people when its fruiting time , types to grow are CHERRIES , PLUMS , APPLES ,MEDLARS , QUINCE , MULBERRY , just to name a few , also you could plant varieties that have become endangered .	Under the mitigation measures relating to loss of habitat for wintering birds, the Applicant proposes scrub/hedgerow planting with berry/fruit bearing native trees and shrubs such as hawthorn, blackthorn, crab apple (*Malus sylvestris*), holly, bird cherry (*Prunus padus*), wild cherry (*Prunus avium*), buckthorn (*Rhamnus catharticus*) and rowan to form part of the soft landscaping for the energy park, where large numbers of winter thrushes have been recorded. Importantly, community farming, re-establishing indigenous plants, sensory areas, voluntary participation through the Wildlife Trust, and public access are all topics under discussion. These options need to be properly managed to ensure	Section 7 (e.g. paragraph 7.2.3.13)

Consultee type	Consultee	Comments	Response / Action	Reference within this document
			long-term funding, development, and protection, which the Applicant is working to put in place.	

4. ASSESSMENT PARAMETERS

4.1.1.1 The methodology for assessing the effects on ecology and nature conservation considers feedback contained in the Scoping Opinion, as well as other comments received as part of the ongoing stakeholder engagement including from Natural England and North Lincolnshire Council.

4.1.1.2 The objective of the assessment is to gather and assess data on internationally, nationally and locally designated sites of nature conservation importance, on legally protected species, and on habitats and species identified as being of principal importance for the conservation of biodiversity (HPI; SPI; identified under Section 41 of the NERC Act, 2006) or which are otherwise regarded to be of importance. This information has been used to inform the Project design, with further information provided in section 5.5 of the Design and Access Statement (**Document Reference 5.3**). The information has also been used to inform the assessment of impacts resulting from the Project, and to formulate appropriate mitigation where impacts are unavoidable. The EcIA describes all likely effects, lists all mitigation measures and reports on residual effects.

4.1.1.3 The EcIA considers construction and operation of the Project. Regarding the construction phase, the focus is upon the types of impacts that will arise from construction in the Energy Park Land, in addition to the Railway Reinstatement Land, the Northern DHPWN Land and the Southern DHPWN Land.

4.1.1.4 The operational phase includes the operation of all developments within the Energy Park Land, the reinstated Dragonby to Flixborough rail line and the DHPWN, as well as maintenance and refurbishment of the Project. The operational phase will also include the ongoing, long-term management commitments for the green infrastructure, sustainable drainage systems (SuDS) and other habitat mitigation, compensation and enhancement features.

4.1.1.5 The precise details of the decommissioning process are not presently foreseeable. However, the impacts and effects of decommissioning are unlikely to be materially different or greater than those from construction and associated impacts are likely to be manageable to a similar extent as during construction. Overall, it is anticipated that ecological effects from decommissioning works will be no greater than those associated with the construction works. As such, the assessment of effects generated by construction works will be applicable to both the construction and decommissioning phases of the Project.

5. ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

5.1.1.1 The methodology used to assess effects on ecology and nature conservation was based on the CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland. The assessment involves:

- identifying relevant ecological features which may be affected by the Project, through desk-based and field survey work;
- setting out mitigation and compensation inherent to the Project, including established best practices, legislative requirements and design measures. This is split into construction phase mitigation, compensatory habitat creation and operational phase mitigation;
- predicting likely impacts (actions resulting in changes to an ecological feature) and assessing resultant effects (outcome resulting from an impact upon the conservation status or structure and function of an ecological feature) arising from construction and operation;
- detailing additional biodiversity enhancement measures which contribute to an overall net gain in biodiversity units (informed by an assessment of net gain using the Defra Biodiversity Metric 3.0; Appendix I); and
- assessing overall residual effects (predicted to remain after the implementation of mitigation, compensation and enhancement measures) of the Project.

5.1.1.2 To support the assessment, the scale at which relevant ecological features have value was determined with reference to the following geographical levels:

- international (generally this is within a European context, reflecting the general availability of good data to allow cross-comparison);
- national (Great Britain, but considering the potential for certain features to be more notable (of higher value) in an England context relative to Great Britain as a whole);
- regional (East Midlands);
- county (Lincolnshire);
- district (North Lincolnshire);
- local (features that do not meet criteria for valuation at a District or higher level, but that have sufficient value at the site level to merit retention or mitigation); and
- negligible (common and widespread features that have very low value at the site level and which do not require retention or mitigation at the relevant location to otherwise maintain a favourable nature conservation status or to deliver wider relevant biodiversity objectives).

5.1.1.3 The assessment of likely effects includes consideration of whether changes are beneficial or adverse in line with nature conservation objectives and policies. A beneficial change improves the quality of the environment or halts or slows an existing decline in quality, whilst an adverse change

reduces the quality of the environment. Where possible, the magnitude or intensity of impacts is described quantitatively, including the spatial area or distance over which the impact/effect occurs. The assessment also considers the duration of an impact, or the time over which an impact is expected to last prior to recovery or replacement of the feature, as well as whether an impact is temporary or permanent. Temporary impacts are where recovery is possible or for which effective mitigation can be implemented. A permanent effect is one from which recovery is either not possible or cannot be achieved within a reasonable timescale (in the context of the feature being assessed).

5.1.1.4 The assessment of likely significant and residual effects uses the CIEEM (2018) approach, which categorises effects as *significant* or *not significant* and quantifies them in relation to the *geographic scale at which the effect is significant*. This depends on the likely severity and spatial scale of effects, the level at which the integrity of an ecological feature will likely be affected, and whether the effects will likely result in a temporary or more permanent long-term effect on the extent, size or integrity of a site, habitat, species assemblage or community, population, or group. Highly localised geographic effects were categorised as significant at a site level; moderately localised effects were categorised as significant at a local level; and more widespread effects were categorised as significant at a district level.

5.2 Establishing the baseline

5.2.1.1 This section summarises the approach used to define the baseline study area, and the methods used for the desk study and baseline ecology surveys.

5.2.2 Background

5.2.2.1 For most ecological receptors, the survey and assessment area boundaries were defined by the Order Limits. However, the total area surveyed for species and habitats was larger than this for reasons relating to species ecology, survey logistics and alterations made to the Order Limits over the course of the survey period. Ecological surveys have been on-going and the boundaries of survey areas have continued to evolve as the Project design has progressed.

5.2.2.2 A summary of the study areas defined for the various ecological surveys and methodologies is provided below, with full descriptions provided in the survey reports in the Appendices.

5.2.3 Work Undertaken to Date

5.2.3.1 To date (May 2022), the following ecological surveys have been completed or are underway. Summaries of the survey methods are provided below:

1. A desk study was conducted to identify the presence of statutory and non-statutory wildlife sites and any legally protected species or HPI or SPI within the area. Local records within 5 km were obtained from a data search with the Greater Lincolnshire Nature Partnership (GLNP) in April 2021. The Multi-Agency Geographic Information for the Countryside (MAGIC) was used to identify designated sites of local,

national and international importance for nature conservation (statutory sites only) on or within the zone of influence of the Project. Desk study results are included in the Appendices;

2. Extended Phase 1 habitat surveys were carried out across all of the Application Land and a 50 m buffer. Habitats were surveyed following the method set out in the Phase 1 Habitat Survey Handbook (JNCC, 2010). This provided comprehensive information on each of the habitat types present within the survey area, allowing for an assessment of habitat condition carried out in accordance with the Biodiversity Metric 3.0 Technical Supplement. Habitats with any evidence or potential for legally protected and notable species were also noted, including features with bat roost potential. Checks for commonly occurring invasive plant species subject to strict legal control were also undertaken. The extended Phase 1 habitat surveys followed the approach recommended by the Guidelines for Preliminary Ecological Appraisal (CIEEM, 2017) and conforms to the British Standard BS42020:2013 Biodiversity – Code of practice for planning and development. The area surveyed was completed in sections. Survey reports are included in Appendix B;
3. Great crested newt (GCN) (*Triturus cristatus*) surveys were carried out at ponds[1] and suitable ditches in the Order Limits and within a 0.25 km buffer, in accordance with the Great Crested Newt Mitigation Guidelines (English Nature, 2001). A range of techniques were employed, including Habitat Suitability Index (HSI) assessments (Oldham *et al.,* 2000), bottle trapping, torching, egg searching, terrestrial search and eDNA sample testing. Surveys were conducted between 2019 and 2021 (see Appendix C);
4. Water vole (*Arvicola amphibius*) surveys were undertaken of suitable watercourses on and within 0.1 km of the Order Limits, excluding the River Trent. The survey methodologies followed the Water Vole Conservation Handbook (Strachan *et al.,* 2011) and the 'Water Vole Mitigation Handbook (Dean *et al.,* 2016) (see Appendix D);
5. Otter (*Lutra lutra*) surveys were carried out in suitable watercourses on and within 0.1 km of the Order Limits, excluding the River Trent. These followed a modified method based on that described in Chanin (2003) (see Appendix D);
6. Bird surveys were conducted in line with specifications detailed by the British Trust for Ornithology (BTO) (Gilbert *et al.,* 1998) (see Appendix E). These included;
   - wintering bird surveys of the River Trent between November 2018 and March 2019, comprising a modified Wetland Bird Survey (WeBS) combined with Low Tide Counts conducted from vantage points;
   - wintering bird surveys between November 2019 and March 2020, comprising walked transect routes of the Energy Park Land and the arable farmland to the north of the Flixborough Industrial Estate. A

[1] Access permission was not granted to all ponds within the survey area.

modified methodology was used based on the BTO Wintering Farmland Bird Survey methodology (Gillings et al., 2008) and generic wintering bird monitoring methods detailed in the Bird Monitoring Methods manual (Gilbert et al., 1998);

- breeding bird surveys between April and June 2019, as well as surveys in June 2020, April 2021, May 2021 and June 2021. The surveys followed the BTO Breeding Bird Survey (BBS) methodology, which was specifically adapted for the site. The survey areas included the Energy Park Land and the Railway Reinstatement Land; and
- migratory and wintering bird surveys between August 2021 and April 2022, with weekly visits during September to November inclusive and March to April inclusive. The surveys followed methodology used for the wintering and breeding bird surveys, involving a walked transect of open land within the Energy Park Land and Railway Reinstatement Land (north of Flixborough Industrial Estate).

7. A range of bat surveys were carried out (see Appendix F):
   - bat activity transect surveys were conducted following the standard methodology outlined in Collins (2016), recording bat species, time and activity type (foraging/commuting). Representative samples of habitat within the Energy Park Land and Railway Reinstatement Land were surveyed using walked transects. A minimum of three surveys per transect over the season (spring/summer/autumn) were undertaken. Surveys were conducted between April and October 2019 and June and September 2020;
   - static detectors (Anabat Express) with omnidirectional microphones were placed on representative linear features (hedgerows, scrub, woodland, wooded/ watercourses) throughout the bat activity study area. The detectors were set to record bat calls between sunset and sunrise for a minimum of five nights. They were deployed between April and October 2019 and June and September 2020 across the Energy Park Land and Railway Reinstatement Land; and
   - tree assessments were carried out in trees highlighted in the extended Phase 1 habitat survey as having medium or high potential to support roosting bats. Further ground level assessments were undertaken, including inspection using an endoscope by a suitably experienced ecologist. The assessments followed the methods for visual inspection of trees as described in the BCT Guidelines (Collins, 2016).
8. Badger (*Meles meles*) surveys were undertaken across all the Application Land plus a 50 m buffer (as per the extended Phase 1 habitat surveys, see Appendix B). The survey involved searching for signs of badger activity, including setts and bedding trails, latrines, footprints in soil and mud, paths and excavation, scratching posts, hairs caught in fences, bedding and ‘guard hairs’ at sett entrances, snuffle holes and other evidence of foraging;

9. A terrestrial invertebrate survey was conducted within the Railway Reinstatement Land. Two different survey methods were used in combination during the survey: sweep netting and direct searching (see Appendix G); and
10. Reptile surveys were carried out along the Railway Reinstatement Land (see Appendix H). To survey for the presence of reptiles, artificial refugia (approximately 0.5 x 0.5 m square sheets of suitable material) were placed along the route in suitable habitat; 100 refugia per 1 km. These were left undisturbed for a period of at least 14 days. The area was then subject to nine surveys during suitable weather conditions, during which all refugia, surrounding habitat and naturally occurring habitat features suitable for reptiles were checked. At least one week was left between surveys.

6. BASELINE AND RECEPTORS

6.1 General baseline

6.1.1.1 This section summarises the findings of the desk study and field surveys undertaken relating to the baseline environment of the Application Land.

6.1.1.2 To assist the assessment of impacts, the desk study results are presented for the Application Land, and the results of field surveys are presented for each of the following subsections of the Application Land:

- the Energy Park Land;
- the Railway Reinstatement Land;
- the Northern DHPWN Land; and
- the Southern DHPWN Land.

6.1.2 Desk Study

International Wildlife Sites

6.1.2.1 Six sites of international importance are present within 15 km of the Order Limits, two of which are adjacent to the Project:

- the Humber Estuary Ramsar Site – includes the tidal River Trent, which is located immediately adjacent to the Project. Designated for its international importance for wetland birds, as an example of a near-natural estuary habitat, breeding colony of grey seals (*Halichoerus grypus*), and as an important migration route for both river lamprey (*Lampetra fluviatilis*) and sea lamprey (*Petromyzon marinus*);
- the Humber Estuary SAC – includes the section of the River Trent located adjacent to the Order Limits. The Annex I habitats which the SAC contains are the primary reason for designation and include estuaries, mudflats, and sandflats. Annex I habitats which are as a qualifying feature, but not a primary reason for selection include; sandbanks which are slightly covered by sea water all the time; coastal lagoons; Salicornia and other annuals colonizing mud and sand; Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*); embryonic shifting dunes; white dunes; grey dunes; and dunes with sea buckthorn (*Hippopha rhamnoides*). There are no Annex II species which are a primary reason for designation. Annex II species which are a non-primary reason for designation include sea lamprey, river lamprey and grey seal;.
- the Humber Estuary Special Protection Area (SPA) – located 5.8 km north of the Order Limits, comprises extensive wetland and coastal habitats including reedbeds, mature and developing saltmarsh, sand dunes, marshy slacks, and brackish pools. The SPA supports important numbers of waterbirds (especially geese, ducks, and waders) during the migration periods and in winter. In summer, it supports important breeding populations of bittern (*Botaurus stellaris*) marsh harrier (*Circus aeruginosus*), avocet (*Recurvirostra avosetta*) and little tern (*Sterna albifrons*);

- Thorne Moor SAC – located 9.7 km west of the Order Limits. Annex I features which are the primary reason for designation comprise degraded raised bogs still capable of natural regeneration. There are no other Annex I or Annex II qualifying features;
- Thorne and Hatfield Moors SPA – comprising land within the Thorne Moor SAC and Hatfield Moor SAC, the closest of which is 9.7 km west of the Order Limits and is a site of international, ornithological importance. The site qualifies under article 4.1 of the Directive (79/409/EEC) as it is regularly used by 1% or more of the Great Britain population of nightjar (*Caprimulgus europaeus*); and
- Hatfield Moor SAC – located 12.4 km south-west of the Order Limits (the southernmost point of the Southern DHPWN Land). Annex I features which are the primary reason for designation, comprise degraded raised bogs still capable of natural regeneration. There are no other Annex I or Annex II qualifying features.

6.1.2.2 With the exception of Hatfield Moor SAC, all the above sites lie or partially lie within 15 km radius of the main operational emission source and are therefore considered in terms of effects from air quality. The 15 km radius from the main emissions source is in accordance with Environment Agency guidance on assessing the effects of air quality impacts on protected sites ('Air emissions risk assessment for your environmental permit') and is shown on Sheet 1 of the Plans of statutory or non-statutory sites or features of nature conservation **(Document Reference 4.6).**

6.1.2.3 The desk study found no Special Areas of Conservation (SAC) within 30 km with bats as a qualifying feature.

National and Regional Wildlife Sites

6.1.2.4 A total of 13 nationally and regionally important designated sites, including Sites of Special Scientific Interest (SSSI) and Local Nature Reserves (LNR) were found within 2 km of the Order Limits[2]. The LNRs are shown on Sheet 2 of the Plans of statutory or non-statutory sites or features of nature conservation **(Document Reference 4.6).** The full list of which is included in Table 2, which features sites in descending order of importance and then distance. Four partially overlap with the Order Limits of the Project:

- Conesby (Yorkshire East) Quarry SSSI – the most southern edge of which overlaps (0.13 ha) with the Order Limits of the Railway Reinstatement Land, at the eastern edge of the railway. This SSSI is designated for its geological interest, specifically the exposure of Frodingham Ironstone;
- Phoenix Parkway LNR – a narrow band of woodland (0.16 ha) is located within the Northern DHPWN Land, to the north of the Phoenix Parkway road. This LNR is also adjacent to a small section of the eastern Order Limits of the Energy Park Land;

[2] A distance of 2 km is used as being the maximum likely distance over which physical disturbance could occur (e.g. from construction activities)'.

- Atkinson's Warren LNR – a narrow band of woodland (0.18 ha) is located within the Northern DHPWN Land, to the south of the Phoenix Parkway road (A1077); and
- Phoenix LNR – the Phoenix LNR lies adjacent to the eastern limits of the Energy Park Land, and a small wooded area (0.8 ha) lies within the Railway Reinstatement Land, to the south of the tracks.

6.1.2.5 In addition, 15 SSSIs designated for biology are within 15 km radius of the main emission source (see Table 2 of Appendix A, Effect of Air Quality on Nationally and Locally Designated Sites, and Sheet 1 of the Plans of statutory or non-statutory sites or features of nature conservation **(Document Reference 4.6)**) and are therefore considered in terms of effects from air quality alone.

Table 2: Statutory designated sites within 2 km of the Project

Designation Type and Name	Location in relation to Order Limits	Description of Designated Site
SAC The Humber Estuary	Adjacent	Large estuarine complex (overlaps with Humber Estuary SPA, Ramsar Site and SSSI) designated for its estuary and coastal habitats including intertidal mudflats, sand flats, saltmarsh, reed beds and dunes, as well as populations of sea lamprey, river lamprey and grey seal.
SPA The Humber Estuary	5.8 km north of the Order Limits	Large estuarine complex (overlaps with Humber Estuary SAC, Ramsar Site and SSSI) which supports internationally important populations of breeding, wintering and passage birds
Ramsar Site The Humber Estuary	Adjacent	Large estuarine complex (overlaps with Humber Estuary SAC, SPA and SSSI) designated for its estuarine and coastal habitats, internationally important populations of breeding, wintering and passage birds, and populations of sea lamprey, river lamprey and grey seal.
SSSI The Humber Estuary	Adjacent	Large estuarine complex (overlaps with Humber Estuary SAC, SPA and Ramsar Site) designated for its estuarine and coastal habitats, assemblages of wintering and breeding birds, breeding grey seal colonies, populations of river lamprey and sea lamprey, and assemblages of vascular plants and invertebrates.
SSSI Conesby (Yorkshire East) Quarry	Partially within / adjacent	Geological designation for exposure of Frodingham Ironstone. Supports rich bivalve population.
SSSI Risby Warren	1.2 km east	Designated for its extensive heathland, grassland, and dune formations with associated important plant communities.
LNR Phoenix Parkway	Partially within / adjacent	Structurally diverse, species-rich sandy dry habitats including semi-natural woodland, scattered and dense scrub, with unimproved and semi-improved acid grassland.

Designation Type and Name	Location in relation to Order Limits	Description of Designated Site
LNR Phoenix	Partially within / adjacent	Immediately north of the Phoenix Parkway LNR and similar in habitat structure. The main habitats comprise neutral semi-improved grassland, unimproved acid grassland, brownfield mosaic and standing water. Additional habitats include woodland, scrub, bracken, bare ground, ant hills, lichens, and seasonally wet ground.
LNR Atkinson's Warren	Partially within / adjacent	Sloping rough grassland and woodland with occasional mixed scrub. Tree species include birch and oak with additional plantings of Scots pine (*Pinus sylvestris*) and sycamore (*Acer pseudoplatanus*).
LNR Conesby Quarry	Adjacent to access road	Restored area of Conesby Quarry which is managed as acid grassland and includes the Normanby Road lake "Blue Lagoon" and the surrounding grassland. The area supports several priority species including skylark (*Alauda arvensis*), lapwing (*Vanellus vanellus*) and grayling butterfly (*Hipparchia Semele*).
LNR Sawcliffe	0.7 km south-east	Landfilled former sand quarry comprising recently planted woodland and neutral grassland. A track running north-west to south-east consists of diverse flora typical of sandy soils.
LNR Brumby Wood	1.8 km east	Woodland divided into three blocks by two roads. Supports a substantial amount of semi-natural woodland with neutral grassland and small areas of scrub. There are several veteran trees.
LNR Frodingham	1.7 km south	A small area of species-rich wet meadow to the north of Scunthorpe.
LNR Silica Lodge	1.7 km south-east km	A mixture of scrub, acid grassland (unimproved and semi-improved) with a lake and coarse grassland. The lake is used for fishing and is associated with a rich fauna of birds and invertebrates.

Non-Statutory Designated Sites

6.1.2.6 There are 30 non-statutory designated sites within 2 km of the Order Limits and are shown on Sheet 2 of the Plans of statutory or non-statutory sites or features of nature conservation **(Document Reference 4.6).** This includes 26 Local Wildlife Sites (LWS), seven Local Geological Sites (LGS) and one Regionally Important Geological Site (RGS). The full list is included in Table 3. Seven of which are ecological designations within 2 km of the main emissions source[3], and are shown on Sheet 3 of the Plans of statutory or non-statutory sites or features of nature conservation **(Document Reference 4.6).**The following sites partially overlap with the Order Limits of the Project:

[3] A distance of 2 km is used as being the maximum likely distance over which physical disturbance could occur (e.g. from construction activities) as well as the distance set by the Environment Agency for considering air quality impacts on locally important sites as set out in 'Air emissions risk assessment for your environmental permit'.

- Phoenix Parkway LWS – also designated as an LNR, a narrow band (0.16 ha) is located within the Northern DHPWN Land, to the north of the Phoenix Parkway road;
- Atkinson's Warren LWS – also designated as an LNR, a narrow band (0.18 ha) is which is located within the Northern DHPWN Land, to the south of the Phoenix Parkway road (A1077);
- Conesby Quarry LWS and LGS – has marginal overlaps (totalling 0.45 ha) with the Order Limits of the Railway Reinstatement Land;
- Slag Banks LWS – a small area (0.1 ha) is located within the Order Limits of the Railway Reinstatement Land. The LWS is also immediately adjacent to the eastern Order Limits of the Energy Park Land; and
- Yorkshire East Gullet LWS – a small area (0.47 ha which includes the Conesby (Yorkshire East) Quarry SSSI) is located within the Order Limits of the Railway Reinstatement Land.

Table 3: Non-Statutory designated sites within 2 km of the Project

Designation Type and Name	Location in relation to Order Limits	Description of Site
LWS Phoenix Parkway	Part of the Order Limits / adjacent	21.5 ha of structurally diverse, species-rich sandy dry habitats including semi-natural woodland, scattered and dense scrub, with unimproved and semi-improved acid grassland in the northern end of the site.
LWS and LGS Conesby Quarry	Part of the Order Limits / adjacent	A large (60.1 ha) ironstone quarry, with the western and central parts in filled and a deep depression in the east. The main habitat types include scrub, semi-improved neutral grassland, ruderal, and unimproved acid grassland. There is also wetland vegetation in the east.
LWS Yorkshire East Gullet	Part of the Order Limits / adjacent	Unmanaged former ironstone quarry complex which centres around an elongated lake. The lake is bordered by a steep slope which supports scrub and woodland vegetation with some smaller areas of grassland bracken. Conesby (Yorkshire East) Quarry SSSI is contained within this LWS in the south-east.
LWS, LGS Atkinson's Warren	Part of the Order Limits / adjacent	32.8 ha of sloping rough grassland and woodland with occasional mixed scrub. Tree species include birch and oak with additional plantings of Scots pine and sycamore.
LWS Slag Banks	Part of the Order Limits / adjacent	Wetland and grassland on the north-eastern and south-eastern margins of an infilled ironstone quarry, and a botanically rich sandy area in the south-west within the Phoenix LNR.
LWS Dragonby Gullet	Adjacent	Former ironstone quarry which is dissected by a disused railway. The south-west area of the site comprises a fishing lake which is fringed with unmanaged trees, scrub, grassland, and hay meadows. The north-east area of the site comprises another fishing lake with surrounding coarse grassland and scrub. Botanically diverse and likely to support a range of invertebrates and birds.

Designation Type and Name	Location in relation to Order Limits	Description of Site
LWS Bessemer Way Brownfield Site	Adjacent (6 m from Order Limits)	Former industrial site which comprises areas of grassland and scrub. Species are typical of open sandy swards and include neutral grassland species.
LWS Brumby Common West	0.1 km east	A diverse group of habitats including a lake, conifer plantation, semi-natural woodland, acid grassland, bracken, scrub, and arable weeds.
LWS, LGS Conesby Rock Store	0.1 km south	A 0.7 ha area of low-lying ironstone ore stockpiled by North Lincolnshire Council as an educational resource.
LWS Land adjacent to Johnson's Transport	0.2 km east	Moderately sized area of grassland habitat with some areas of woodland and wetland habitat close to housing, with a bordering ditch to the west.
LWS Normanby Park	0.17 km north	A variety of habitats including planation woodland, grassland (both managed and unmanaged), stream, pond, marsh, and wet woodland. A section of the park is managed for deer. These habitats support a range of birds, brown hare, and amphibians.
LWS, LGS Normanby Park Community Woodland	0.17 km north	An area of extensive planting of trees and shrubs with botanically interesting areas of grassland as well as bracken and a pond. Supports a good variety of invertebrates, birds, and amphibians.
LGS Dragonby Dragon	0.3 km east	The Dragonby Dragon is a sinuous ridge over 20 metres long, with a maximum width of 5 metres and a height of less than 2 metres. It is composed of hard travertine, (a form of calcareous tufa) precipitated from lime rich waters emerging from a spring at the base of the Northampton Sand Ironstone bed slightly higher up the slope. Its ridge like form with 'limbs' like a dragon or prehistoric monster almost certainly gave rise to the local legend that it is the body of a dragon turned to stone.
LWS Burton Wood, Burton upon Stather	0.38 km north	Several springs and small streams, the entire site is listed on the ancient woodland inventory as re-planted ancient woodland.
LWS Gunness Common	0.4 km west	Flat area of acidic peaty pasture on a damp floodplain and bordered by a strip of unmanaged trees and scrub.
LWS Mannaberg Way Drainage Area	0.45 km east	Flood alleviation basin on the west side of the A1029 with wetland vegetation at the lowest levels which supports a mixture of plants, invertebrates, and birds.
LWS Ashby Decoy Golf Course	0.57 km east	The golf course comprises acid grassland with woodland, scrub, neutral grassland, and standing water.
LWS, LGS Sawcliffe	0.7 km south-east	Landfilled former sand quarry comprising recently planted woodland and neutral grassland. A track running north-west to south-east consists of diverse flora typical of sandy soils.

Designation Type and Name	Location in relation to Order Limits	Description of Site
LWS Sawcliffe Medieval Village	0.7 km east	Semi-improved neutral grassland field which is hummocky and contains three botanically rich ponds and bordering hedgerows.
LWS Paupers' Drain	0.75 km north-west	A 7 km stretch of a canalised watercourse with an outfall into the Humber Estuary SSSI on the western banks of the River Trent.
LWS Westcliff Lagoon	0.8 km south-east	Complex lake system surrounded by oak and birch woodland with a small amount of heathland grassland and standing/fallen deadwood.
LWS Normanby Park Golf Course	0.8 km north	Roughly 49 ha site comprising area of improved grassland with unmanaged areas including acid grassland, bracken, stream, and marshy grassland. The unmanaged areas are botanically interesting.
LWS Kingsway Golf Course	1.1 km east	This woodland and grassland site in Scunthorpe occupies land that ranges from wet to dry and from acidic to neutral, supporting a diverse flora. It is surrounded by housing to the west and north, the A18 to the east and a railway line on embankment to the south. Although the grassland areas were used as a golf course at the time of survey, the land is now managed for local recreation and nature conservation.
LGS Crosby Warren Quarry	1.2 km south-east	Quarry restoration adjacent to a fishing lake. Designated due to the well-preserved ammonite fauna.
LWS Brumby Wood	1.5 km east	Woodland divided into three blocks by two roads. Supports a substantial amount of semi-natural woodland with neutral grassland and areas of scrub. There are several veteran trees.
LWS, RGS Bagmoor Gullet and Bagmoor Quarry	1.5 km north east	Botanically diverse strip of a former ironstone quarry complex. The central spine is an elongated lake bordered by scrub and grassland.
LWS Frodingham Railway Cutting	1.8 km south-west	Rectangular area comprising semi-natural woodland, scrub, grassland (unimproved and damp grassland), marsh and fen.
LWS Silica Park	1.7 south-east	A mixture of scrub, acid grassland (unimproved and semi-improved) with a lake and coarse grassland. The lake is used for fishing and is associated with a rich fauna of birds and invertebrates.
LWS Ridge Walk	1.8 km east	A long strip of mature hawthorn (*Crataegus monogyna*) scrub on a limestone escarpment.
LWS Roxby Gullet	1.9 km north-east	Disused ironstone workings with a lake in the base.

Habitats of Principal Importance

6.1.2.7 The following Habitats of Principal Importance (HPI) were returned from within 2 km of the Order Limits:

- 19 counts of Coastal Saltmarsh HPI, all of which are located along the banks of the River Trent, the closest unit is adjacent to the Order Limits of the Energy Park Land;
- Three distinct bodies of Eutrophic Standing Waters HPI, the closest is approximately 0.77 km north-east of the Railway Reinstatement Land, within the Yorkshire East Gullet LWS;
- Ten counts of Intertidal Mudflats HPI, which are located along the banks of the River Trent. The closest is a linear feature, along the eastern banks of the River Trent, 1.7 km west of the Southern DHPWN Land;
- 18 counts of Lowland Dry Acid Grassland HPI, which are scattered across the landscape and include large areas present within Atkinson's Warren and Phoenix Parkway LNRs. The latter features dry acid grassland immediately adjacent to the eastern Energy Park Land . Approximately 28 ha is present to the west of Dragonby Rail Sidings, associated with Conesby Quarry LWS; areas along the perimeter are adjacent to or overlap marginally with the Railway Reinstatement Land;
- Seven records of Lowland Fens HPI are present within the search area, comprising small areas which are located to the north-east of Scunthorpe. The closest record is 0.85 km south-east of the Railway Reinstatement Land, within the Sawcliffe LNR/LWS;
- Seven records of Lowland Heathland HPI, all of which are located to the west of Scunthorpe. The closest is within Ashby Decoy Golf Course LWS, 0.75 km east of the Southern DHPWN Land;
- 20 counts of Lowland Meadows HPI were returned from the search area. Lowland meadow is no longer present within the Order Limits following changes since the PEIR. A large area, making up part of the Conesby Quarry LWS and the adjacent Conesby Quarry LNR, is located adjacent to the eastern section of the Railway Reinstatement Land;
- 46 areas of Lowland Mixed Deciduous Woodland HPI were returned by the desk study. These features are scattered across the landscape, with only relatively small areas of woodland present. One of the larger areas of woodland is present within Atkinson's Warren and Phoenix Parkway LNRs. The Northern DHPWN Land runs along Phoenix Parkway Road between the two LNRs. A small area of woodland falling within Phoenix LNR is located within the Railway Reinstatement Land, to the south of the tracks;
- One area of Lowland Raised Bog HPI was recorded within the 2 km search area, comprising a large feature, 0.4 km north-west of the Southern DHPWN Land at the closest point. The feature is located within the Gunness Common LWS;
- Ten counts of Open Mosaic Habitat on Previously Developed Land HPI were returned, which include several extensive areas to the east of Scunthorpe. The closest is located 80 m east of the Energy Park Land, within the Phoenix LNR and Slag Banks LWS;

- One area of Purple Moor Grass and Rush Pasture HPI is located 1.9 km south of the Southern DHPWN Land, within the Butterwick Hale and Common LWS;
- One area of Reedbed HPI is located to the north of Scunthorpe, within an industrial park. The feature is 5 km east of the Energy Park Land at the closest point;
- One record of Rivers HPI comprises a section of the River Trent which has been classified as such, the record is 1.55 km west of the Southern DHPWN Land at the closest point;
- Three records of Traditional Orchards HPI were returned by the desk study, comprising distinct, small areas, the closest of which is 0.14 km north of the Railway Reinstatement Land, within the village of Flixborough;
- Four counts of Wet Woodland HPI, which were returned from the search area. The closest is 0.66 km east of the Southern DHPWN Land, within the Ashby Decoy Golf course LWS;
- Two counts of Wood-pasture and Parkland HPI which make us an extensive area of the Normanby Park LWS, 0.58 km north of the Railway Reinstatement Land; and
- Five records of Ancient Woodland were recorded within the 2 km search radius, comprising an extensive of ancient, replanted woodland within the Burton Wood LWS, 0.38 km north of the Railway Reinstatement Land. Alongside, a group of four pockets of ancient woodland within the Brumby Wood LWS, approximately 1.4 km east of the Southern DHPWN Land.

6.1.2.8 Table 4 shows the HPI types within the Application Land or directly adjacent to the Order Limits returned by the desk study. No HPI were recorded within the Energy Park Land or the Southern DHPWN Land. Note that no areas of Lowland Dry Acid Grassland were found in the Railway Reinstatement Land during the Phase 1 habitat surveys.

Table 4: Location of HPI within and adjacent to the Project returned by the desk study (see text for details)

HPI	Northern DHPWN Land	Railway Reinstatement Land
Lowland Dry Acid Grassland		✓
Lowland Mixed Deciduous Woodland	✓	

Species

6.1.2.9 For the purposes of this report, records of species of interest returned by the desk study within 5 km are included. In some cases, more detailed analyses were carried out within a smaller defined radius. It should be noted that the spatial data for species records varied from two to eight-digit national grid reference numbers. Therefore, accurate distances of species from the Order Limits could not always be calculated. In some instance, species were recorded at ‘0 m’ from the Order Limits, however this does not always indicate that the record originates from within the Order Limits.

Where spatial data are limiting, this is made clear in the description of results below.

Amphibians

6.1.2.10 The desk study returned 242 records of GCN from within 5 km of the Order Limits of the Project. The records include results from presence/absence of eDNA sampling, as well as traditional survey methods; bottle trapping, torching, egg searching, netting and terrestrial searching. A peak count of 236 GCN was returned from a record located at a minimum distance of 2.36 km south east of the Order Limits.

6.1.2.11 The desk study results were analysed in more detail at a smaller spatial scale of 0.5 km from the Order Limits, as this is generally considered the maximum commuting distance of GCN from a breeding pond (English Nature, 2001). The following records were returned from within 0.5 km of each of the Application Land subsections:

- the Energy Park Land returned 11 records of GCN, all of which are in the Phoenix Parkway LNR. A peak count of 44 GCN was recorded in 2018, the closest record was located 0.13 km east of the Order Limits;
- the Railway Reinstatement Land returned 182 records of GCN within the 0.5 km search radius. The records were returned from three distinct areas; the Conesby Quarry and associated Dragonby Sidings; the Foxhills Industrial Estate; and immediately south of the railway line in the Bagmoor Wind Farm. A peak count of 126 adult GCN was returned from a survey in the Conesby Quarry LWS, which is adjacent to the Order Limits of the Railway Reinstatement Land;
- the Northern DHPWN Land returned no records of GCN within 0.5 km. The desk study included results of an eDNA test conducted in 2018, 0.14 km east of the Order Limits, which returned a negative result for GCN. A review of aerial satellite imagery and Ordnance Survey maps did not identify a pond at this location, suggesting that only a small or transient water body may be present; and
- the Southern DHPWN Land returned no records of GCN from within 0.5 km. The closest records are located 1.4 km north east of the Southern DHPWN Land, within the Phoenix Parkway LNR.

6.1.2.12 Other amphibians returned by the desk study which were recorded on or within 0.5 km of the Order Limits include smooth newt (*Lissotriton vulgaris*), common toad (*Bufo bufo*), and common frog (*Rana temporaria*).

Bats

6.1.2.13 Bat species returned from within 5 km of the Order Limits comprise two records of Brandt's bat (*Myotis brandtii*), 30 records of brown long-eared bat (*Plecotus auritus*), 304 records of common pipistrelle (*Pipistrellus pipistrellus*), 27 records of Daubenton's bat (*Myotis daubentonii*), two records of Nathusius's pipistrelle (*Pipistrellus nathusii*), three records of Natterer's bat (*Myotis nattereri*), 37 records of noctule (*Nyctalus noctula*), 54 records of soprano pipistrelle (*Pipistrellus pygmaeus*), eight records of whiskered bat (*Myotis mystacinus*), 83 unidentified pipistrelle species (*Pipistrellus* sp.), and 228 unidentified bat species (*Chiropter* sp.).

6.1.2.14 Of these, 100 were records of hibernating bats or roosts. Species recorded as hibernating or roosting within 5 km comprise brown long-eared bat, common pipistrelle, Daubenton's bat, Natterer's bat, noctule, soprano pipistrelle, whiskered bat, and unidentified bat species. Most records returned had only a six-digit national grid reference, therefore an accurate estimate of the distance of roosts from the Order Limits was not attainable. Seven roost records had a minimum distance from the Order Limits of 0 m, however as spatial data are limiting, it is likely that they do not originate from within the Order Limits.

Birds

6.1.2.15 More than 5000 records of birds listed as non-native, protected or priority species by the GLNP were returned by the 5 km search radius. Key species include, barn owl (*Tyto alba*), black redstart (*Phoenicurus ochruros*), cuckoo (*Cuculus canorus*), black-tailed godwit (*Limosa limosa*), curlew (*Numenius arquata*), fieldfare (*Turdus pilaris*), grasshopper warbler (*Locustella naevia*), hawfinch (*Coccothraustes coccothraustes*), hen harrier (*Circus cyaneus*), kingfisher (*Alcedo atthis*), lapwing, linnet, little ringed plover (*Charadrius dubius*), marsh harrier, merlin (*Falco columbarius*), nightjar, osprey (*Pandion haliaetus*), peregrine (*Falco peregrinus*), pink-footed goose (*Anser brachyrhynchus*), redshank (*Tringa totanus*), redwing (*Turdus iliacus*), reed bunting (*Emberiza schoeniclus*), ring ouzel (*Turdus torquatus*), ruff (*Calidris pugnax*), skylark, snipe (*Gallinago gallinago*), spoonbill (*Platalea leucorodia*), spotted flycatcher (*Muscicapa striata*), starling (*Sturnus vulgaris*), tree pipit (*Anthus trivialis*), tree sparrow (*Passer montanus*), turtle dove (*Streptopelia turtur*), whooper swan (*Cygnus cygnus*), whimbrel (*Numenius phaeopus*), wood warbler (*Phylloscopus sibilatrix*), woodlark (*Lullula arborea*), yellow wagtail (*Motacilla flava*) and yellowhammer (*Emberiza citrinella*). More detailed results are included in Appendix B.

Reptiles

6.1.2.16 The 5 km search radius returned seven records of common lizard (*Zootoca vivipara*); two of which were within the Southern DHPWN Land, three were close to the Dragonby Sidings and Railway Reinstatement Land, the remaining two records were from within Scunthorpe, 1.3 km south-west of the Northern DHPWN Land at the closest point. Two records of grass snake (*Natrix natrix*) were returned from desk study, the closest is approximately 4 km south east of the Order Limits.

Badger

6.1.2.17 The desk study returned 322 records of badger, 271 of which were recorded as setts, within 5 km of the Order Limits. However, most of the national grid references only featured six-digits, therefore a detailed spatial assessment could not be made. The data revealed that there is badger activity, in the form of latrines and trails, and records of badger observed foraging close to Dragonby. This indicates badgers are highly active in the area.

Otter and water vole

6.1.2.18 19 records of otter were returned by the desk study, the closest is from approximately 0.5 km south of the Railway Reinstatement Land, comprising a dead otter along the road. Six records were from 0.6 - 0.7 km north west of the Flixborough Industrial Estate, on the western banks of the River Trent. There were no records of holts, all records comprising either field observations, dead otters along roads, tracks/trails or spraints.

6.1.2.19 A total of 628 water vole records were returned by the desk study from within 5 km of the Order Limits. Most of the records included an eight-digit national grid reference, confirming that they are highly active in the local area. The closest record is of water vole burrows 0.1 km east of the Southern DHPWN Land.

Other mammals

6.1.2.20 SPI mammals returned by the desk study included 98 records of brown hare (*Lepus europaeus*), including records of brown hare from within the Railway Reinstatement Land. One record of a harvest mouse (*Micromys minutus*), which was recorded as dead 0.7 km north west of the Flixborough Industrial Estate, on the western banks of the River Trent. In addition, 252 records of European hedgehog (*Erinaceus europaeus*) were returned, including one record from within the Order Limits of the Northern DHPWN Land.

Marine mammals

6.1.2.21 One record of common porpoise (*Phocoena phocoena*) was returned from the 5 km search radius. The record was of one adult recorded in 2015, within the River Trent, approximately 50 m from the Order Limits.

Fish

6.1.2.22 The desk study returned sixteen records of European eel (*Anguilla anguilla*), one record of smelt (*Osmerus eperlanus*), three records of arctic salmon (*Salmo salar*) and one record of river lamprey which is a qualifying feature of the SAC. The closest record is of European eel, located approximately 1.2 km west of the Order Limits, in the River Trent.

Invertebrates

6.1.2.23 Records of butterflies returned by the 5 km search radius comprise grayling, grizzled skipper (*Pyrgus malvae*), large heath (*Coenonympha tullia*), large tortoiseshell (*Nymphalis polychloros*), silver studded blue (*Plebejus argus*), small heath (*Coenonympha pamphilu*), wall (*Lasiommata megera*) and white-letter hairstreak (*Satyrium w-album*).

6.1.2.24 A total of 42 moth species were retuned by the desk study, including the following species: garden tiger (*Artica caja*), mottled rustic (*Caradrina morpheus*), small square-spot (*Diarsia rubi*), light brown apple moth (*Epiphyas postvittana*), rosy minor (*Litoligia literosa*), dot moth (*Melanchra persicariae*), shoulder-striped wainscot (*Leucania comma*), cinnabar (*Tyria jacobaeae*), shaded broad-bar (*Scotopteryx chenopodiata*), knot grass (*Acronicta rumicis*), blood vein (*Timandra comae*), buff ermine (*Spilarctia luteum*), and white ermine (*Spilosoma lubricipeda*).

6.1.2.25 No other priority or protected invertebrate species were returned by the desk study.

Plants (including invasive species)

6.1.2.26 The following plant species which are considered to be priority or protected species by the GLNP were returned from the 5 km search radius of the desk study: bluebell (*Hyacinthoides non-scripta*), purple milk-vetch (*Astragalus danicus*), and yellow bird's-nest (*Monotropa hypopitys*).

6.1.2.27 Schedule 9 listed non-native invasive plant species returned by the desk study comprise 13 records of Himalayan balsam, 21 records of Japanese knotweed, four records of Montbretia (*Crocosmia x crocosmiiflora*), seven records of wall cotoneaster (*Cotoneaster horizontalis*), four records of New Zealand pygmy weed (*Crassula helmsii*), and ten records of variegated yellow archangel (*Lamiastrum galeobdolon* subsp*. argentatum*). Most records featured a four to six-digit national grid reference number, therefore the distances of records from the Order Limits have not been estimated.

6.2 Energy Park Land – Baseline

6.2.1 Baseline Habitats

6.2.1.1 The extended Phase 1 habitat surveys identified the following habitats to be present within the Order Limits of the Energy Park Land arable, buildings, hardstanding, standing water, running water, hedgerows, broadleaved woodland, scattered trees, dense, continuous, and scattered scrub, tall ruderal and marginal vegetation, bracken and swamp, semi-improved acid grassland and species-poor semi-improved grassland. Full habitat descriptions and their location are included in Appendix B. Extensive areas of the habitats described will not be developed and are included in this section to provide context. Some areas exempt from development will be used as ecological mitigation and enhancement areas.

6.2.1.2 The majority of the Energy Recovery Facility (ERF), Concrete Block Manufacturing Facility (CBMF), Plastic Recycling Facility (PRF), Residue Handling and Treatment Facility (RHTF) and associated curtilage landscaping fall within the existing Flixborough Industrial Estate which comprises hardstanding, warehouse type buildings and site infrastructure, with encroachment onto the adjacent arable cropland and small areas of scrub.

6.2.1.3 Most of the footprint of the southern gas Above Ground Installations (AGI), Electric Vehicle (EV) and Hydrogen (H_2) re-fuelling station, the new railhead and access road are set within the arable cropland and associated network of ditches and marginal vegetation to the south of the Flixborough Industrial Estate and Flixborough Wharf.

Hardstanding and buildings

6.2.1.4 A total of 18 buildings were recorded, 16 of which are located within the Flixborough Industrial Estate area. The majority are used for the storage of materials and comprise large, metal corrugated warehouse type structures, with pitched, corrugated roofs. There is also a series of porta cabins, used primarily as office facilities, and occasional brick buildings. The buildings in

the Flixborough Industrial Estate are surrounded by hardstanding. To the north side of Flixborough Industrial Estate, on the banks of the River Trent there is a small red brick building. There are two farm buildings within the arable farmland at Park Ings Store, which are used as grain stores. The buildings are red brick and corrugated metal construction.

Arable and species-poor semi-improved grassland

6.2.1.5 Managed arable farmland on flat ground was the most abundant habitat type recorded in the survey area. Crops recorded during the survey include rapeseed (*Brassica* sp.) and barley (*Hordeum vulgare*). The arable fields are extensive and there are abundant ditches present. There are several areas of set-aside land within the arable fields which are characterised as poor semi-improved grassland. Flora recorded frequently in these areas include false-oat grass (*Arrhenatherum elatius*), cocksfoot (*Dactylis glomerata*), white clover (*Trifolium repens*), red clover (*Trifolium pratense*), common knapweed (*Centaurea nigra*), greater bird's-foot trefoil (*Lotus pedunculatus*) and creeping thistle (*Cirsium arvense*). The majority of arable fields have wide field boundaries which were recorded as poor semi-improved grassland. Common grassland species recorded within the field boundaries include Yorkshire fog (*Holcus lanatus*), false-oat grass, cow parsley (*Anthriscus sylvestris*) and common hogweed (*Heracleum sphondylium*).

Watercourses and marginal vegetation

6.2.1.6 The arable fields have an extensive network of wide, deep ditches. As the Project has evolved, some of the surveyed ditches are no longer within the Order Limits. There are 21 ditches within the Energy Park Land. Of note, these include the Lysaght's Drain, the channel of which is more than 3 m wide at the western limits and is the major arable drain for the surrounding farmland. The Lysaght's Drain is fed by the surrounding ditches. The majority of these have steep banks (30° to 90° angle) which are up to 4 m in height. Typical marginal vegetation includes short and long grasses such as false oat-grass, cock's foot and perennial ryegrass *(Lolium perenne*), together with common hogweed, cow parsley, nettle (*Urtica dioica*), and creeping thistle. Water depth and flow is variable across the ditches; five were recorded as dry, two were dry in places and the remainder had a recorded water depth of under 10 cm to over 0.5 m. Emergent vegetation comprised common reed (*Phragmites australis*), reedmace (*Typha latifolia*), fools-water-cress (*Apium nodiflorum*), brooklime (*Veronica beccabunga*), water-starwort (*Callitriche* agg.), water-crowfoot (*Ranunculus aquatilis*) and water mint (*Mentha aquatica*). Emergent vegetation was limited in some ditches due to recent dredging. It is likely that water quality within the ditch system is affected by the surrounding intensive agriculture land use.

Hedgerows

6.2.1.7 Ten hedgerows are present in the Energy Park Land, of which nine qualify as HPI. The other two comprise non-native Leyland cypress (*Cupressus* × *leylandii*) hedgerows. Of these, only two hedgerows fall within the limits of deviation of components of the Energy Park Land:

- A native, species poor, unmanaged roadside hedgerow to the west of the new railhead location. Hawthorn dominates the feature alongside occasional bramble (*Rubus fruticosus* agg.) and rose (*Rosa* sp.); and
- A native, species-poor hedgerow which is adjacent to Ferry Road West. This hedgerow is outgrown and planted on a raised bank. The hedgerow is dominated by hawthorn with frequent blackthorn (*Prunus spinosa*) and is 3 m in height and 2 m wide. Ground flora is dominated by tall ruderals including nettle and common hogweed, with occasional cow parsley and cleavers (*Galium aparine*).

Scrub, tall ruderal vegetation and scattered trees

6.2.1.8 Dense and scattered scrub, tall ruderal vegetation and scattered trees are relatively common features within the limits of deviation of the Energy Park Land, with small areas surrounding buildings and hardstanding of Flixborough Industrial Estate, as well as along the boundary fence lines of Flixborough Wharf. The majority of the scrub in these areas is scattered and is dominated by willow (*Salix* sp.), bramble and elder (*Sambucus nigra*). Frequently recorded species in the tall ruderal vegetation include common nettle, rosebay willowherb (*Chamaenerion angustifolium*), creeping thistle, teasel (*Dipsacus fullonum*), broad-leaved dock (*Rumex obtusifolius*), false oat grass and great willowherb (*Epilobium hirsutum*).

Amenity grassland, scattered trees and marginal vegetation

6.2.1.9 A large embankment is present between the River Trent and the road; a narrow strip along its western extent falls within the Order Limits. The embankment is dominated by amenity grassland with occasional scattered trees present. Marginal vegetation dominated by common reed is located along the banks of the River Trent. Himalayan balsam, a Schedule 9 listed invasive species, was recorded in scattered stands amongst the marginal vegetation of the River Trent. Marginal vegetation and Himalayan balsam were located outside of the Order Limits.

Standing water

6.2.1.10 Three bodies of standing water fall within the limits of deviation of the ERF, PRF and RHTF. An additional five bodies of standing water were recorded within the Energy Park Land and three waterbodies were recorded within 0.25 km of the Energy Park Land. Descriptions and details of further surveys of waterbodies are included under *Amphibians (including great crested newts)*, below.

Mosaic of semi-natural habitats

6.2.1.11 A sizeable area (13 ha) of semi-natural habitat, which will not be directly affected by the Project, is located east of the Energy Park Land. The area is located immediately west of the Phoenix LNR and Slag Banks LWS. Habitats within this area include dense extensive stands of bracken; hawthorn scrub; dense willow scrub; scattered mature trees; scattered scrub; hedgerows; areas of swamp habitat dominated by common reed; a small area of semi-improved neutral grassland; patches of dry acid grassland in poor condition; and tall ruderal vegetation. Five bodies of

standing water are present. The three waterbodies located in the commercial poultry farm are located adjacent to this area.

6.2.1.12 This mosaic of semi-natural habitats was identified as a valuable area of potential relic 'heathland' habitat on coversands, albeit that overall it is in poor condition. The search of MAGIC maps found that part of it had previously been classified as a mosaic with areas of Lowland Dry Acid Grassland HPI, patches of which persist. In addition, the areas of reedswamp qualify as Lowland Fens HPI, and the stands of bracken and scrub are considered to be valuable associated habitat. The area extends to the east to form part of a major block of semi-natural habitat including Phoenix Parkway LNR/LWS, Atkinson's Warren LNR/LWS and Slag Banks LWS.

6.2.2 Baseline Species

6.2.2.1 The potential for protected species within the Energy Park Land are presented below.

Amphibians (including great crested newts)

6.2.2.2 Three bodies of standing water fall within the limits of deviation of the ERF, PRF and RHTF. These are shown within the Amphibian Survey Plans in Technical Appendix C and comprise:

- Ponds 1 and 2 - Two surface water drainage ponds, both lined and very deep. No aquatic vegetation is present and scattered scrub is present on the banks; and
- Pond 36 - A large area of pooling water on hardstanding, with no aquatic or marginal vegetation present. Construction materials were scattered throughout the water body at the time of survey. The water body was considered too transient to be classed as a pond, therefore it is not included in the amphibian survey report.

6.2.2.3 An additional five bodies of standing water were recorded within the Energy Park Land:

- Pond 23 - A small area of wet ground, dominated by sedges, with pooling water up to 10 cm in depth;
- Pond 24 - A small pocket of pooling water situated within an area of dense bracken growth, with a water depth of up to 20 cm;
- Pond 25 - A small area of standing water, comprising a depression in the ground, which is dominated by yellow iris, with a water depth of under 10 cm;
- Pond 26 - A large pond located partially within the Order Limits, in an area of dense scrub; and
- Pond 27 - A pond situated within an area of dense willow scrub.

6.2.2.4 An additional three waterbodies were recorded within 0.25 km of the Energy Park Land:

- Pond 28 - A pond located adjacent to the Order Limits, within a neighbouring property which is a commercial poultry farm. Access was not agreed; however, the pond was observed from the adjacent land. A

HSI was conducted of the pond, however as access was limited, no further amphibian surveys were completed;

- Pond 29 - Located adjacent to the pond described above. The pond was also not accessible; however, it was observed from the property boundary. A HSI was conducted of the pond, however as access was limited, no further amphibian surveys were completed; and
- Pond 30 - A pond also located within the commercial poultry farm adjacent to the Order Limits. The pond was not visible from the boundary of the property; however, satellite imagery indicates that it is small, approximately 125 m2 in size, with partial shading of the banks by trees and scrub. Due to access limitations no HSI assessment or further amphibian surveys were conducted.

6.2.2.5 Overall, eight bodies of standing water were recorded within the Energy Park Land, and a further three waterbodies were recorded within 0.25 km of the Energy Park Land. Of these, one was not taken forward for survey as it was assessed as offering negligible potential for amphibians (the large area of pooling water on hardstanding at Pond 36). Pond 30 was not surveyed due to access restrictions. Five waterbodies achieved a HSI score of average (Pond 23, Pond 24, Pond 25, Pond 26, Pond 29), all of which are located within the mosaic of semi-natural habitats described in paragraph 6.2.1.11. Three ponds scored a HSI of below average including Pond 1 which is within the limits of the deviation of the Energy Park Land, as well as Pond 27 and Pond 28. Pond 2, which is in the limits of deviation of the Energy Park Land, scored a HSI of poor suitability for GCN. Table 5 summarises the pond HSI scores.

Table 5: Habitat Suitability Index Scores of ponds on or within 0.25 km of the Energy Park Land

Pond No.	SI1	SI2	SI3	SI4	SI5	S6	SI7	SI8	SI9	SI10	HSI Score
P1	1	1	0.5	0.01	1	1	1	0.4	0.33	0.9	0.48
P2	1	1	0.9	0.67	0.2	1	1	1	1	0.6	0.77
P23	1	0.2	0.1	0.67	1	1	1	1	1	0.8	0.64
P24	1	0.2	0.1	0.67	1	1	1	1	1	0.8	0.64
P25	1	0.2	0.1	0.67	1	1	1	1	1	0.8	0.64
P26	1	0.9	1	0.33	0.2	0.67	0.67	1	1	0.4	0.64
P27	1	0.1	0.9	0.33	0.2	1	1	1	1	0.3	0.53
P28	1	0.2	0.5	0.33	1	0.67	0.67	1	0.33	0.3	0.52
P29	1	1	0.9	0.33	1	0.67	0.67	1	0.33	0.3	0.65
P30	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S

Pond suitability: <0.5 'poor', 0.5 – 0.59 'below average', 0.6 – 0.69 'average', 0.7 – 0.79 'good', >0.8 'excellent'
N/S – Not Surveyed due to access restrictions.

6.2.2.6 Following the HSI assessment, three ponds were subject to further survey for GCN. GCN eDNA samples were taken of Pond 26, which returned a positive result, and Pond 27, which returned a negative result. Sampling for eDNA of GCN was not conducted on Ponds 23, 24 or 25 as water levels

were too low to obtain a water sample. Ponds 1, 28 and 29 were not sampled due to access restrictions.

6.2.2.7 Traditional amphibian presence/absence surveys were conducted on Pond 2, comprising four visits where bottle trapping, torch light surveys and egg searching were conducted. No GCN were recorded during the surveys. A total count of 15 smooth newt, four common frog and one common toad were recorded.

6.2.2.8 Due to access restrictions, amphibian presence/absence surveys were not conducted on Pond 26 (with positive eDNA) or Pond 1. Following the negative result of the eDNA test, no further surveys were conducted on Pond 27. Water levels were too low on ponds 23, 24 and 25 to bottle trap, therefore these ponds were also excluded from the amphibian presence/absence surveys.

6.2.2.9 Terrestrial habitats which provide suitable refuge, commuting and foraging habitat for GCN and other amphibians include the marginal vegetation along the network of arable field drains, arable field margins, hedgerows, and scattered scrub. The mosaic of semi-natural habitats in the eastern section of the Energy Park Land provides the greatest number of opportunities for amphibians. The arable fields which dominate the landscape of the Energy Park Land provide sub-optimal terrestrial habitat for GCN and other amphibians due to the limited diversity of vegetation structure and high levels of management, including the use of fertilisers and pesticides.

Bats

6.2.2.10 Suitable foraging and commuting habitat for bats within the Energy Park Land includes arable fields, hedgerows, woodland, grassland, dense and scattered scrub, and scattered trees. These habitats are connected to other areas of good quality bat foraging and commuting habitat; specifically, the River Trent, mature hedgerows and woodland located along arable field boundaries. Overall, the Energy Park Land was assessed as offering **moderate** suitability for foraging and commuting bats in accordance with Collins (2016).

6.2.2.11 Bat species for which the Energy Park Land provides suitable foraging and commuting habitat include species which show a preference for utilising ‘edge’ habitats. Such species include common pipistrelle and myotid species (*Myotis* spp.), which are flexible in their foraging habitat. The arable fields and areas of semi-improved grassland may provide favourable foraging habitat for noctule bats which show a preference for feeding in ‘open’ habitats. However, the low abundance of insects will limit the value of the foraging habitat for noctule bats.

6.2.2.12 A total of 18 buildings were recorded within the Energy Park Land. The preliminary roost assessment found that these buildings offer **negligible to low** potential for roosting bats in accordance with the guidance (Collins, 2016).

6.2.2.13 One tree with potential to support roosting bats was recorded within the eastern part of Energy Park Land, comprising a semi-mature oak situated in the mosaic of semi-natural habitats, which is therefore well connected to

suitable foraging and commuting habitat for bats. One potential roosting feature was recorded on the tree; a compression fork located on the south facing aspect of the trunk. Overall, the tree was assessed as offering **low** potential to support roosting bats, in accordance with Collins (2016).

6.2.2.14 Bat activity transects were conducted in the Energy Park Land (see Appendix F for survey locations). Three visits were made between June and August 2020 (inclusive), during which the following bat species were recorded; common pipistrelle, soprano pipistrelle, *Myotis* sp. and noctule. Across the three visits, common pipistrelle was the most frequently recorded species (total passes recorded = 22), followed by soprano pipistrelle (n = 5), *Myotis* sp. (n = 3) and noctule (n = 1). Common pipistrelle bats were recorded on all survey visits and soprano pipistrelle on two, whereas *Myotis* sp. and noctule were only recorded on one of the four surveys. Bat activity levels throughout the surveys were low, as expected due to the openness of the habitats present. A peak number of 13 passes was recorded on visit one, undertaken on the 23rd June 2020. Activity during the surveys was concentrated largely to commuting and foraging over the numerous ditches present on site, along with parallel to hedgerows and along the edge of woodland patches. No social calling was recorded during any of the transect surveys.

6.2.2.15 Five Anabat Express static recording detectors (see Appendix F for locations) were deployed within the Energy Park Land on three occasions between June and August 2020 (inclusive). Static monitoring analysis revealed the presence of *Myotis* sp., common pipistrelle, soprano pipistrelle and noctule bat species. The most frequent species recorded was common pipistrelle (80%), followed by soprano pipistrelle (16%), *Myotis* sp. (3%), and noctule (2%). Deployment location 6 recorded the highest levels of bat activity (on average 175 passes per night), with a total of 1921 common pipistrelle passes over the three deployment periods between June - August 2020. Location 8 had consistently high levels of bat activity, with an average of 41 passes per night, followed by location 10 with 40 passes per night. Levels of high activity are concentrated around moderate foraging habitat, specifically ditches, hedgerows and scrub. Location 6 and 7 recorded the highest levels of social activity (89% and 10% of all social calls, respectively).

6.2.2.16 Lowest levels of bat activity were witnessed at deployment locations 7 and 9, with 28 and 16 bat passes on average per night, respectively. There was one instance of equipment failure at location 9 (August), however, given the consistently low number of passes throughout successfully recorded months, this equipment failure is not thought to restrict the results.

6.2.2.17 Bat activity varied across the months, with June (n = 694) and July (n = 246) presenting the highest average bat passes per night when bats are most active; August (n = 79) presented moderate levels of activity in comparison. Static location 6 contributed the most recordings and was located at NGR: SE 86231 13440, on the banks of Lysaght's Drain, close to the River Trent.

Birds

6.2.2.18 Habitats within the Flixborough Industrial Estate are dominated by hardstanding and buildings, which provides very limited nesting and foraging habitat for birds. Furthermore, the volume of traffic, vehicle, and machinery movements (cranes associated with the port) and the number of people further reduces the favourability of the habitats within and adjacent to the Flixborough Industrial Estate for foraging and nesting birds.

6.2.2.19 The vast areas of arable land and associated field drains, marginal vegetation and field margins provide suitable foraging, sheltering and nesting habitat for many bird species. Results of the desk study, wintering bird surveys and breeding bird surveys found that suitability and evidence of ground nesting birds including grey partridge (*Perdix perdix*), skylark and lapwing, shrub nesting birds, species associated with farmland and/or marginal vegetation including reed bunting, yellowhammer, linnet (*Linaria cannabina*) and reed warbler (*Acrocephalus scirpaceus*), and overwintering thrushes and starlings including large flocks of fieldfare and redwing. The mosaic of semi-natural habitats in the eastern section of the Energy Park Land provides habitat for woodland and shrub nesting species as well as conditions for ground nesting birds including snipe, woodcock (*Scolopax rusticola*).

6.2.2.20 The Energy Park Land was subject to wintering bird surveys, comprising five monthly visits between November 2019 and March 2020 (inclusive). Breeding bird surveys were completed during June 2020, April 2021, May 2021 and June 2021. Migratory visits were carried out between August 2021 through to April 2022. Tables 6, 7, and 8 summarise the species of note recorded during the bird surveys. For the purpose of this report, only species which are qualifying features of the Humber Estuary SPA; Humber Estuary Ramsar Site; Humber Estuary SSSI; and are SPI or feature on the Birds of Conservation Concern 4 (BoCC4) Red or Amber list of species are included in the results of the wintering bird surveys.

Table 6: Key bird species located within or adjacent to the Energy Park Land during the wintering bird surveys

Common name	Scientific name	Peak count	SPA listed	Ramsar listed	SSSI listed	S41	Red listed	Amber listed
Lapwing	*Vanellus vanellus*	c.50	✓ Article 4.2	✓ wintering & passage	✓ wintering & passage	✓	✓	
Mallard	*Anas platyrhynchos*	c.41	✓ Article 4.2					✓
Marsh harrier	*Circus aeruginosus*	1	✓ Article 4.1	✓ breeding				✓
Oystercatcher	*Haematopus ostralegus*	3	✓ Article 4.2	✓ wintering & passage	✓ wintering & passage			✓
Teal	*Anas crecca*	13	✓ Article 4.2	✓ wintering & passage	✓ wintering & passage			✓
Bullfinch	*Pyrrhula pyrrhula*	22				✓		✓
Dunnock	*Prunella modularis*	9				✓		✓
Grey wagtail	*Motacilla cinerea*	4					✓	
Herring gull	*Larus argentatus*	9				✓	✓	
House sparrow	*Passer domesticus*	8				✓	✓	
Kestrel	*Falco tinnunculus*	6						✓
Meadow pipit	*Anthus pratensis*	9						✓
Mute swan	*Cygnus olor*	1			✓ breeding assemblage			✓
Reed bunting	*Emberiza schoeniclus*	4			✓	✓		✓

Common name	Scientific name	Peak count	SPA listed	Ramsar listed	SSSI listed	S41	Red listed	Amber listed
					breeding assemblage			
Skylark	*Alauda arvensis*	35				✓	✓	
Snipe	*Gallinago gallinago*	2			✓ breeding assemblage			✓
Song thrush	*Turdus philomelos*	2				✓	✓	
Starling	*Sturnus vulgaris*	75				✓	✓	
Tree sparrow	*Passer montanus*	12				✓	✓	
Woodcock	*Scolopax rusticola*	1					✓	
Yellowhammer	*Emberiza citrinella*	106				✓	✓	

SPA species refer to the non-qualifying species listed under article 4.2 of the Directive.
S41 refers to species that are listed as Species of Principal Importance under The Natural Environment and Rural Communities (NERC) Act 2006
Red listed birds are those that are; Globally threatened, have shown historical population decline in the UK during 1800–1995, have shown a severe (at least 50%) decline in UK breeding population over last 25 years, or longer-term period, and have had a severe (at least 50%) contraction of their UK breeding range over last 25 years, or the longer-term period.
Details on Amber listed birds can be found at Stanbury et al. (2021)
Note: Fieldfare and redwing is not included in the table because they are red-listed only as breeding birds.

6.2.2.21 A summary of the survey records for each species listed in Table 6 is given below:

- approximately 50 lapwings were recorded flying around arable fields north of the village of Amcotts, west of the River Trent during the survey in November 2018. Three pairs of lapwings were also recorded in the arable fields to the west of Skippingdale Retail Park during the March 2020 survey. Lapwing were recorded on the Energy Park Land or surrounding survey on no other occasions;
- mallard were recorded on the Energy Park Land during January, February and March of the 2019/2020 surveys, with a peak count of 42 in March 2020 that included 24 birds using the water drains and arable farmland within the Order Limits. Mallard were recorded on all five of the 2018/2019 surveys with birds observed roosting and feeding along the immediate banks of the River Trent outside the Order Limits with a peak count of approximately 41 in November 2018;
- a single marsh harrier was recorded foraging over the arable fields north of Flixborough Industrial Estate during the March 2020 survey;
- thirteen teal were recorded in an arable field drain on one occasion during the winter bird surveys;
- individual and small numbers of oystercatchers were recorded in the arable farmland both to the north and south of the Flixborough Industrial Estate during the 2019/2020 surveys. Records include foraging birds and birds flying over the site. A peak count of three oystercatchers were recorded during the December 2019 survey;
- dunnock were regularly recorded during each survey, a peak count of nine individuals was the maximum recorded during each survey. Most individuals were recorded along hedgerows and in the eastern section of the Energy Park Land;
- small numbers of grey wagtail were during surveys between November 2019 and February 2020. A peak count of four grey wagtail were recorded around the field drains in the arable fields to the south of Flixborough Industrial Estate during the November 2019 survey;
- herring gull were recorded on buildings within the Flixborough Industrial Estate during the January 2019 to March 2019 surveys. During the 2019/2020 surveys herring gull were recorded regularly flying over the site, with a peak count of nine during the January 2020 survey;
- six house sparrows were recorded during December 2019 and eight were recording during February 2020;
- up to six kestrel were recorded hunting over able fields during surveys between November 2019 and March 2020, the majority of which were recorded around Neap House;
- meadow pipit were recorded in arable fields during all surveys between November 2019 and March 2020, with a peak count of nine during the January 2020 surveys;
- a single mute swan was recorded flying over the site during the November 2019 survey;

- occasional individual and small numbers of reed bunting were recorded in arable fields of the Energy Park Land during the 2019/2020 wintering bird surveys, with a peak count of 4;
- small numbers of skylarks were observed in the arable field within the Energy Park Land during surveys undertaken between November 2019 and February 2020, a peak count of 35 skylarks was recorded during March 2020, with the birds frequently recorded singing and/or in pairs in the arable farmland;
- two snipe were recorded during the December 2019 surveys and 1 snipe was recorded during the January 2020 surveys, in mosaic of semi-natural habitats which lies adjacent to the Phoenix Parkway LNR;
- occasional, individual song thrush were recorded during the wintering bird surveys;
- flocks of starling were recorded across the arable fields within the Energy Park Land during the surveys between November 2019 and March 2020, a peak count of 77 was recorded during the January 2020 surveys;
- a peak count of 12 tree sparrows were recorded during the January 2020 surveys, with eight tree sparrows also recorded during the November 2019 surveys and the December 2019 surveys. The birds were recorded in the marginal vegetation of the Lysaght's drain, close to Neap House;
- a single woodcock was flushed from the dense bracken, in the mosaic of semi-natural habitats in the eastern section of the Energy Park Land during the February 2020 surveys; and
- yellowhammer were recorded occasionally and in small numbers, flying over the Energy Park Land, with a peak count of three recorded.

Table 7: Breeding bird survey results of key bird species (including possible, probable and confirmed breeding birds) located within the Energy Park Land

Common name	Scientific name	Breeding status	SPA listed	SSSI listed	Sch 1	S41	Red listed	Amber listed
Mallard	*Anas platyrhynchos*	Confirmed	✓ Article 4.2					✓
Cetti's warbler	*Cettia cetti*	Confirmed			✓			
Bullfinch	*Pyrrhula pyrrhula*	Possible						✓
Dunnock	*Prunella modularis*	Probable				✓		✓
Grasshopper warbler	*Locustella naevia*	Possible				✓	✓	
Grey partridge	*Perdix perdix*	Possible				✓	✓	
House sparrow	*Passer domesticus*	Possible				✓	✓	
Linnet	*Linaria cannabina*	Possible				✓	✓	
Meadow pipit	*Anthus pratensis*	Possible						✓
Reed bunting	*Emberiza schoeniclus*	Confirmed		✓		✓		✓
Skylark	*Alauda arvensis*	Confirmed				✓	✓	
Snipe	*Gallinago gallinago*	Possible		✓				✓
Song thrush	*Turdus philomelos*	Possible				✓	✓	
Tree sparrow	*Passer montanus*	Possible				✓	✓	
Willow warbler	*Phylloscopus trochilus*	Confirmed						✓
Yellowhammer	*Emberiza citrinella*	Possible				✓	✓	
Yellow wagtail	*Motacilla flava*	Possible				✓	✓	

6.2.2.22 Of the breeding bird species listed in Table 7, their peak counts, overview of counts, and location during the surveys are described in detail below:

- individual bullfinches were recorded frequently in the woodland/scrub surrounding the Energy Park Land. This species was assessed as probably breeding in the Railway Reinstatement Land, however within the Energy Park Land it was only recorded as possibly breeding. A peak count of four birds were recorded during the June 2020 survey; A peak count of four birds were recorded during the June 2020 survey;
- Cetti's warbler were recorded as confirmed breeding, with singing adults and fledged young recorded in the common reed, marginal vegetation of the River Trent, close to the Flixborough Wharf;
- dunnock were frequently recorded along the boundaries of the Energy Park Land and in the marginal vegetation of arable field drains. While this species was recorded as confirmed breeding in the Railway Reinstatement Land, it was only recorded as possibly breeding in the Energy Park Land. A peak count of 12 was recorded;
- a single grasshopper warbler was recorded on one occasion during the May 2019 survey, located in the area where the Lysaght's drain meets the River Trent. It is thought that species is possibly breeding in the area;
- grey partridge was frequently recorded in the arable fields to the south of Flixborough Industrial Estate, with a peak count of 8 recorded during the May 2021 survey within Energy Park Land. A peak count of 14 was recorded during the April 2021 survey. This species was recorded as possible breeding;
- house sparrows were occasionally recorded in small numbers, with a peak count of four birds recorded during the May 2021 surveys. No evidence of breeding was observed, however as suitable breeding habitat is present within Energy Park Land, house sparrows were assessed as possibly breeding;
- linnet was recorded in larger numbers in the Energy Park Land, with a peak count of 35 birds recorded during the June 30th 2021 survey. It is thought that they are possibly breeding in the area;
- a peak count of 35 reed bunting was recorded during the May 2021 surveys, of these, 26 were recorded within the Energy Park Land. This species was recorded as confirmed as breeding within the marginal vegetation along the River Trent and arable cropland;
- a peak count of 21 mallard were recorded in May 2021, 18 of which were located within the Energy Park Land. This species was confirmed as breeding in the arable farmland;
- meadow pipit were recorded as possibly breeding in the arable farmland, with a peak count of 10 birds recorded during the May 2021 survey, 7 of which were from within the Energy Park Land;
- skylark were recorded on all occasions. A peak count of 81 skylarks were recorded during the May 2021 survey, 57 of which are were recorded from within the Energy Park Land;

- snipe were recorded in small numbers in the arable farmland and grassland of the Energy Park Land. A peak count of four were observed in April 2021. This species is assessed as possibly breeding;
- song thrush were frequently recorded singing in habitats surrounding the arable farmland, with a peak count of eight recorded during the June 30th 2021 survey. This species was assessed as possibly breeding in the area;
- small numbers of tree sparrow were recorded occasionally during the 2020/2021 surveys in the arable cropland, with a peak count of five in the June 18th 2021 survey. It is possible that this species is breeding in the area;
- willow warbler were recorded singing in the scrub and woodland on all occasions, with a peak count of 11 willow warblers recorded during the May 2021 survey;
- yellowhammer, which were recorded singing on all survey visits. A peak count of 31 yellowhammer were recorded during the April 2021 survey, 27 of which were recorded in the arable farmland to the south of the Flixborough Industrial Estate. Birds were recorded as individuals along the arable field boundaries and a flock of 18 yellowhammer were also observed feeding in the arable cropland; and
- yellow wagtails were recorded during the 2020/2021 surveys, with a peak count of 21 yellow wagtail observed in the arable crops of the Energy Park Land.

Table 8: Migratory bird survey results of key bird species located within the Energy Park Land

Common name	Scientific name	SPA listed	Ramsar species	SSSI species	S41	Red listed	Amber listed
Curlew	*Numenius arquata*	✓ Article 4.2 non-breeding waterbird assemblage	✓ wintering & passage	✓ wintering & passage	✓		
Golden Plover	*Pluvialis apricaria*	✓ Article 4.1 qualifying wintering species	✓ wintering & passage	✓ wintering & passage			
Lapwing	*Vanellus vanellus*	✓ Article 4.2	✓ wintering & passage	✓ wintering & passage	✓	✓	
Mallard	*Anas platyrhynchos*	✓ Article 4.2					✓
Marsh harrier	*Circus aeruginosus*	✓ Article 4.1 qualifying breeding species	✓ breeding	✓ breeding			✓
Oystercatcher	*Haematopus ostralegus*	✓ Article 4.2	✓ wintering & passage	✓ wintering & passage			✓
Redshank	*Tringa totanus*	✓ Article 4.2		✓ wintering & passage			✓
Shelduck	*Tadorna tadorna*	✓ Article 4.2		✓ wintering & passage			

Common name	Scientific name	SPA listed	Ramsar species	SSSI species	S41	Red listed	Amber listed
Teal	*Anas crecca*	✓ Article 4.2	✓ wintering & passage	✓ wintering & passage			✓
Bullfinch	*Pyrrhula pyrrhula*				✓		✓
Black-headed gull	*Chroicocephalus ridibundus*						✓
Common gull	*Larus canus*						✓
Common sandpiper	*Actitis hypoleucos*						✓
Dunnock	*Prunella modularis*				✓		✓
Fieldfare	*Turdus pilaris*					✓	
Great black-backed gull	*Larus marinus*						✓
Greenfinch	*Chloris chloris*					✓	
Green sandpiper	*Tringa ochropus*						✓
Greylag goose	*Anser anser*						✓
Grey partridge	*Perdix perdix*				✓	✓	
Grey wagtail	*Motacilla cinerea*					✓	
Herring gull	*Larus argentatus*				✓	✓	
House sparrow	*Passer domesticus*				✓	✓	
Kestrel	*Falco tinnunculus*						✓
Kingfisher	*Alcedo atthis*			✓ breeding assemblage			✓
Lesser black-backed gull	*Larus fuscus*						✓
Linnet	*Linaria cannabina*				✓	✓	
Meadow pipit	*Anthus pratensis*						✓
Mistle thrush	*Turdus viscivorus*					✓	

Common name	Scientific name	SPA listed	Ramsar species	SSSI species	S41	Red listed	Amber listed
Moorhen	*Gallinula chloropus*						✓
Mute swan	*Cygnus olor*			✓ breeding assemblage			✓
Pink-footed goose	*Anser brachyrhynchus*						✓
Quail	*Coturnix coturnix*						✓
Reed bunting	*Emberiza schoeniclus*			✓ breeding assemblage	✓		✓
Reed warbler	Acrocephalus scirpaceus			✓ breeding assemblage			
Redwing	*Turdus iliacus*					✓	
Rook	*Corvus frugilegus*						✓
Sedge warbler	*Acrocephalus schoenobaenus*						✓
Skylark	*Alauda arvensis*				✓	✓	
Snipe	*Gallinago gallinago*						✓
Song thrush	*Turdus philomelos*				✓		✓
Starling	*Sturnus vulgaris*				✓	✓	
Stock dove	*Columba oenas*						✓
Tree sparrow	*Passer montanus*				✓	✓	
Whimbrel	*Numenius phaeopus*					✓	
Whitethroat	*Curruca communis*						✓
Whooper swan	*Cygnus cygnus*						✓
Willow warbler	*Phylloscopus trochilus*						✓

Common name	Scientific name	SPA listed	Ramsar species	SSSI species	S41	Red listed	Amber listed
Woodcock	*Scolopax rusticola*					✓	
Wood pigeon	*Columba palumbus*						✓
Wren	*Troglodytes troglodytes*						✓
Yellowhammer	*Emberiza citrinella*				✓	✓	
Yellow wagtail	*Motacilla flava*			✓ breeding assemblage	✓	✓	

6.2.2.23 The SPA, Ramsar and SSSI qualifying species were only recorded in small numbers with golden plover, lapwing, mallard, oystercatcher, redshank and teal recorded using habitats within the Order Limits for foraging and/or roosting. Curlew, marsh harrier and shelduck were noted in the surrounding area. Full species details are provided below;

- curlew - listed as part of the non-breeding waterbird assemblage qualification of the Humber Estuary SPA, Ramsar and SSSI. Five birds were recorded flying south along the River Trent (outside of the Order Limits) to the north of Flixborough Industrial Estate on Visit 1 and two again in same area on Visit 2;
- golden plover - Listed as a qualifying wintering species under Annex 1 of the Humber Estuary SPA and non-breeding waterbird assemblage for the SSSI. Between Visit 15 to 18, birds were recorded using the arable fields towards the centre of the Energy Park Land, predominately for roosting. A peak count of 82 were present on Visit 15, with 51 on Visit 16, six on Visit 17 and 25 on Visit 18. Elsewhere, outside the Order Limits, a significant flock of 290 birds were sighted in flight south over the River Trent during Visit 14 to the west of the Energy Park Land; seven flew over heading east to the east of Flixborough Industrial Estate on Visit 2; one flew south west over fields to north of the Order Limits on Visit 6; three flew over to the north on Visit 13; and one was along the River Trent to the north on Visit 24;
- lapwing - listed as part of the non-breeding waterbird assemblage qualification of the Humber Estuary SPA, Ramsar and SSSI. From Visit 11 to Visit 14 birds were present roosting on the arable fields within the Energy Park Land. Lapwing favoured the field to the west of Park Ings Farm where numbers ranged from 14 to a peak of 31 on Visit 14. Three birds were recorded again on Visit 22 while birds were noted outside the Order Limits to the north with one on Visit 21, three on Visit 22 and two on Visit 25;
- mallard - listed as part of the non-breeding waterbird assemblage qualification of the Humber Estuary SPA associating with River Trent and Lysaght's Drain, were recorded on all but one of the 26 surveys with a peak count of 45 on Visit 5. Records from within the Order Limits were restricted to 19 of the 26 surveys dominated by single figure counts involving birds feeding along the Lysaght’s Drain and adjoining drains to the south where notable counts comprised 22 on Visit 11 and eleven on Visit 22;
- marsh harrier - Listed as a qualifying breeding species under Annex 1 of the Humber Estuary SPA and breeding species for the Ramsar and SSSI. One bird flew south west outside the Order Limits over arable fields to the north of Flixborough Industrial Estate;
- oystercatcher - listed as part of the non-breeding waterbird assemblage qualification of the Humber Estuary SPA, Ramsar and SSSI. Two birds were present within the south east corner of the Energy Park Land on Visit 19. Two birds were noted flying south down the River Trent to the west of the Order Limits on Visit 22;

- redshank - listed as part of the non-breeding waterbird assemblage qualification of the Humber Estuary SPA and SSSI. Between Visits 14-18 and Visits 22-24 birds were recorded feeding in water drains within the survey area, of these three were in the Energy Park Land drains on Visit 16 and four on Visit 23 with single birds present on Visits 14, 17, 22 & 24. Outside the Order Limits to the north of Flixborough Industrial Estate four birds were noted on Visit 15, nine on Visit 16, one on Visit 18 and two on Visit 19;
- shelduck - listed as part of the non-breeding waterbird assemblage qualification of the Humber Estuary SPA and SSSI. No records from within the Order Limits, one bird was recorded flying south over farmland to the north of Flixborough Industrial Estate adjacent to the River Trent on Visit 11;
- teal - listed as part of the non-breeding waterbird assemblage qualification of the Humber Estuary SPA, Ramsar and SSSI. One bird was present in large water drain at the south east corner of the main site near Skippingdale Industrial Park on Visit 8.

6.2.2.24 Additional wildfowl and wader sightings comprise;

- green sandpiper – up to three birds were present between Visit 11 to Visit 18, feeding in water drains within the southern Energy Park Land and to the north of Flixborough Industrial Estate and one on Visit 22;
- greylag goose – two flew south down the River Trent during Visit 2, 149 birds flew over in two skeins during Visit 7 heading northwest, one flew south over fields to south of Flixborough Industrial Estate on Visit 8; ten flew south along the River Trent to the north of Flixborough Wharf on Visit 9; two flew north along the River Trent on Visit 11, one flew north on Visit 22 and five flew west over the Energy Park Land on Visit 24;
- mute swan – one on Visit 4 and five on Visit 5 involving two on the River Trent to the north of Flixborough Wharf and three flew south east over the Energy Park Land towards Skippingdale Industrial Park. Two birds frequented Lysaght's Drain area, Energy Park Land on Visits 12, 17, 18 and 26 with an additional two birds flying south over Flixborough Industrial Estate on Visit 11 and four birds flying south over the survey area on Visit 12;
- pink-footed goose – 64 on Visit 6 flew over the northern edge of Flixborough Industrial Estate in two skeins, 45 flew over the Energy Park Land during Visit 7 heading north west, and 253 flew over Flixborough Industrial Estate and arable fields to north in three skeins during Visit 8, 88 flew over on Visit 11 including two skeins of 19 and 29 birds over the Energy Park Land, 65 flew north along River Trent on Visit 14 and a significant movement of 338 birds flew over the survey area in four skeins on Visit 15; and
- whooper swan – 24 flew south over the main Energy Park Land from the direction of Flixborough Industrial Estate on Visit 9 and three flew south over the survey area on Visit 12.

6.2.2.25 Two grain stores located in the western section of the Energy Park Land were assessed for barn owl presence in September 2021. No evidence of

barn owl presence was found in either building and both buildings were assessed as having low suitability for barn owl. The first comprises a large single storey agricultural building, constructed of corrugated metal sheeting over a metal frame. Two large doors on the west elevation were open at the time of survey, but normally are kept closed with metal shutters. There was one potential access point where a missing metal sheet above the right-hand door offers a gap of approximately 50 x 20 cm. Internally, perching opportunities were available along the raised conveyor belt.

6.2.2.26 The second of the two buildings is constructed of red brick, with a corrugated fibre cement roof. Large doors on the western elevation were blocked with a breezeblock wall, though there are two large doors/openings on the western elevation that allow permanent access. Internally, the building is 90% full of grain with a portable cabin unit and stored equipment. Potential perches include metal i-beams and the portacabin. A single active wood pigeon nest was observed located on beams above the roof stanchion.

Reptiles

6.2.2.27 Suitable basking, foraging and refuge habitat for reptiles within the Energy Park Land include the field margins, marginal vegetation, network of arable field drains and hedgerows within the arable farmland. The mosaic of semi-natural habitats in the eastern section of the Energy Park Land is considered most suitable for reptile species. Habitats of note in this area include species-poor semi-improved acid grassland, marginal vegetation, tall ruderal vegetation, bracken, dense and scattered scrub, and woodland. No reptile surveys were conducted in the Energy Park Land.

Badger

6.2.2.28 Five badger setts were recorded along the banks of ditches in the arable farmland. Four were recorded as outlying setts and one as a main, active sett. The main sett is located on the eastern bank of a large ditch, and comprises 7 active entrance holes with latrines and bedding recorded at the hole entrances, as well as a further three collapsed entrances. Mammal trails which appeared to be regularly used are present around the main sett. The feeding remains of badger were regularly observed in the northern section of the site along the arable field boundaries.

6.2.2.29 Habitats which are considered suitable for foraging, commuting or sett building badger include the arable field boundaries, marginal vegetation, ditches, hedgerows, tall ruderal vegetation, bracken, dense and scattered scrub, broadleaved woodland, and plantation woodland.

Otter and water vole

6.2.2.30 The general character of the Energy Park Land is dominated by extensive arable farmland, with a network of interconnected arable field drains, the majority of which connect to the Lysaght's Drain, a large drain which traverses the Energy Park Land from east to west. Most drains have steep sides, with banks at an angle of 45°, between 1 and 5 m in height. The channel widths vary, with minor drains having a width of 0.5 m, and major drains having a width of up to 4 m. The drains are typically bound by wide

field margins. The drains are managed, with evidence of dredging and vegetation removal present. Due to the management regime, the drains varied in character from having limited marginal vegetation and abundant open water, to being dense with common reed, other aquatic vegetation and having long, dense marginal cover of grasses and herbaceous plants. In total, there are 21 wet ditches within the Energy Park Land (ditches 6 to 27) which were assessed as offering suitable habitat for otter and water vole.

6.2.2.31 Evidence of otter recorded during the field surveys comprised: a set of otter prints, along the banks of the River Trent at NGR SE 85856 14504, immediately adjacent to the ship dock at Flixborough Wharf; and an otter seen laying up in the long grass next to a ditch at the eastern side of the Energy Park Land (NGR: SE 87363 13558).

6.2.2.32 Results from the water vole surveys and trail cameras found no evidence of water vole on most of the ditches. The following evidence of water vole was recorded:

- Ditch 11, more than 20 footprints of water vole were observed on an exposed silt bar at the most eastern end of the ditch (NGR: SE 87277 13541). No other corroborating evidence of water vole was recorded;
- Ditch 18, three burrows and a single latrine on the western bank which were identified as water vole (NGR: SE 86304 13391); and
- Ditch 8, the feeding remains of water vole were recorded on the banks of the ditch (NGR: SE 87115 14128), with no other corroborating evidence of water vole.

6.2.2.33 Overall, there is a low level of water vole activity in the Energy Park Land, with the presence of water vole burrows and a latrine only recorded in one of the 21 ditches that was assessed as suitable for water vole (Ditch 18).

6.2.2.34 The trail cameras recorded one American mink (*Neovison vison*), an invasive, non-native species located in arable field drain at NGR: SE 86491 13859.

Other mammals

6.2.2.35 Brown hare, a SPI, was regularly recorded along the arable field margins. Additional mammal species (non-SPI) recorded within the Energy Park Land comprised roe deer (*Capreolus capreolus*) and their young. A single water shrew (*Neomys fodiens*) was sighted in the eastern mosaic area during migratory bird surveys carried out in September 2021. Other species considered likely to be present include wood mouse (*Apodemus sylvaticus*), common shrew (*Sorex araneus*) bank vole (*Myodes glareolus*) and field vole (*Microtus agrestis*).

Invertebrates

6.2.2.36 The mosaic of semi-natural habitats in the eastern area of the Energy Park Land supports a diversity of terrestrial invertebrate species and is considered to be of greater value to invertebrates than the main Energy Park Land. Whilst the network of arable field drains, associated marginal vegetation, hedgerows and field margins provide suitable habitat for

invertebrate species, the intensively managed arable fields are sub-optimal for invertebrates.

6.3 Railway Reinstatement Land – Baseline

6.3.1 Baseline Habitats

6.3.1.1 The Project will include the re-opening of the existing Dragonby to Flixborough branch line. The Railway Reinstatement Land includes the existing railway line, along with access routes, construction compounds and working areas.

6.3.1.2 The railway line itself features stone ballast, metal tracking and concrete sleepers. It has become colonised by scrub, tall ruderal, and ephemeral vegetation, with areas of bare ground present. The embankments surrounding the line vary in character, with areas of scrub, woodland, grassland, and sparsely vegetated ground present.

6.3.1.3 Conesby Quarry LWS/LGS overlaps marginally with the Railway Reinstatement Land. The quarry comprises an area of pioneer habitats in a disused quarry pit, with several water bodies present. Habitats along the length of the Railway Reinstatement Land includes scrub, neutral and calcareous grassland, woodland and the perimeter of adjacent arable and pasture fields.

6.3.1.4 A single access track will be used for the railway reinstatement works. This runs from Normanby Road to the Dragonby Sidings. The track comprises hardstanding, with surrounding tall ruderal vegetation, scrub, and watercourses.

Hardstanding and buildings

6.3.1.5 The ground conditions of the existing railway line comprise stone track ballast, with concrete sleepers and a metal tracking along the length of the line. There is a single building within the Railway Reinstatement Land, comprising a large warehouse which is used by Vossloh Cogifer, near Dragonby, with associated yard hardstanding, surrounded by security fencing.

Semi-improved, calcareous grassland

6.3.1.6 Two areas of semi-improved calcareous grassland, which are generally in poor condition, are located along the railway line. Both areas are unmanaged and located on freely draining, base rich, pebble/stone substrate. The first area is located to the north of Normanby Industrial Estate, the second, notable area of semi-improved calcareous grassland is located further east along the railway line, close to the Conesby Quarry. Along these sections of the line, the habitat is open and receives much sunlight. The sward varies in height, from low, and from ephemeral type vegetation to swards with a height of approximately 50 cm. There is no one common or dominant species throughout, however viper's bugloss (*Echium vulgare*) is locally dominant in the western section. Other species noted include barren brome (*Bromus sterilis*), false oat grass, soft brome (*Bromus hordeaceus*), Yorkshire fog, red fescue, blue fleabane (*Erigeron acris*), sulphur clover (*Trifolium ochroleucon*), common stork's bill (*Erodium*

cicutarium), smooth cat's ear (*Hypochaeris glabra*), smooth tare (*Vicia tetrasperma*), common vetch (*V. sativa*), perforate St. John's wort (*Hypericum perforatum*), biting stonecrop (*Sedum acre*) and great mullein (*Verbascum thapsus*). Northern marsh orchid (*Dactylorhiza purpurella*), southern marsh orchid (*Dactylorhiza praetermissa*) and bee orchid (*Ophrys apifera*) were also noted within the sward. These areas of grassland qualify as Lowland Calcareous Grassland HPI.

Dense and scattered scrub

6.3.1.7 Much of the trackway itself has been colonised by bramble scrub. Scrub is also present surrounding the tracks, with willow, hawthorn, blackthorn, rose and gorse (*Ulex europaeus*) frequently recorded.

Neutral semi-improved grassland

6.3.1.8 Small areas of semi-improved neutral grassland are located along the banks of the railway line, with areas becoming outcompeted by tall ruderal vegetation including cow parsley and common hogweed. However, common species noted include bush vetch (*Vicia sepium*), primrose (*Primula vulgaris*), annual meadow grass (*Poa annua*), false oat grass, cock's-foot, forget-me-not (*Myotis* sp.), shining cranesbill (*Geranium lucidum*), meadow vetchling (*Lathyrus pratensis*), Russian comfrey (*Symphytum x uplandicum*), field horsetail (*Equisetum arvense*), barren brome (*Bromus sterilis*), white campion (*Silene latifolia*) and common knapweed (*Centaurea nigra*).

Broadleaved woodland and scattered trees

6.3.1.9 Areas of broadleaved woodland occur along several sections of the railway embankment. The majority are not particularly dense and the ground is largely bare and composed of pebbles/stones with little soil. They form linear features and in many places the tree/shrub canopy overhangs parts of the railway trackbed. The trees vary in age from young to semi-mature, with sycamore (*Acer pseudoplatanus*) and ash (*Fraxinus excelsior*) largely dominant. The understory includes hawthorn, bramble and rose, and the ground flora includes false oat grass, cock's-foot, cleavers and ivy.

Tall ruderal vegetation

6.3.1.10 Tall ruderal vegetation is scattered throughout the Railway Reinstatement Land, including along arable field boundaries, along the trackway and railway embankments. Two notable sections of tall ruderal vegetation were recorded:

- a mound of raised earth within the Flixborough Industrial Estate, directly adjacent to the railway line, which features scrub and tall ruderal species; and
- a wide strip of tall ruderals immediately north of Flixborough Industrial Estate, along the arable field boundaries.

Ephemeral vegetation

6.3.1.11 Ephemeral vegetation features frequently along the railway line, over stony ground.

Standing water

6.3.1.12 There are no waterbodies within the Railway Reinstatement Land. A total of 15 ponds and two large ditches are located within 0.25 km of the Railway Reinstatement Land. Descriptions and details of further survey are included under *Amphibians (including great crested newts)*, below.

Water courses

6.3.1.13 No water courses were recorded along the existing railway line. Two water courses are present elsewhere within the Railway Reinstatement Land:

- two arable field drains to the north of Flixborough Industrial Estate, both of which (Ditches 39 and 40), connect to a large network of arable field drains in the extensive area of arable farmland; and
- two shallow drainage swales, which run parallel to the access track. Both swales are short in length and feature shallow banks.

Arable and species-poor semi-improved grassland

6.3.1.14 Managed arable farmland is present to the north and east of Flixborough Wharf. Crops recorded during the surveys comprise barley. The field margins are characteristic of poor semi-improved grassland, with Yorkshire fog, false-oat grass, cow parsley, common hogweed and creeping thistle frequently recorded.

6.3.1.15 Common grassland species recorded within the field boundaries include Yorkshire fog, false-oat grass, cow parsley and common hogweed.

Hedgerows

6.3.1.16 Four hedgerows were recorded along the boundaries of the arable fields to the west and east of the Railway Reinstatement Land. All hedgerows qualify as HPI:

- Hedgerow 1 – A young, intact native species-rich, roadside hedgerow planted in a slight banking. Tree guards are present on most specimens. Approximately 1.5 m in height, under 0.5 m wide with multiple gaps. Species present comprise abundant hawthorn, occasional hazel (*Corylus avellana*), rose, field maple (*Acer* campestre) and blackthorn. Ground flora comprises cocksfoot, tufted hair-grass (*Deschampsia cespitosa*), creeping thistle, nettle, meadow cranesbill (*Geranium pratense*) and wood avens (*Geum* urbanum);
- Hedgerow 2 – A small section of intact species-poor hedgerow situated adjacent to the roadside. Outgrown, with a height of 3 m and width of 1.5-2 m. Dominated by hawthorn, with occasional rose. Scattered, semi-mature ash and ash saplings are present, alongside dense bramble scrub and ivy (*Hedera helix*) cladding on hawthorn. Ground flora comprises meadow cranesbill, wood avens, herb-Robert (*Geranium* robertianum) and ivy;
- Hedgerow 3 – Mature intact species-poor hedge and trees with evidence of historical laying. Predominantly 3 m high and 2 m wide, but with some shorter, more defunct sections. Species present includes

hawthorn and field maple, with areas of bramble. Ground flora includes nettle and cow parsley; and

- Hedgerow 4 – Mature, native intact species-rich, unmanaged hedgerow, with evidence of historical laying. Approximately 4 m high and 2 m wide, the hedgerow is not dense to the ground. Species present comprises of hawthorn, holly (*Ilex* aquifolium), rose, elder and oak, alongside bramble scrub.

6.3.2 Baseline Species

6.3.2.1 The occurrence of invasive non-native species and potential for protected species within the Railway Reinstatement Land is presented below.

Plants (including invasive species)

6.3.2.2 Small stands of Himalayan balsam were recorded along the railway line and in the Railway Reinstatement Land to the north of the Flixborough Industrial Estate.

Amphibians (including great crested newts)

6.3.2.3 No waterbodies are present within the Railway Reinstatement Land. 15 ponds and two large ditches are located within 0.25 km, alongside an additional six ponds located just outside of the 0.25 km buffer. All ponds and ditches are described below and their locations are presented within Technical Appendix C. Ordered in distance from the Order Limits, they comprise:

- Pond 16 is a very large water body adjacent to the Order Limits that stretches to the north (1000 m x 70 m). It is a disused ironstone quarry that has filled with water. Much of it has sheer stone cliffs, the majority is inaccessible because of steep slopes covered with dense gorse, bramble, and hawthorn;
- Ditch 1 is located 9 m south of the Order Limits and comprises a largely dry and filled with dense stands of common reed, and approximately 1 m in width. The northern section of the ditch has water flowing from a manhole cover. A short section (10 m) at the far north-western end has ponded where the gradient is very slight. Water clarity is good, however no aquatic vegetation is present;
- Ditch 2 is located 12 m south-east of the Order Limits and is approximately 2 m - 4 m wide, supporting dense reedmace and common reed along its margins, alongside grassy herbaceous banks;
- Pond 3 is located 19 m south-east of the Order Limits and is a narrow, approximately 50 m x 10 m pond, surrounded by dense young alder and bramble scrub. The pond is mostly open, but with a small area of reedmace swamp at the western side;
- Pond 7 is a small pool in an area of dense reed swamp, approximately 7 m x 7 m in extent and sited 32 m south of the Order Limits. Reedmace is dominant and the pond is surrounded by young willow scrub. The water is slightly turbid, but with filamentous algae gradually growing across the surface;

- Pond 10 is part of a dense reed bed approximately 40 m x 50 m and located 52 m south of the Order Limits. It is very shallow, approximately 5-10 cm in depth with a few deeper patches reaching to about 30 cm;
- Pond 8 is located 58 m north of the Order Limits and comprises a large fishing pond used for private fishing, with numerous jetties present along the margins. The pond is surrounded by mature trees and scrub with no aquatic vegetation present. The banks vary from shallow to steep;
- Pond 11 is like Pond 6, 62 m south of the Order Limits and with several interconnecting areas of open shallow swamp supporting patches of reedmace, rushes and common spike rush, with no other aquatic vegetation present. The pools are a maximum of 10 cm deep and 5/6 m wide (maximum area 70 m x 20 m);
- Pond 35; the Blue Lagoon, is located 70 m north-west of the Order Limits at the closest point. The Blue Lagoon is part of the Conesby Quarry Local Nature Reserve (LNR), is a very deep, large water body which is approximately 370 m x 140 m. The waterbody features large areas of open water, with banks which are dominated by common reed. Small areas of willow scrub are present along the bank, providing small areas of shading. There is a public footpath around the perimeter of the waterbody which is heavily used by dog walkers;
- Pond 18 could not be accessed as it is located on a stepped section of the quarry sides, 94 m west of the Order Limits. Surveyors were made aware of the pond by site management and the pond was viewed from a vantage point to the west. The pond appears to be dominated by common reed and according to conversations with the site management, previous surveys have recorded GCN;
- Pond 4 is a moat-like pond with a central island situated 0.12 km south-east of the Order Limits; the water body in total is approximately 250 m x 10 m in extent. The pond supports large areas of reedmace and common reed along the margins. Open areas have abundant submerged aquatic vegetation. The pond is situated in an area of mixed scrub and unmanaged grassland. Newt exclusion fencing was located approximately 30 m to the south of the pond on the edge of an adjacent development site at the time of survey;
- Pond 12 is located 0.12 km north of the Order Limit and comprises a slurry pit for an industrial chicken farm that is regularly pumped out;
- Pond 13 is a fishpond adjacent to Pond 12 and 0.14 km north of the Order Limits. The pond is heavily stocked;
- Pond 19 comprises two waterbodies which are adjacent to each other and located 0.14 km west of the Order Limits; for the purposes of the survey they are recorded as one pond. Approximately 500 m2, the pond has shallow areas towards the banks, increasing to a depth of up to 0.5 m. Shallow, sloped earth banks are present along the western section, with steep banks of the quarry pit present along the eastern edge. The eastern bank was not accessible for survey. Willow and bramble scrub shade approximately 50% of the pond edge and water is dominated by common reed;

- Pond 20 is situated 0.15 km east of the Order Limits and is a long, narrow water body which was previously a stocked, fishing lake. The site is now gated off and not maintained as a fishing lake, it is located within the Yorkshire East Gullet LWS. Approximately 380 m x 35 m, and the pond is very deep, with a depth of 0.3 m along the bankside. The eastern bank was not accessible for survey, comprising very steep banks which feature dense woodland. The full length of the western bank was accessible. The banks of the pond are steep, which is likely to accommodate fishing. Willow scrub shades the majority of the western bank. Aquatic vegetation includes water mint, duckweed (*Lemnoideae* sp.) and water lily (*Nymphaeaceae* sp.);
- Pond 17, a large, deep water body which is approximately 115 m x 85 m and located 0.16 km west of the Order Limits, within Conesby Quarry LWS, LGS. It is understood that the water body is drained quarterly as part of the ongoing management of the quarry and that historically, the water body was drained monthly. Conversations with a site manager indicate that the water volume fluctuates rapidly; with the area being dry following drainage, then forming a deep lake in the following months. The substrate and banks are the exposed, bare earth of the quarry pit. No aquatic vegetation was recorded in the waterbody. Marginal vegetation is limited, with patches of scrub present on the eastern banks. Access to the waterbody is limited as the banks are unstable;
- Pond 5 is a shallow flash located near the corner of an access road, 0.22 km east of the Order Limits. It is a maximum of 10 cm in depth. It supports an abundance of common spike rush (*Eleocharis palustris*) and occasional reedmace;
- Pond 9 is situated 0.25 km north of the Order Limits and is approximately 15 m x 15 m in extent, situated on the south-western corner of a small poplar (*Populus* sp.) plantation, and situated within an arable farm; the surrounding fields are managed to grow grass turves. The pond appears quite recently enlarged, with bare earth banks and sandy rocky margins, and low but dense charophyte growth across the central two thirds of the pond, together with occasional reedmace;
- Pond 6 is a series of very shallow, clear pools located 0.27 km south of the Order Limits, over generally flat, but slightly undulating surface of rutted clay and limestone fragments. The pools are generally a maximum of about 10 cm deep and 2-5 m x 1-2 m in size. Patches of reedmace and common reed are present, alongside common spike rush and sprawling bryophytes;
- Pond 15 is adjacent to Pond 14 and located 0.27 km south-west of the Order Limits. The pond is approximately 25 m x 10 m in extent, and slightly less densely covered with reeds than Pond 14. No aquatic plants other than emergent reeds are present and the banks are covered with dense willow and bramble scrub;
- Pond 14 is a reedbed located 0.3 km south-west of the Order Limits, approximately 25 m x 10 m in extent and is densely covered with common reed;

- Pond 22 is in area of disturbed ground 0.33 km south of the Order Limits, close to the steel works. Approximately 50 m x 20 m, the water is shallow along the banks, with deeper areas towards to the centre of the pond. The pond is not shaded, the surrounding vegetation comprising sparse ephemeral and tall ruderal species. Aquatic vegetation includes submerged grasses and occasional water mint. Access was limited as there are steep and unstable piles of earth surrounding the pond along the eastern and southern banks; and
- Pond 21 is a large water body located 0.34 km south-east of the Order Limits and was a previously a stocked, fishing lake. The pond is also located within the Yorkshire East Gullet LWS. The pond is very deep and approximately 400 m x 100 m. At the time of survey, the pond had flooded its banks, with deep water present along the western banks which are sloped, grassland. The eastern banks were not accessible for survey as they are dominated by dense scrub.

6.3.2.4 Table 9 summarises the HSI scores of ponds on and within 0.25 of the Railway Reinstatement Land. The HSI survey assessed the ponds as having the following suitability for GCN:

- excellent habitat suitability for GCN – P4, P10, P16, P19, P22, D2;
- good habitat average suitability for GCN – P3, P7, P9, P13;
- average habitat suitability for GCN – P5, P6, P11, P14, P15, P17, P35;
- below average habitat suitability for GCN – P20, D1; and
- poor habitat suitability for GCN – P8, P12, P21.

6.3.2.5 Pond 18 was not accessible for HSI survey. The pond is located on a stepped section of the Conesby Quarry LWS. According to conversations with the site management, previous surveys have recorded GCN.

Table 9: Habitat Suitability Index Scores of ponds on or within 0.25 km of the Railway Reinstatement Land

Pond No.	SI1	SI2	SI3	SI4	SI5	S6	SI7	SI8	SI9	SI10	HSI Score
P3	1	1	0.9	0.67	0.2	1	1	1	1	0.6	0.77
P4	1	0.9	0.9	1	1	0.67	1	1	1	1	0.94
P5	1	0.2	0.1	0.67	1	1	1	1	0.67	0.7	0.60
P6	1	0.6	0.1	0.67	1	1	1	0.95	0.67	0.8	0.68
P7	1	0.1	1	0.67	1	0.67	1	0.95	1	0.7	0.70
P8	1	N/A	0.9	0.33	0.2	0.67	0.01	0.63	0.67	0.3	0.33
P9	1	0.4	1	1	1	0.67	1	0.98	0.67	0.3	0.75
P10	1	0.4	0.5	0.67	1	1	1	0.95	1	0.8	0.80
P11	1	0.85	0.1	0.67	1	1	1	0.95	1	0.4	0.68
P12	1	0.8	0.1	0.01	1	1	1	0.8	0.33	0.3	0.38
P13	1	0.9	0.9	0.67	1	0.67	1.01	0.8	0.33	0.8	0.77
P14	1	0.2	1	0.33	1	1	1	0.9	1	0.3	0.67
P15	1	0.2	1	0.33	1	1	1	0.9	1	0.3	0.67
P16	1	0.8	0.9	1	0.4	0.67	1	0.85	1	0.8	0.82
P17	1	N/A	0.1	0.67	1	1	1	1	1	0.3	0.65
P18	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S
P19	1	1	1	1	0.67	1	0.67	1	1	0.8	0.90
P20	1	N/A	0.9	1	0.67	0.67	0.01	1	1	0.5	0.50
P21	1	N/A	0.9	0.67	0.9	0.67	0.01	1	1	0.4	0.48
P22	1	0.95	1	0.67	1	0.67	0.67	1	1	0.4	0.81

Pond No.	SI1	SI2	SI3	SI4	SI5	S6	SI7	SI8	SI9	SI10	HSI Score
P35	1	N/A	0.9	0.67	1	0.67	0.33	1	0.67	0.3	0.67
D1	1	0.1	0.9	0.67	0.2	1	1	0.95	1	0.3	0.57
D2	1	1	0.9	0.67	1	0.67	1	1	0.95	0.8	0.89

Pond suitability: <0.5 'poor', 0.5 – 0.59 'below average', 0.6 – 0.69 'average', 0.7 – 0.79 'good', >0.8 'excellent'
N/S – Not Surveyed due to access restrictions.

6.3.2.6 Ponds 3-16, Ditch 1 and Ditch 2 were not sampled for GCN eDNA. They were each subject to amphibian presence/absence surveys in 2019, with GCN presence confirmed in Ponds 3, 4, 6, 7, 11, 15 and Ditch 2. Population assessment surveys of these ponds found:

- Ponds 3 and 4 supported medium populations of GCN (Natural England, 2001), with peak counts of GCN (24 male, 6 female) in pond 3 on the 20th of May 2019. The peak count of GCN in pond 4 was 14 (13 male, 1 female) on the 13th of May 2019; and
- Ponds 6, 7, 11 and 15 hold small populations of GCN. Pond 6 had a peak count of one female GCN on the 13th of May 2019. Pond 7 had a peak count of two male GCN on the 14th of May 2019. Pond 11 had a peak count of five GCN (four male, one female) on the 13th of May 2019. Ditch 2 had a peak count of one male GCN on the 6th, 13th and 21st May 2019.

6.3.2.7 GCN eDNA samples were taken of Pond 17, 20, 21, 22, and 35 in April 2021, returning the following results:

- positive – Pond 22;
- negative – Ponds 20, 21 and 35; and
- inconclusive – Pond 17, no further assessment was undertaken due to safety concerns of accessing this water body.

6.3.2.8 Pond 19 was not sampled for GCN eDNA as GCN presence had already been confirmed by amphibian surveys. Pond 18 was not sampled due to access restrictions.

6.3.2.9 Ponds 19, 20, 21, 22, and 35 were also subject to GCN presence/absence surveys in 2021, with GCN presence only confirmed in Ponds 19 and 20. Pond 19 was found to support a small population of GCN, with a peak count of 10 GCN recorded on the 3rd June 2021. Pond 20 was also found to support a small population, with a peak count of 10 GCN recorded on the 17th May 2021.

6.3.2.10 During the 2019 and 2021 amphibian/presence absence surveys, smooth newts were recorded in Ponds 3-15, 19, 22 and Ditches 1 and 2. High numbers (>20 individuals) were recorded in Pond 7, Pond 19 and Ditch 2. High numbers (>50 individuals) of common toad were recorded in Ponds 20 and 35. Small numbers of common toad were recorded in Ponds 3-6, 9, 10, 15 and Ditch 2. Common frog was recorded in Ponds 6, 19 and 22. No amphibians were recorded in Pond 16 during the surveys.

6.3.2.11 Terrestrial habitats which provide suitable refuge, commuting and foraging habitat for GCN and other amphibians are abundant along the railway line, including dense and scattered scrub, woodland, and long grassland. The tracks, sleepers and ballast of the existing railway also provide refuge habitat for amphibians. The arable fields close to the Flixborough Industrial Estate are considered to provide less suitable terrestrial habitat for amphibians. The access road provides negligible habitat for amphibians, however suitable habitat occurs in the surrounding landscape and it is likely that commuting amphibians are present during the evening between March and June.

Bats

6.3.2.12 The railway line provides a continuous, linear habitat corridor in the local landscape and provides suitable foraging and commuting habitat for bats within the Railway Reinstatement Land. These habitats include woodland, grassland, dense and scattered scrub, and scattered trees. These habitats are connected to other areas of good quality bat foraging and commuting habitat, including, abundant bodies of open water, the River Trent, woodland, and scrub (Burton Wood LWS, Yorkshire East Gullet LWS, Normanby Park LWS) and grassland/mosaic habitats including the Conesby Quarry LNR. Overall, the Railway Reinstatement Land was assessed as offering **moderate** suitability for foraging and commuting bats in accordance with Collins (2016).

6.3.2.13 Bat species for which the Railway Reinstatement Land provides suitable foraging and commuting habitat include species which show a preference for utilising 'edge' habitats; common pipistrelle and *Myotis* species. The connectivity to areas of woodland suggests that species such as brown long-eared bat, noctule or natterer's bat may be present. Due to the abundance of open water within the surrounding area and the connectivity to the River Trent, it is possible that Daubenton's bats are active in the area.

6.3.2.14 One building is present within the Railway Reinstatement Land, comprising a warehouse type building used by Vossloh Cogifer. The preliminary roost assessment found that this building offers negligible potential for roosting bats in accordance with the guidance (Collins, 2016).

6.3.2.15 One tree, comprising a semi-mature willow located south of the railway line has potential to support roosting bats. A further tree located west of the railway line on the boundary of Conesby Quarry was found to have bat boxes installed, offering high potential for roosting bats in accordance with Collins (2016).

6.3.2.16 The Railway Reinstatement Land was subject to bat activity transect surveys, comprising seven visits between April and October 2019. The following bat species were recorded; common pipistrelle, soprano pipistrelle, noctule and *Myotis* sp. Across the seven visits, common pipistrelle was the most frequently recorded species (total passes recorded = 53), followed by soprano pipistrelle (n = 10), noctule (n = 4), and *Myotis* sp. (n = 1). Common pipistrelle bats were recorded on six survey visits, soprano pipistrelle on 5 and noctule on 3, whereas *Myotis* sp. was only recorded on one of the seven surveys. It should be noted that the first survey in April recorded no bat presence, though this was likely due to cold weather rather than indicating absence. Bat activity levels throughout the surveys were low. A peak count of 17 passes was recorded on two surveys (2nd and 4th visit), undertaken on the 28th of May 2019 and 18th July 2019. Activity type during the surveys was restricted to foraging passes along treelines and commuting from west-east and east-west; no social calling was recorded during any of the transect surveys. Common pipistrelle and soprano pipistrelle activity were concentrated around areas of scrub and treelines between the site and the adjacent arable fields.

6.3.2.17 10 Anabat Express static recording detectors were deployed within the Railway Reinstatement Land on 7 occasions between June to October

2019 and April to May 2020. Static monitoring analysis revealed the presence of *Myotis* sp., common pipistrelle, soprano pipistrelle and noctule bat species, in congruence with transect visits. Overall, the most frequent species recorded was common pipistrelle (49%), followed by *Myotis* sp. (25%), soprano pipistrelle (22%) and noctule (4%). Deployment location 9, which was along the northern boundary of the Flixborough Industrial Estate, recorded the highest levels of bat activity (on average 148 passes per night), however it should be noted that due to equipment failures, the deployment period for this detector was limited to 3 days on two visits (October 2019 and April 2020), and failed to record on a further two visits (July 2019 and September 2019). The figures are likely indicative of bat activity in that area given the location and habitats present. In addition, location 5 had consistently high levels of bat activity, with an average of 104 passes per night, followed by location 4 with 63 passes per night. Levels of high activity are concentrated around high-quality foraging habitat, specifically woodland edges and woodland corridors created by tracks, dense scrub, and tall ruderal vegetation. Location 9 and 5 recorded the highest levels of social activity (53% and 21% of all social calls, respectively).

6.3.2.18 Bat activity varied across the months, with August (n = 109) and June (n = 59) presenting the highest average bat passes per night when bats are most active, October (n = 59) also presented high levels of activity with static location 5 and 9 contributing the most recordings.

Birds

6.3.2.19 The habitats within the Railway Reinstatement Land, including dense and scattered scrub, woodland and grassland, provide suitable foraging, sheltering and nesting habitat for scrub, woodland and farmland bird species. The areas of arable farmland to the north of Flixborough Industrial Estate provide additional habitat for wintering birds, ground nesting species and farmland birds. The access track is regularly disturbed and is unlikely to offer potential for birds.

6.3.2.20 The arable fields to the north and east of Flixborough Industrial Estate, which are included within the Railway Reinstatement Land were partially included in the 2018/2019 wintering bird surveys, and then fully included in the 2019/2020 wintering bird surveys. The summary of key species which are qualifying features of the Humber Estuary SPA/SSSI/Ramsar Site, SPI or feature on the BoCC4 Red or Amber lists are included in Appendix E.

6.3.2.21 The railway line and partial areas surrounding the Railway Reinstatement Land were subject to breeding bird surveys, comprising three monthly visits between April 2019 and June 2019 (inclusive). The survey involved walking a transect which included a section of the River Trent (to the south of Flixborough Industrial Estate), walking through the Flixborough Industrial Estate, and then walking the extent of the railway line to Dragonby.

6.3.2.22 Table 10 summarises the species of note recorded during the breeding bird surveys. Only birds recorded as possible, probable or confirmed breeding birds, which are also qualifying features of the Humber Estuary SPA//Ramsar Site, Schedule 1 listed species, SPI, or feature on the BoCC4 Red or Amber lists are included in the table (no Humber Estuary SSSI birds were recorded).

Table 10: Key bird species located within or adjacent to the Railway Reinstatement Land during the wintering bird surveys.

Common name	Scientific name	Peak count	SPA listed	Ramsar listed	SSSI listed	S41	Red listed	Amber listed
Oystercatcher	*Haematopus ostralegus*	2	✓	✓	✓			✓
Marsh harrier	*Circus aeruginosus*	1	✓	✓				✓
Lapwing	*Vanellus vanellus*	1	✓	✓	✓	✓	✓	
Reed bunting	*Emberiza schoeniclus*	c.90				✓		✓
Skylark	*Alauda arvensis*	12				✓	✓	
Yellowhammer	*Emberiza citrinella*	c.94				✓	✓	

SPA species refer to the non-qualifying species listed under article 4.2 of the Directive.
S41 refers to species that are listed as Species of Principal Importance under The Natural Environment and Rural Communities (NERC) Act 2006
Red listed birds are those that are; Globally threatened, have shown historical population decline in the UK during 1800–1995, have shown a severe (at least 50%) decline in UK breeding population over last 25 years, or longer-term period, and have had a severe (at least 50%) contraction of their UK breeding range over last 25 years, or the longer-term period.

6.3.2.23 A summary of the survey records for each species listed in Table 10 is given below:

- oystercatcher were occasionally recorded in the arable fields to the north of the Flixborough Industrial Estate, with a peak count of 2;
- a single marsh harrier was observed on one occasion foraging over the stubble fields to the north of Flixborough Industrial Estate, close to the River Trent. The bird was recorded during the March 2020 wintering bird survey;
- a single lapwing was recorded in the fields to the north of Flixborough Industrial Estate on one occasion, it should be noted that the bird was outside the Railway Reinstatement Land;
- individual, small and large flocks of reed bunting were frequently recorded to the north of the Flixborough Industrial Estate, utilising the marginal vegetation of the River Trent, the arable stubble fields and the strip of tall ruderal vegetation adjacent to the industrial estate. A peak count of approximately 90 birds were recorded during the January 2020 wintering bird survey;
- yellowhammer were also recorded as individual birds and in larger flocks, with birds seen to the north of Flixborough Industrial Estate, flying between the marginal vegetation of the River Trent, the stubble arable fields and the strip of tall ruderal vegetation adjacent to the Flixborough Industrial Estate; and
- skylark were recorded in the fields to the north of Flixborough Industrial Estate, with a peak count of 12 birds in March 2020, comprising singing and displaying birds. It should be noted that no singing birds were recorded within t the Railway Reinstatement Land, with all birds recorded to the north of the Order Limits.

Table 11: Key species recorded during the 2019 breeding bird surveys of the Railway Reinstatement Land.

Common name	Scientific name	Breeding status	SSSI listed	Sch 1	S41	Red listed	Amber listed
Bullfinch	Pyrrhula pyrrhula	Probable			✓		✓
Dunnock	Prunella modularis	Confirmed			✓		
Cetti's warbler	Cettia cetti	Confirmed		✓			
Grey partridge	Perdix perdix	Possible			✓	✓	
House sparrow	Passer domesticus	Possible			✓	✓	
Linnet	Linaria cannabina	Possible			✓		
Reed bunting	Emberiza schoeniclus	Confirmed	✓		✓		✓
Skylark	Alauda arvensis	Confirmed			✓	✓	
Song thrush	Turdus philomelos	Possible			✓	✓	
Tawny owl	Strix aluco	Possible					✓
Willow warbler	Phylloscopus trochilus	Confirmed					✓
Yellowhammer	Emberiza citrinella	Possible			✓	✓	

6.3.2.24 A summary of the survey records for each species listed in Table 11 is given below:

- bullfinch were recorded frequently along the railway line and were assessed as probably breeding, due to the presence of a pair observed in suitable nesting habitat during the breeding season. A peak count of 9 bullfinch was recorded during the June 2019 survey;
- dunnock were frequently recorded along the railway line and the presence of fledged young along the route confirms that this species is breeding. A peak count of 14 dunnock were recorded during the May 2019 surveys;
- cetti's warbler were recorded as confirmed breeding, with singing adults and fledged young recorded in the common reed, marginal vegetation of the River Trent, close to the Flixborough Industrial Estate, as well as a singing adult in the Conesby Quarry LWS, adjacent to the railway line;
- grey partridge was frequently recorded in the arable fields during the breeding bird surveys, with a peak count of 14 recorded during the April 2021 survey, of these, only 4 were recorded from within the Railway Reinstatement Land. This species was recorded as possibly breeding;
- house sparrows were occasionally recorded in small numbers, with a peak count of five birds recorded during the June 2019 surveys. No evidence of breeding was observed, however as suitable breeding habitat is present within the Railway Reinstatement Land, house sparrows were assessed as possibly breeding;
- linnet were occasionally recorded along the railway line in small numbers, pairs or as individual birds, with a peak count of 13 birds recorded during the June 2019 survey. Greater numbers were recorded in the surrounding arable farmland; however, this species was limited in the arable farmland which falls within the order limits or the Railway Reinstatement Land. It is thought that they are possibly breeding in the area;
- reed bunting were occasionally recorded along the railway line, and confirmed as breeding within the marginal vegetation along the River Trent and arable cropland;
- skylark were recorded singing in the arable fields during all survey visits. A single bird was confirmed as breeding within the Conesby Quarry LWS, with 1 adult seen displaying during the June 2020 visit;
- song thrush were frequently recorded singing along the railway line and habitats surrounding the arable farmland, with a peak count of seven recorded during the May 2021 survey. This species was assessed as possibly breeding in the area;
- one tawny owl was recorded in a tree along the railway line on one occasion in June 2019. It is possible that this species is breeding along or adjacent to the Railway Reinstatement Land;

- willow warbler were recorded singing along the railway line and in the 2020/2021 surveys on all occasions, with confirmed breeding during the June 2019 visit, comprising 5 instances of recently fledged young along the railway line and a peak count of 26 birds;
- yellowhammer, which were recorded singing on all survey visits, including along the length of the railway line and in the arable farmland. A peak count of 13 yellowhammer were recorded during the May 2019 survey; and
- yellow wagtails were recorded during the 2020/2021 breeding bird surveys. A peak count of 21 were recorded in May 2021, of these seven were in the arable farmland to the north of Flixborough Industrial Estate. Numbers of yellow wagtail were limited within the Railway Reinstatement Land, with only individual or small numbers recorded.

Reptiles

6.3.2.25 The existing railway line provides suitable basking, foraging and refuge habitat for reptiles within the Railway Reinstatement Land. Habitats include the scrub, woodland, and grassland, alongside the railway infrastructure itself, tracks, sleepers and stone ballast.

6.3.2.26 The railway line was subject to reptile surveys, comprising nine visits. During the nine surveys, common lizards were recorded on 4 occasions, with a peak count of three common lizard recorded during the 6th September 2019 and 20 September 2019 visits. Occasional field mouse (*Apodemus sylvaticus*) were also recorded, alongside a peak count of five common toad.

Badger

6.3.2.27 The railway line provides suitable sett building, foraging and commuting habitat for badger, in particular the areas of woodland which have sloped banking that is favoured by this species for sett building. During the surveys, no badger setts were recorded within the Railway Reinstatement Land. A large main badger sett (approximately 10 entrances) is located beyond the railway line fencing. Badger latrines were also recorded adjacent to the calcareous grassland along the railway line.

Otter and water vole

6.3.2.28 Six ditches with the potential to support otter and water vole were recorded on or within 0.1 km of the Railway Reinstatement Land, comprising:

- two ditches to the south of the Dragonby to Flixborough railway line, within the grounds of an industrial estate (Ditch 1 and 2); and
- three arable field drains (Ditch 4, 5, 39 and 40) to the north of Flixborough Industrial Estate, set in the arable farmland, including the Burton and Flixborough Arable Drain. Of these, Ditches 5 and 39 are located partially within the Order Limits of the Railway Reinstatement Land.

6.3.2.29 The results of the otter and water vole survey found no evidence of these species and limited potential for otter and water vole in the ditches to the

south of the railway line (Ditch 1 and 2). Evidence of water vole in the ditches to the north of Flixborough Industrial Estate was extensive, including burrows, latrines, feeding stations and runs. In addition, the surveyor had conversations with a contractor who was dredging the field drains, which indicated that water vole is regularly seen in this area. In summary, the following evidence of water vole was recorded:

- Ditch 5, 7 water vole latrines, abundant water vole burrows, runs and feeding stations recorded. Overall, the ditch has medium water vole activity, and appears to be favoured above the adjacent the ditches; and
- Ditch 4, 1 water vole latrine, occasional water vole burrows, runs and feeding stations. The more western end of the ditch was assessed as the most suitable for water vole, due to the eastern end having a greater flow speed. There is low water vole activity in the ditch.

6.3.2.30 Overall, there is medium water vole activity in the ditches to the north of Flixborough Industrial Estate. No evidence of otter was found in this area, but commuting and foraging otter may occasionally traverse the watercourses. No evidence of otter or water vole was recorded in the ditches to the south of the railway line, making it highly unlikely that these species are active.

Other mammals

6.3.2.31 One hedgehog, an SPI, was recorded along the railway line close to the village of Flixborough during the evening bat activity survey on the 20th of June 2019. The dense scrub and woodland along the Railway Reinstatement Land, provide abundant refuge, commuting and foraging habitat for this species. Other, non-SPI species likely to be present include wood mouse, common shrew and field vole.

Invertebrates

6.3.2.32 A total of 235 species were recorded during the invertebrate surveys of the Railway Reinstatement Land. Of the species recorded one, the wall brown butterfly (*Lasiommata megera*), is listed as an SPI. Additional species recorded include: 2 ground bugs which were previously given extinct status, but which have re-established themselves in England in recent years; 1 ‘Red Data Book’ picture-wing fly (*Tephritis praecox*) which has recently colonised England; 2 ‘Nationally Scarce’ species of grass fly; 1 ‘Notable B’ weevil; the ‘Notable’ adonis ladybird (*Hippodamia variegate*); and the ‘Least Concern’ long-winged conehead (*Conocephalus discolour*) and a soldier fly. These species are described in more detail below.

6.3.2.33 The wall brown butterfly is an SPI. Whilst it is widespread and not rare, it is sporadic and irregular in its occurrence. The caterpillars feed on several common grasses but this species does seem to be limited to areas with maximum sunlight and often on bare or partly bare substrates.

6.3.2.34 Two ground bugs *Stictopleurus abutilon* and *S. punctatonervosus* were very rare in England and both were thought to be extinct or rare vagrants but re-appeared in the mid to late 1990s and they have recolonised,

increased in abundance, and spread since. Both are associated with early mosaic habitats.

6.3.2.35 The picture-winged fly is another recent colonist with only six records on the National Biodiversity Network (NBN) Atlas. There are at least two records for the Midlands and one for Breckland. This species is almost certainly associated with composite plants, many of which are associated with open situations.

6.3.2.36 *Lasiambia palposa* and *Siphonella oscinina* are both small black grass flies, both associated with open mosaic habitats (although there is some incorrect published information linking the latter to pine trees). The former may be predators of grasshopper egg pods whilst the latter has been reared from spider's eggs and from scale insects.

6.3.2.37 The distinctively marked weevil *Ceutorhynchus geographicus* is local and is phytophagous on viper's bugloss. Consequently, it occurs on disturbed ground, grassland, and coastal habitats (i.e., wherever the food plant is found).

6.3.2.38 The adonis ladybird is a species which was formerly confined to coastal grasslands but has spread inland in the last 2-3 decades. It can be quite frequent on early mosaic habitats and should be downgraded from Notable.

6.3.2.39 The long-winged conehead is another species which had a much more restricted distribution in the UK formerly being restricted to counties south of the River Thames. It has increased in abundance in recent decades and spread north which has led to its being downgraded from 'Notable' status to 'Least Concern'. The soldier fly (*Chorisops nagatomii*) was added to the British list in 1979 when it was separated from the more common *C. tibialis*. It is widespread in England and is not uncommon.

6.3.2.40 Two species recently downgraded and noted during the surveys include hawthorn jewel beetle (*Agrilus sinuatus*) and grey-backed snout-hoverfly (*Rhingia rostrate*). The local ground bug (*Chorosoma schillingi*) was also recorded; this species is relatively uncommon inland. The eastern end of the disused railway line also supported a small population of the local brown argus butterfly (*Aricia agestis*).

6.3.2.41 The records suggest that the disused railway line is of nature conservation value for its invertebrates. This may partly reflect the sandy superficial deposits around Scunthorpe which create a number of high value habitats for nature conservation (best shown in the inland sand-dunes on nearby Risby Warren) and support a number of rare species, but they also probably reflect the value of the open mosaic habitat along the railway line including the partly bare ground, calcareous flora, and south facing embankment.

6.4 The Northern DHPWN Land – Baseline

6.4.1 Baseline Habitats

6.4.1.1 The Northern DHPWN Land includes hedgerows, grassland, deciduous woodland, dense and scattered scrub, and allotments which are located either side of the Order Limits. The Phoenix Parkway Local Nature Reserve

(LNR) and Local Wildlife Site (LWS) and The Atkinson's Warren LNR/LWS abut the Order Limits in the western section. To the east, the DHPWN is split into Option A and Option B, with habitats include hardstanding, buildings, ornamental planting and small areas of scrub and tall ruderal vegetation.

Hardstanding and buildings

6.4.1.2 The Northern DHPWN Land follows the Phoenix Parkway, before taking a loop around Normanby Road and Bessemer Way (Option B), incorporating the substation off Normanby Road along Option A. As such, hardstanding of the road and adjacent footpaths, is the dominant habitat within the Northern DHPWN Land. There are numerous buildings within the Northern DHPWN Land, comprising commercial units.

Semi-natural broadleaved woodland

6.4.1.3 Semi-natural broadleaved woodland is present within the LNRs, with narrow strips recorded within the Northern DHPWN Land. Of these, woodland falling within Atkinson's Warren LNR/LWS and Phoenix Parkway LNR/LWS qualify as HPI. Tree species recorded in these areas include oak, silver birch, ash and sycamore. These areas include woodland within:

- the Atkinson's Warren LNR/LWS to the south of the Northern DHPWN Land;
- the Phoenix Parkway LNR/LWS to the north of the Northern DHPWN Land; and
- a narrow strip of semi-natural broadleaved woodland to the east of the Foxhills Industrial Estate.

Broadleaved plantation woodland

6.4.1.4 Narrow bands of plantation woodland lie adjacent to the Phoenix Parkway (A1077). The bands of plantation woodland border the adjacent Atkinson's Warren LNR/LWS and Phoenix Parkway LNR/LWS. Most of the trees in the canopy are semi-mature. Species recorded include silver birch, sycamore, rowan (*Sorbus aucuparia*) and ash. The understory is limited, with sapling sessile oak (*Quercus petraea*) and sapling hawthorn recorded.

Dense/continuous scrub

6.4.1.5 Several narrow bands of scrub located adjacent to Phoenix Parkway fall within the Northern DHPWN Land. Two larger areas of dense scrub are adjacent to roundabouts along the route, and comprise hazel, sycamore, willow, silver birch, bramble, hawthorn, rose, gorse, and sapling sessile oak. A third larger area of dense scrub (approximately 0.9 ha) is present over sloping ground adjacent to the substation off Normanby Road along the Option A route. Species present comprise; willow, silver birch, bramble, butterfly-bush, mature hawthorn, sycamore, ash, rose and elder, alongside teasel and common mugwort.

Hedgerows

6.4.1.6 The following four hedgerows were recorded within the Northern DHPWN Land. All hedgerows qualify as HPI:

- mature, hawthorn hedgerow which runs parallel to the Phoenix Parkway, located to the north of the road. The hedgerow is 3.5 m high, 2 m wide and dense to ground level;
- mature, hawthorn hedgerow which runs parallel to the Phoenix Parkway, located to the south of the road. Occasional willow, rose and bramble were also recorded in the hedgerow, which is 3.5 m high, 2 m wide and dense to ground level;
- mature, hawthorn hedgerow which runs parallel to the Phoenix Parkway, located to the south of the road. The hedgerow is 3.5 m high, 1.5 m wide and dense to ground level; and
- an outgrown hedgerow, with dense scrub present making the hedge over 3.5 m wide in areas and up to 2 m in height, is located along a field boundary, within the Order Limits of the Northern DHPWN Land. The hedgerow is growing along the channel of a dry ditch. Hawthorn, blackthorn, willow, rose, and bramble were recorded.

Neutral, semi-improved grassland

6.4.1.7 Within the Northern DHPWN Land, strips of neutral semi-improved grassland were recorded in a field to the south of the Phoenix Parkway and in a small area of dense and scattered scrub to the north of the road.

Amenity grassland, introduced shrubs and scattered trees

6.4.1.8 Managed to a short sward, amenity grassland was frequently recorded along the roadside along Normanby Road and Bessemer Way. Introduced shrubs and scattered trees are also present in the ornamental planting within the Northern DHPWN Land.

6.4.2 Baseline Species

6.4.2.1 The occurrence of invasive non-native species and potential for protected species within the Northern DHPWN Land is presented below.

Plants (including invasive species)

6.4.2.2 A large stand of Japanese knotweed (Schedule 9 listed species) is present to the east of Normanby Road adjacent to the substation (Option A only). The area of Japanese knotweed appears well established and it is likely that rhizomes are present in the amenity grassland which is adjacent.

6.4.2.3 Cotoneaster (*Cotoneaster* sp.) was occasionally recorded in the ornamental planting along the eastern part of the Northern DHPWN Land and within scrub bordering Phoenix Parkway. Certain species of cotoneaster are listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended). Identifying cotoneaster to species level is difficult; therefore, as a precaution, it is advised that the species on site are treated as being listed in Schedule 9.

Amphibians

6.4.2.4 No waterbodies were recorded within 0.25 km of the Northern DHPWN Land, therefore the presence of GCN is considered highly unlikely. Species such as common toad and common frog which are more flexible in their habitat requirements, may traverse the Northern DHPWN Land. Habitats which provide suitable refuge, foraging and commuting habitat include the areas of woodland, grassland, hedgerows, and scrub which feature along the Phoenix Parkway. Along the Normanby Road and Bessermer Way, the habitats become less suitable for amphibians.

Bats

6.4.2.5 The semi-natural habitats along the Phoenix Parkway, including the woodland, scrub, grassland, and hedgerows provide suitable commuting and foraging habitat for bats. In addition, the Phoenix Parkway is well connected to the Phoenix Parkway LNR/LWS and Atkinson's Warren LNR/LWS which provide habitat for these species. To the east, semi-natural habitats become scarcer, and the habitats are less suitable for foraging and commuting bats.

6.4.2.6 The surveys found no trees with features suitable for roosting bats within the Northern DHPWN Land. No buildings fall within the Order Limits and adjacent buildings are generally modern, commercial structures, which provide very limited roosting opportunities for bats.

Birds

6.4.2.7 The areas of woodland, scrub, hedgerows, trees and introduced shrubs provide suitable habitat for tree and shrub nesting birds. There is negligible potential for ground nesting species.

Reptiles

6.4.2.8 Suitable basking, foraging and refuge habitat for reptiles within the the Northern DHPWN Land are limited, with the Atkinson's Warren LNR/LWS, Phoenix Parkway LNR/LWS and allotments featuring the most suitable habitats. Species which may be present include grass snake and slowworm (*Anguis fragilis*). It should be noted that only small slivers of the LNR/LWS sites are present within the Northern DHPWN Land. Due to the presence of a busy road adjacent to these habitats, it is highly unlikely that large numbers of these species are present within t the Northern DHPWN Land.

Badger

6.4.2.9 No evidence of badger was recorded during the surveys. The areas of woodland, scrub, grassland, and hedgerows along the road provide suitable foraging commuting and some sett building habitat for badger. As evidence of these species has been frequently recorded in other areas of the Application Land, it is known that they are active in the area. Therefore, badger may occasionally traverse the Northern DHPWN Land. Whilst there is potential for sett-building/excavating, it is considered unlikely in close proximity to the roadside.

Other mammals

6.4.2.10 It is likely that hedgehog, wood mouse, common shrew bank vole and field vole are active in the area.

6.5 The Southern DHPWN Land – Baseline

6.5.1 Baseline Habitats

6.5.1.1 The Southern DHPWN Land is dominated by arable farmland, with associated field margins, arable field drains and marginal vegetation. There are also small areas of scrub and poor semi-improved grassland present.

6.5.1.2 The construction of the Southern DHPWN will take place to the west of the A1077 and M181 roads. This has been taken into consideration for the requirement of habitat and species surveys.

Standing water

6.5.1.3 Five waterbodies were recorded on or within 0.25 km of the Southern DHPWN Land. Descriptions and discussions are included under the section on *Amphibians (including great created newts).*

Watercourses

6.5.1.4 A total of eight ditches holding water were recorded within the Southern DHPWN Land, comprising Ditch 3 which is described under *Amphibians (including great created newts)*, below, and Ditches 29-33 and Ditches 35-36, which are described in this paragraph as they are similar in character. All of the ditches are arable field drains, set in the extensive arable farmland to the west of the A1077 and M181 roads. The ditches vary in size, with recorded channel widths between 1 and 2 m, water depths from less than 0.5 m to more than 0.5 m, typically steep banks of a height between 1 and 3 m. Common reed, reedmace and yellow iris were frequently recorded in the emergent vegetation. Marginal vegetation along the banks was frequently dominated by tall herbaceous plants and grasses.

Dense, continuous and scattered scrub

6.5.1.5 Scrub species dominate the easement of the M181 road adjacent to the Southern DHPWN Land. Occasional areas of scrub were also recorded along the field boundaries and within the ditches, comprising young willow, silver birch, hawthorn, rose and oak saplings.

Tall ruderal and marginal vegetation

6.5.1.6 Marginal vegetation, including common reed and yellow iris, is present within most wet and dry ditches. Tall ruderal vegetation is a common feature, located along some of the arable field boundaries surrounding arable ditches.

6.5.2 Baseline Species

6.5.2.1 The potential for protected species within the Southern DHPWN Land is presented below.

Amphibians (including great crested newts)

6.5.2.2 Of the five waterbodies within 0.25 km, two are located to the east of the M181. As this major road is a barrier to traversing amphibians, ponds to the east of the M181 were not taken forward for further survey and assessment. The remaining three bodies of standing water within 0.25 km of the Southern DHPWN Land comprise a large ditch and two fishing lakes which are located within the Nuddock Wood Lakes fishery. Pond locations are presented within Technical Appendix C:

- Ditch 3 - a large ditch that runs laterally to the raised embankment of the railway line. Approximately 650 m x 20 m, with a deep central area. The banks are exposed earth with no aquatic vegetation present; however, the western section of the ditch is dense with common reed. Overall, the ditch was assessed as offering below average habitat suitability for GCN;
- Pond 33 is a large, commercial fishing lake that is stocked with fish. Approximately 200 m x 160 m, and very deep. The pond was assessed as offering poor habitat suitability for GCN; and
- Pond 34 is a small pond, which has recently been partially filled in. The pond was previously stocked and used as a commercial fishing lake; however, it is no longer managed for fishing. The banks feature large areas of exposed silt and sections which are dominated by dense scrub. The pond was also assessed as offering poor habitat suitability for GCN.

Table 12: Habitat Suitability Index Scores of ponds on or within 0.25 km of the Southern DHPWN Land

Pond No.	SI1	SI2	SI3	SI4	SI5	S6	SI7	SI8	SI9	SI10	HSI Score
P33	1	N/A	0.9	1	0.2	0.67	0.01	0.67	0.67	0.3	0.38
P34	1	1	0.9	0.33	1	1	0.01	0.67	0.67	0.3	0.46
D3	1	N/A	1	0.33	0.2	0.67	0.67	0.67	0.33	0.7	0.55

Pond suitability: <0.5 'poor', 0.5 – 0.59 'below average', 0.6 – 0.69 'average', 0.7 – 0.79 'good', >0.8 'excellent'
N/S – Not Surveyed due to access restrictions.

6.5.2.3 GCN eDNA samples were taken of Ponds 33, 34 and Ditch 3 which returned a negative result confirming GCN absence. Sampling for eDNA of GCN was not conducted on Ponds 31 or 32 as effects on these water bodies had been scoped out of the assessment.

6.5.2.4 Amphibian presence/absence surveys were conducted on Ponds 33 and 34, comprising three visits where bottle trapping, torch light surveys and egg searching were conducted. No GCN were recorded during the surveys. A peak count of 60 common toads was recorded in Pond 33 and 8 common toads in Pond 34. Despite GCN being present within the surrounding area, it is considered highly unlikely that GCN are active within the Southern DHPWN Land due to:

- the negative eDNA results returned from water bodies to the west of the M181;

- the absence of GCN recorded during the amphibian presence/absence surveys of Ponds 33 and 34; and
- water bodies to the west of the M181 are isolated from the works area by the M181, a major road.

6.5.2.5 Areas of scrub and woodland provide suitable refuge, commuting and foraging habitat for other amphibians, including common toad which was recorded in high numbers during the amphibian presence/absence surveys at the Nuddock Wood Lakes fishery.

Bats

6.5.2.6 The network of scrub, woodland and open fields provide suitable foraging and commuting habitat for bats including common pipistrelle, noctule and *Myotis* species. The large areas of standing water provide foraging habitat favoured by Daubenton's bats. Overall, these features offer moderate suitability for foraging and commuting bats in accordance with Collins (2016).

6.5.2.7 Following adjustments to the Order Limits, there are no buildings present within the Southern DHPWN Land and two trees (assessed as low and negligible potential for roosting bats) no longer fall within the Order Limits, therefore are scoped out of this assessment.

Birds

6.5.2.8 Narrow bands of scrub, tall ruderal and marginal vegetation provide suitable habitat for scrub and tree nesting birds, although limited in extent. No bird surveys were carried out within the Southern DHPWN Land.

Reptiles

6.5.2.9 Areas of scrub provide cover for reptile species such as grass snake and slowworm. However, they are isolated from semi-natural habitats of greater value for reptile species.

Badger

6.5.2.10 No badger setts were found within the Southern DHPWN Land. A disused outlying sett located in an area of woodland west of the M181 is located approximately 42 m from the Order Limits. Areas of scrub and the network of ditches provide suitable foraging, commuting and refuge habitat for badger.

Otter and water vole

6.5.2.11 Overall, the wet ditches were assessed as providing suitable habitat for commuting and foraging otter as well as potential burrow building, foraging and commuting habitat for water vole. It is understood that access and construction will be undertaken to the west of the A107 and M181 roads, as such only wet ditches to the west of the roads were taken forward for otter and water vole survey. During the surveys, no evidence of otter or water vole was observed along the ditches. However, as these species are

present in the wider area, there is potential for water vole to colonise these ditches in the future and for otter to traverse the diches.

6.5.2.12 Ditch 3 is not connected to any other waterways. Overall, the ditch was assessed as providing sub-optimal habitat for water vole due to the heavy shading from surrounding scrub and absence of marginal vegetation which is favoured by water vole. In addition, there are abundant ditches which provide more favourable conditions for water vole in the surrounding area, making it unlikely that water vole would build burrows along the ditch. There is potential for otter and water vole to traverse the ditch, however as there in absence of connectivity to other, more suitable otter and water vole habitat, this is considered unlikely.

Other mammals

6.5.2.13 Other mammals considered likely to use habitats within the Southern DHPWN Land include hedgehog, wood mouse, common shrew, and field vole.

Invertebrates

6.5.2.14 The habitats within the Southern DHPWN Land provide suitable habitat for invertebrates. However, due to the absence of notable habitats, it is likely that only a common assemblage of species is present.

7. MITIGATION

7.1 Overview of Mitigation

7.1.1.1 This section describes the mitigation measures considered in the assessment of likely significant effects. This includes embedded mitigation that has been integrated into the design of the Project and good practice measures that will be adopted during the construction and operational phases. It also covers habitat creation and management which will provide necessary compensation for anticipated impacts on habitats and species. It does not include elements of habitat creation and management which can be considered solely as biodiversity enhancements.

7.1.1.2 The measures identified follow the principles of the Mitigation Hierarchy (CIEEM, 2018): minimising the loss of ecologically important and designated habitats; avoiding harming such habitats; and designing appropriate compensation for unavoidable habitat loss.

Minimising Loss

7.1.1.3 Standard mitigation commitments will be implemented to minimise loss to habitats and species throughout the Project. In all cases, the working footprint will be kept to a minimum with impacts on key receptors avoided wherever possible. This has included careful design of the Order Limits to reduce habitat loss, with particular focus given to habitats which require more time to establish (e.g. woodland), as well as avoiding encroachment into regional and local designated wildlife sites.

Avoidance of Harm

7.1.1.4 A Code of Construction Practice (CoCP) is provided in Annex 7 of the ES (**Document Reference 6.3.7**). The CoCP includes an outline Invasive Non-native Species Management Plan and an outline Protected Species Management Plan and provides the basis for a future Construction Environmental Management Plan (CEMP) which will be prepared pre-construction by the relevant contractor. The final content of the CEMP will be approved by the Local Planning Authority, in consultation with Natural England (and others), and adhered to as a condition of the works during all construction activities. The CEMP will include all measures to avoid impacts on designated sites, HPI, other habitats of importance and protected/sensitive species.

7.1.1.5 A key component is the appointment of a suitably qualified (or team of suitably qualified) Ecological Clerk of Works (ECoW). The ECoW will undertake pre-works surveys for protection species as required, establish suitable exclusion zones, advise on site access, timing and micro-siting of works, and supervise construction activities to ensure mitigation measures are implemented.

7.1.1.6 The CEMP will provide details on standard mitigation commitments that the contractor is required to adopt to minimise environmental and ecological impacts. This includes:

- minimising disturbance through noise and lighting during construction;

- the adoption of best practices and development of management plans to prevent pollution from dust, chemicals and excess sediment;
- appropriate soil stripping and storage, adhering to Defra (2009);
- the protection of existing trees and vegetation to be retained prior to any materials or machinery being brought on site. Protective fencing will be installed in line with BS 5837:2012;
- the implementation of control measures to prevent the introduction or spread of non-native species; and
- ensuring all site workers are aware of ecological issues.

Compensation for Unavoidable Loss

7.1.1.7 Appropriate mitigation and compensation will be secured for all unavoidable impacts on habitats and protected species. Wherever possible, habitats will be carefully reinstated; if this is not possible, compensatory habitat will be created elsewhere at least equal in area to that lost. Areas proposed for compensatory habitat creation are shown on the indicative Landscape and Biodiversity Plans (**Document Reference 4.10**) along with an illustrative design; the Design Principles and Codes (**Document Reference 5.12**) provide a framework for delivering these plans. A Landscape and Biodiversity Management and Monitoring Plan (LBMMP) will also be prepared, detailing the creation and ongoing management of compensatory habitats, together with the techniques to enhance existing habitats during the operational phase. An outline LBMMP is provided (**Document Reference 5.7**).

7.2 Construction Phase Mitigation

7.2.1 Designated Sites and HPI

International Wildlife Sites

7.2.1.1 Mitigation to address likely impacts arising from construction on internationally designated sites (i.e., the Humber Estuary SAC, SPA and Ramsar Site) will be set out in the CEMP. This will cover the following issues relevant to the Humber Estuary designated site: pollution, including control of dust through the development of a Dust Management Plan; surface water management; noise emissions; vibration disturbance; light pollution; and biosecurity.

National and Regional Wildlife Sites

7.2.1.2 Mitigation for the Humber Estuary SSSI is set out above as this overlaps with the Humber Estuary SAC, SPA and Ramsar Site.

7.2.1.3 The Order Limits have been designed to avoid overlap with national and regional wildlife sites. Where overlaps occur, these comprise small areas only. Measures in the CEMP (outlined in the CoCP) to limit dust pollution and fuel/chemical spillage will be strictly adhered to in the vicinity of national and regional wildlife sites.

7.2.1.4 Linear strips of Phoenix Parkway LNR and Atkinson's Warren LNR fall within the Northern DHPWN Land. It is anticipated that trenching works will take place in the vicinity, and a very limited number of trees/shrubs and possibly areas of ground vegetation within the LNR boundaries may need to be removed to facilitate construction. To mitigate impacts, the following measures will be adopted:

- the working area will be kept to a minimum;
- any felled/pruned trees and shrubs will be retained and stacked to create deadwood habitat piles;
- stripped turves and soil will be stored separately and carefully replaced to allow the ground vegetation to recover;
- on completion of construction works, replacement trees and shrubs matching those that are removed will be planted in an irregular pattern at a spacing of around 1.5-2 m;
- to aid establishment, where necessary transplants will be protected by stock-proof fencing, rabbit-proof fencing and/or protective guards (preferably made of bio-degradable material); and
- an ECoW will provide specific instructions on all of these measures.

7.2.1.5 The Conesby (Yorkshire East) Quarry SSSI is designated on the basis of its geological value and is located within the boundary of Yorkshire East Gullet LWS. As such, no ecological mitigation is required with respect to this SSSI and it is not considered further within this ES chapter.

7.2.1.6 The northern boundary of the Phoenix LNR lies immediately south of the Railway Reinstatement Land and to the south of the tracks. The vegetation in this area comprises dense native-species scrub, which is a common feature along the margins of the railway line. Permanent removal of young trees and scrub within 5 m of the railway will require appropriate mitigation to minimise impacts, including:

- machinery and workers will be instructed to disturb the minimum area of ground near to the LNR boundary;
- access routes to working areas will be shared with and approved by the project ecologist prior to works commencing to avoid damage to habitats within the LNR;
- selected felled/pruned trees and shrubs will be retained and stacked to create deadwood habitat piles suitable for amphibians and reptiles; and
- compensation for removed trees and scrub will be achieved through woodland creation and natural regeneration within the planned landscape area north of the tracks.

7.2.1.7 Conesby Quarry LNR is located adjacent to the Railway Reinstatement access track and will not be affected directly.

Non-statutory Designated Sites

7.2.1.8 Where possible, works have been designed to avoid impacting locally important wildlife sites. Measures in the CEMP will mitigate possible effects from dust pollution and fuel/chemical spillage.

7.2.1.9 Mitigation for Atkinson's Warren and Phoenix Parkway LWS is set out above as they overlap with the corresponding LNRs.

7.2.1.10 Conesby Quarry LWS marginally overlaps with the Order Limits of the Railway Reinstatement Land (total of 0.45 ha). Along the northern boundary of the LWS, impacts on scrub will be mitigated in line with paragraph 7.2.1.7 above. To the south, the LWS supports semi-improved neutral grassland located adjacent to the proposed access track. The construction phase will enforce a suitable speed limit and take measures to ensure vehicles and construction machinery stay within the confines of the track do not impact adjacent habitat. Where the Order Limits are slightly wider, any required passing places, contractor welfare units and/or refuelling sites will be located outside of the LWS over species-poor grassland to the south of the track.

7.2.1.11 Yorkshire East Gullet LWS also overlaps with the Railway Reinstatement Land (0.47 ha). The LWS includes areas of grassland and scattered scrub extending between 15 m and 55 m east of the railway tracks, to the north of Dragonby Sidings. Impacts arising from scrub removal within 5 m of the trackbed will be mitigated in line with paragraph 7.2.1.7 above. In addition, targeted scrub removal outside of the 5 m buffer will be carried out to improve and increase the existing areas of Lowland Calcareous Grassland, to compensate for loss of this habitat. All scrub removal will be undertaken using handheld machinery, outside of the nesting bird season and under the direction of a supervising ecologist.

7.2.1.12 Slag Banks LWS falls within partially within the Railway Reinstatement Land, (0.1 ha); impacts on the LWS will be mitigated in line with paragraph 7.2.1.7 above.

7.2.1.13 Bessemer Way Brownfield Site LWS is situated adjacent to the Northern DHPWN Land. The working corridor will not encroach within this LWS and suitable mitigation for secondary impacts to be developed in detail in the CEMP will be adhered to.

Habitats of Principal Importance

7.2.1.14 Hedgerows within the Application Land which qualify as HPI are to be retained wherever possible. However, approximately 0.67 km of hedgerow (including the hedgerow north of Ferry Road West and a hedgerow close to Stather Road) is likely to require removal within the Energy Park Land. Approximately 0.62 km of hedgerow bordering the Northern DHPWN Land is also likely to require removal to facilitate construction. The following mitigation measures will compensate for these losses:

- where possible, removed sections of hedgerow will be promptly reinstated following completion of construction within affected areas;

- topsoil from beneath the hedgerows will be stripped and stored separately, with soil storage areas clearly signed and demarcated to prevent any mixing with other soils;
- topsoil will be replaced after works and any banks reformed to similar profiles as before;
- replacement and compensatory hedgerow planting will be based on native shrub species of local origin. All new and replacement hedgerows within the Energy Park Land will be species-rich, supporting over five woody species within each 30 m length and managed to achieve good condition in line with the BNG Metric; and
- to aid establishment, where necessary transplants will be protected by stock-proof fencing, rabbit-proof fencing and/or protective guards (preferably made of bio-degradable material).

7.2.1.15 The root zones of retained hedgerows in proximity to construction activities will be safeguarded by Root Protection Areas (as defined in British Standard: BS: 5837:2012), as will be specified within the CEMP. This will also include appropriate dust suppression measures, management of fuel/chemical spillage, and control and treatment of surface water runoff during construction to minimise secondary impacts on hedgerow HPI.

7.2.1.16 The Dragonby to Flixborough railway line features several small areas of Lowland Calcareous Grassland in poor condition. Mitigation for the loss and disturbance of these areas will be detailed in the CEMP, including minimising the area of vegetation clearance required, establishing exclusion zones with appropriate signage, and pollution prevention measures. Compensation for unavoidable habitat loss will include the expansion of this habitat where scrub and/or trees will be permanently lost, and around the perimeter of proposed woodland planting to the west of the railway. Habitat creation will use translocated turfs where appropriate. Further details are provided under Section 7.3 below.

7.2.2 Other Habitats

7.2.2.1 Mitigation for other areas of habitat within the Application Land that do not qualify as HPI are detailed below.

Arable Land and Poor Semi-improved Grassland

7.2.2.2 The Energy Park Land will result in the loss of 62 ha of arable farmland, including associated grassland field margins and areas of species-poor set-aside grassland. The creation of Lowland Meadow grassland habitat within the Application Land will provide compensation for the loss of these habitats. Details are provided under Section 7.3 below.

Scrub, Tall Ruderal Vegetation and Bracken

7.2.2.3 Small areas of scrub across the Application Land area will be affected by construction works. Where individual patches of scrub cannot be retained, they will be reinstated at the same location or compensated for by planting as part of the proposed landscaping area at a ratio of at least 2:1. Minor loss of species-poor tall ruderal and bracken vegetation will also occur;

these will be compensated for by the planned habitat creation described under Section 7.3 below.

Woodland

7.2.2.4 Small areas of woodland are present within the Order Limits and along the Railway Reinstatement Land and Northern DHPWN Land. Others areas of woodland in the vicinity have been avoided. Woodland along Phoenix Parkway is addressed as part of Phoenix Parkway LNR (Section 7.1.2.4). Several sections of non-HPI woodland are present along the railway line embankments. Trees and bushes within 5 m either side of the railway will likely be felled or pruned in order to ensure safe running of the branch line. The following mitigation measures and compensation will be provided:

- CEMP measures will be implemented to protect retained trees from root damage and compaction and to limit impacts affecting retained woodland, caused by dust and pollutants;
- material from felled/pruned trees and shrubs will be retained and stacked in nearby habitats to create deadwood habitat piles to benefit amphibians, reptiles and invertebrates; and
- compensatory woodland creation will include the planting of a 5 - 10 m buffer extending 1 km along the northern side of the railway, to the south and south-east of the town of Flixborough. Appropriate native trees and shrubs will be planted in an irregular pattern at a spacing of around 1.5 to 2 m within this area. To aid establishment, where necessary transplants will be protected by stock-proof fencing, rabbit-proof fencing and/or protective guards (preferably made of bio-degradable material).

Watercourses, Standing Water and Marginal Vegetation

7.2.2.5 The CEMP will include detailed pollution prevention measures and measures to prevent unplanned physical damage to banks which will be strictly adhered to when working near to watercourses and standing waters.

7.2.2.6 Construction works will directly affect ditches within the Energy Park Land and the Southern DHPWN Land. All ditches will be retained where possible and culverted or diverted only where necessary. Watercourse crossings within the Southern DHPWN Land will be established using ducts installed across the channel connecting to trenches or using a thrust boring technique. In all circumstances, working within a wet channel will be avoided, minimising the potential for pollution caused by suspended sediments and run-off of fuels and oils from machinery entering the watercourse. Once ducts are installed, ditches will be fully reinstated to their original condition and allowed to flow naturally.

7.2.2.7 Within the Energy Park Land, approximately 600 m of field drains require removal or diversion/culverting to facilitate the Project. Over 4.8 km will be retained and appropriate mitigation implemented to prevent harm to the water environment. Habitat loss will be offset through the creation of new swales and ditches within the proposed wetland area (see Section 7.3 below).

7.2.2.8 Within the Energy Park Land, three bodies of standing water fall within the limits of deviation of the ERF, PRF and RHTW. These comprise two surface-water drainage ponds, which are lined and feature no aquatic vegetation, and a large area of pooling water on hardstanding within the Flixborough Industrial Estate. These features require removal to facilitate the Project. The proposals for wetland creation and SuDS will provide sufficient compensation for the loss of these features.

7.2.3 Species

7.2.3.1 Key mitigation measures required for species during construction are set out below.

Plants (including invasive species)

7.2.3.2 An outline Invasive Non-Native Species (INNS) Management Plan is included in the CoCP (**Document Reference 6.3.7**). This applies to:

- Himalayan balsam located within the Railway Reinstatement Land to the north of the Flixborough Industrial Estate;
- cotoneaster present in occasional areas of ornamental planting and woodland edge within the Northern DHPWN Land; and
- Japanese knotweed located to the east of Normanby Road within the Northern DHPWN Land.

7.2.3.3 The INNS management plan (provided in outline in Annex 7 to the ES) will be finalised as part of the CEMP and will include (where appropriate) detailed measures for the removal of invasive species and biosecurity measures to prevent the import or spread of invasive species. The LBMMP will include details of the ongoing monitoring regime of the Project during operation. This will allow for early identification and treatment of invasive species should they colonise.

Amphibians (including great crested newts)

7.2.3.4 No mitigation is considered necessary for GCN within the Energy Park Land, the Northern DHPWN Land and the Southern DHPWN Land, due to the absence of ponds with confirmed GCN presence within 0.25 km of construction areas. Common amphibians are likely to be present in the Energy Park Land, the Southern DHPWN Land and the Railway Reinstatement Land due to the presence of suitable waterbodies.

7.2.3.5 GCN have been confirmed as present in ponds within 0.25 km of the Railway Reinstatement Land, with medium populations present in Ponds 3 and 4; and small populations present in Ponds 6, 7, 11, 15, 19 and 20. A licence from Natural England will be sought for works considered likely to affect GCN; district level licensing will be considered as a potential option. Where required for licensing, repeated eDNA surveys of ponds will be undertaken during the survey season prior to works commencement. No works that could affect suitable GCN terrestrial habitat will begin until the necessary licence has been obtained.

7.2.3.6 Reasonable avoidance measures will be included within a method statement within the CEMP, outlining mitigation and compensation measures for GCN. Measures will be implemented by contractors undertaking railway reinstatement works within 0.25 km of GCN ponds:

- timing of works for the clearance of suitable amphibian refuge habitat (including track ballast, railway sleepers and tracks) within 0.25 km of GCN breeding ponds will take place during the GCN breeding season (mid-March to end of June), when most of the population will be located within the breeding pond. If this is not possible (i.e., due to other constraints, such as nesting birds) the works will be undertaken between April and October;
- guidance on the use of access routes, vehicles, plant and tools will be provided by a suitably qualified ecologist when specifying the construction methodology;
- before clearance works commence, all contractors will receive a 'tool-box' talk or site induction from a suitably qualified ecologist to make them aware of the potential for GCN, legislative context and procedure if GCN are encountered during works;
- vegetation clearance will involve strimming using handheld machinery to a height of 150 mm (and arisings removed), a minimum of 48 hours before strimming to ground level, to encourage individuals to move out of the immediate area. Strimming will be carried out under ecological supervision;
- prior to any disturbance/destruction of amphibian refuge habitat, suitable compensatory habitat in the form of hibernacula, in a nearby location will be installed. The careful dismantling of log/brash piles will be carried out by hand, and reassembled outside of the working area. Railway sleepers will be carefully lifted and the underside inspected by the supervising ecologist before being taken off site or repositioned;
- hand searching will be undertaken after strimming and prior to the commencement of construction within 0.25 km of a GCN pond, by a suitably experienced ecologist;
- any trenches or other excavations will be backfilled, covered over, or a means of escape provided (e.g. plank) at the end of each day in order to prevent amphibians becoming stranded within trenches. Trenches will be carefully inspected in the morning prior to commencement of works;
- all stockpiling of materials or storage of machinery within 0.25 km of GCN ponds must be contained within sub-optimal habitat (bare ground or hard standing);
- all excavated material will be stored in such a way that does not create habitat for GCN (i.e., well compacted with no voids); and
- in the event that GCN are encountered, works in that location must cease immediately and the scheme ecologist contacted. GCN will be moved by a suitably licensed ecologist or agent to a suitable location

outside the working area. Common amphibians will be carefully relocated in the same way by site operatives.

7.2.3.7 Mitigation for potential impacts on common amphibians includes phased strimming during vegetation clearance (leaving 48 hours between strimming to 150 mm and ground level); anti-entrapment measures for trenches and other excavations; compact stockpiling of materials over hardstanding or open ground; and ensuring contractors are aware of amphibians and a suitable area they may be relocated to. ECoW supervision will also be required for the draining down of ponds and removal/diversion of ditches within the Energy Park Land, in order to oversee amphibian welfare and support the relocation of any amphibians to an undisturbed ditch outside of the working area.

Bats

7.2.3.8 No bat roosts were recorded within the Order Limits. A total of three trees had potential to support roosting bats, of which one is located within the Energy Park Land, away from construction areas and will be unaffected. The other two trees are located within the Railway Reinstatement Land, of which one has bat boxes installed. Wherever possible, trees will be retained and their root systems will be protected from disturbance through the implementation of Root Protection Areas. If felling or pruning is necessary, pre-commencement checks, involving an aerial assessment of potential roosting features, will be undertaken immediately prior to works affecting these trees. Bat boxes will be repositioned on a suitable tree nearby and replaced if found to be broken or damaged. Two additional Schwegler 2F bat boxes will be installed on a nearby suitable tree to compensate for the loss of any natural roosting features.

7.2.3.9 As an additional precautionary measure, checks for potential bat roosting features in both buildings and trees will form part of the pre-clearance ecology walkovers that will be incorporated in the CEMP. If roosting bats or potential bat roosts are identified an appropriate mitigation strategy will be developed.

7.2.3.10 Clearance of habitats, including arable fields, field margins, scrub, tall ruderal, hedgerows, trees and grassland, will result in the loss of suitable bat foraging and commuting habitat. Where possible, these features will be preserved by minimising working areas. Planned habitat creation, shown on the Indicative Landscape and Biodiversity Plans (**Document Reference 4.10**), includes broadleaved woodland, hedgerows, scrub, grassland and wetland areas within the Energy Park Land and the Railway Reinstatement Land. Once established, these measures are anticipated to provide suitable compensation and deliver an overall increase in the amount of bat foraging and commuting habitat available, and ongoing management and monitoring during Project operation will be addressed in the LBMMP. An outline LBMMP is provided (**Document Reference 5.7**).

7.2.3.11 Proposed external artificial lighting, including temporary construction lighting (if works are required at night) and permanent security, operational and road lighting installed within the Order Limits will be designed to avoid light spill onto existing commuting corridors and created habitats.

Luminaires across the Application Land will feature integrated or integrated and additional external shielding, which will always point downwards and have forward-throwing light distribution with a reduced kickback. No additional lighting will be installed along the existing network of roadways within the Order Limits, with the exception of modifications to lighting arrangements at new junctions proposed on Ferry Road West and Stather Road.

Breeding Birds

7.2.3.12 Short-term impacts affecting nesting birds will be minimised by timing of construction works. Where possible, the clearance of nesting habitats will be undertaken outside the breeding bird season (March to August inclusive). Any clearance of suitable habitats for tree/scrub nesting birds that is carried out within the bird breeding season (e.g. to avoid risks of disturbing overwintering GCN or common lizard), will be subject to pre-clearance bird surveys carried out by a suitably experienced ecologist. Areas of bare or sparsely vegetated ground that are to be disturbed in the nesting bird season will also be subject to a pre-works survey to check for ground-nesting species favouring open habitats. No works will be carried out within a nesting buffer zone determined by the ECoW, until the young have fledged and are no longer returning to the nest site. Works will only be undertaken once a suitably qualified ECoW has declared the nest is no longer in use. Where pre-clearance checks identify Cetti's warbler, measures to avoid disturbance to this species will involve establishing a minimum 25 m exclusion zone depending on the level of surrounding construction noise.

7.2.3.13 Specific compensation measures, as shown on the Indicative Landscape and Biodiversity Plans (**Document Reference 4.10**), will be provided for key species identified as possible, probable or confirmed breeding. This will include:

- Cetti's warbler: wet scrub and swamp/marginal vegetation creation for loss of Cetti's warbler breeding habitat; key species to feature in the habitat creation scheme will include common reed and willow;
- blackcap/dunnock/song thrush/bullfinch/tree sparrow: any loss of scrub, woodland or hedgerows, which provides suitable breeding habitat for these species, will be compensated for by woodland, scrub and hedgerow creation. Woodland areas will incorporate a dense scrub layer of native broadleaved species, including hawthorn, blackthorn, hazel, elder and willow. Hedgerows and scrub will include similar species. Management of woodland and scrub will aim to maintain varied growth stages, with dunnock favouring low-growing, closed canopy scrub and song thrush preferring older mature stands of scrub;
- grey partridge: any loss of arable fields which are suitable for grey partridge will be compensated for with the provision of long, tussocky grassland. Grassland areas will be managed to provide suitable foraging, shelter and breeding habitat for grey partridge;

- reed bunting/reed warbler/grasshopper warbler/linnet: mitigation for any loss of breeding habitat will include the provision of tall marginal vegetation dominated by grasses and wetland habitats;
- skylark: to mitigate for any loss of arable cropland which provides significant habitat for breeding skylark, areas of new habitat will be created. This will include the provision of Lowland Meadow and/or bringing existing areas of grassland into a management regime that will provide habitat for breeding skylark;
- willow warbler: any loss of suitable habitat will be mitigated for by the creation of dense scrub, comprising native species; new scrub planting within the wetland area and the woodland creation will provide breeding habitat for this species;
- yellowhammer: hedgerow creation will be incorporated into the landscape design of the Energy Park Land, with management regimes that avoid cutting during the nesting bird season. Wetland creation, Lowland Meadow creation and SuDS areas with tall marginal vegetation will provide seed sources throughout the winter. The creation of semi-natural habitats will also provide more favourable habitat for invertebrates, creating more food sources for yellowhammer; and
- yellow wagtail: any loss of arable farmland will require mitigation in the provision of lowland meadow, dense marginal/tall ruderal, 'weedy' vegetation and wetland features.

Wintering birds

7.2.3.14 Impacts on wintering birds include the disturbance and loss of overwintering habitats used for foraging and roosting, through increases in noise, vibration, artificial lighting and human disturbance. Mitigation to reduce impacts will be incorporated into the CEMP.

7.2.3.15 The arable farmland and associated field margins, tall ruderal vegetation, drainage ditches, hedgerows and scrub provide valuable shelter and food resources for over wintering fieldfare, redwing, blackbirds, starlings, reed bunting and yellowhammer. As such, any loss of these habitats will require mitigation for wintering birds. This will include:

- grassland creation (e.g., Lowland Meadow) to provide an overwinter seed-source;
- scrub/hedgerow planting with berry/fruit bearing native trees and shrubs such as hawthorn, blackthorn, crab apple (*Malus sylvestris*), holly, bird cherry (*Prunus padus*), wild cherry (*Prunus avium*), buckthorn (*Rhamnus catharticus*) and rowan into the soft landscaping for the Energy Park Land, where large numbers of winter thrushes have been recorded; and
- provision of marginal and tall ruderal vegetation within wet features.

Reptiles

7.2.3.16 A method statement regarding protection of reptiles will be incorporated into the CEMP for the Project. A precautionary approach to works will be adopted in areas of confirmed reptile presence along the Railway Reinstatement Land, displacing any reptiles to suitable habitats including the railway ballast, tracks and line, woodland, scrub, tall ruderal/marginal vegetation, and grassland areas. Displacement will be carried out in line with the following measures:

- prior to the commencement of works, all contractors will receive a 'tool-box' talk from a suitably qualified ecologist to make them aware of the potential for encountering common lizards and procedure if reptiles are found during works;
- phased working areas will be clearly defined to limit potential disturbance of habitats;
- an ecological walkover prior to each phase of works will confirm a method of vegetation clearance, likely to involve a combination of the following:
    a. Woodland and grassland habitats not considered to offer suitable hibernation habitat for reptiles will be cleared to ground level between September and March (to avoid the nesting bird season and under no constraints from reptiles).
    b. Areas supporting suitable reptile hibernation habitat will be cleared under ecological supervision during the reptile active season (mid-April – mid-October inclusive), following a pre-commencement check for nesting birds.
    c. Prior to habitat clearance during the reptile active season (mid-April – mid-October inclusive), areas will be subject to hand searching by a suitably experienced ecologist. The ecologist will supervise directional strimming of vegetation to 150 mm. A second strim will then be completed 1-2 hours later to 50 mm. Any reptiles found will be encouraged to move naturally out of the working area into suitable adjacent habitat.
- following strimming to 50 mm, any potential hibernation or refuge habitat (such as rock piles, tree roots or wood/brash piles) present within the working area will be dismantled and removed carefully under supervision of the ecologist;
- immediately after vegetation clearance, arisings will be removed from the working area to avoid creating suitable habitat for reptiles. For example woody material can be used to create habitat in unaffected areas of the site, under direction from a suitably qualified ecologist;
- post-clearance and during earthworks, all vegetation will be kept short until completion of works in a given area;
- all stored materials, which may provide reptiles with suitable refugia, will be raised off the ground, on pallets stored over bare ground;

- all excavated material will be stored in such a way that does not create habitat for reptiles (i.e. well compacted with no voids); and
- any trenches or other excavations required within the site will be backfilled before nightfall, or a ramp left to prevent reptiles becoming trapped. Trenches will be carefully inspected in the morning prior to commencement of works.

7.2.3.17 Compensatory habitats will be created for the loss of habitats used by common lizards, including areas of woodland and calcareous grassland within the Railway Reinstatement Land (see Section 7.3 below). Logs from felled trees will be used to create suitable refugia and basking locations along the south-facing embankment of the railway.

Badger

7.2.3.18 A method statement regarding the protection of badgers during construction will be incorporated into the CEMP (outline measures are provided in the outline Protected Species Management Plan in an appendix to the CoCP (**Document Reference 6.3.7**). In all circumstances, the preferred option will be to retain badger setts in-situ and micro-site any nearby works to avoid direct impacts and minimise disturbance. Key considerations within the CEMP will include:

- pre-construction walkovers and monitoring for badgers a maximum of two months prior to each phase of works. If additional setts are found, measures will be incorporated into the mitigation strategy;
- installation (or integration with construction site fencing) of suitable fencing to discourage badgers from entering the construction site whilst providing a safe route to accessible foraging habitats. The fencing will be targeted to areas close to main badger setts;
- there will be a phased construction where a main sett is nearby, to avoid isolation / fragmentation of badgers from foraging and commuting habitat. In particular, the construction programme for the new road will be designed to avoid isolating badgers from surrounding habitats;
- no construction works will be undertaken within 30 m of an active sett not subject to temporary closure, and clear marks will be used to delineate the boundaries of the working areas;
- heavy machinery and site access will be planned to avoid coming near badger setts;
- fire or chemicals will not be used within 20 m of a sett entrance;
- any trees that need to be felled will be felled in such a way that they fall away from active setts, and any felled trees will be cleared from badger paths and sett entrances;
- loud noises and vibrations will be avoided as much as possible near active setts;
- light spillage or night working will be avoided close to an active badger sett. Temporary construction and permanent artificial lighting will avoid excess spillage onto adjacent habitats and badger commuting routes

leading from setts to badger tunnels and beyond, with new scrub and tree planting offering additional screening;

- any excavations will be covered at night or a means of escape provided for wildlife;
- a watching brief will be maintained for badgers and if any are seen or suspected works will be stopped immediately and a suitably qualified ecologist contacted; and
- contractors will be vigilant during the works and should a tunnel be breached and impacts on a badger or any other animal be suspected, then the works will stop immediately, and a suitably qualified ecologist contacted.

7.2.3.19 If direct impacts cannot be reasonably avoided, affected outlier setts will be subject to temporary closure under a licence from Natural England.

7.2.3.20 Badger using the main sett at Ditch 16 within the Energy Park Land will be affected by the reduction and fragmentation of foraging habitat. Arable land is considered to be a primary foraging resource for badgers. Appropriate mitigation will be provided by installing a minimum of one suitable badger tunnel beneath the access road and associated commuting routes. Tunnels will incorporate adequate drainage; be 600 mm in diameter; and located where existing habitat connectivity can be enhanced though appropriate landscaping, including the provision of cover around tunnel entrances. If necessary, suitable fencing will be erected to encourage badgers to use the tunnels. Badgers will be provided with a dry route to the tunnel and arable land beyond, with no ditches to cross.

7.2.3.21 Elsewhere within the site, a main badger sett was recorded within woodland approximately 10 m south of the Railway Reinstatement Land. In addition to mitigation outlined above (and to be detailed in the CEMP), the following measures will be implemented with respect to this sett:

- works within 30 m of this sett will be avoided within the badger breeding season (June to November inclusive);
- no excavations will be dug within 30 m of the sett;
- prior to commencement, all contractors must be made aware of the potential for badger to be encountered during works;
- vegetation clearance required within 10 m of the sett will be carried out under ecological supervision and using hand tools only;
- contractors will not store materials within 10 m of the sett and noise levels will be kept to a minimum; and
- machinery will not track within 10 m of the sett.

7.2.3.22 Should additional active setts become established within working areas, which would risk disturbance to badgers, a revised mitigation strategy will be produced.

Otter and water vole

7.2.3.23 Evidence of otter was recorded along the banks of the River Trent and a ditch to the east of the Energy Park Land, away from any construction areas. Mitigation will involve pre-construction walkovers of ditches in construction areas to confirm that no new holts or lying up sites are present. If otter holts or couches are identified during surveys, an appropriate mitigation strategy will be agreed with Natural England.

7.2.3.24 As otters are largely nocturnal, mitigation measures during construction (provided in the outline Protected Species Management Plan in an appendix to the CoCP, (**Document Reference 6.3.7**), and to be developed in detail in the CEMP) will focus on the restriction of night-time working (to avoid disturbance to roaming otters), and the maintenance of barrier-free, night access along ditches as follows:

- all contractors will be made aware of the potential presence of otter;
- Wherever possible, night-time working near watercourses will be avoided or else minimised;
- there will be no direct illumination of watercourses;
- obstructions to otter movement along watercourses will, wherever possible, be temporarily removed, beached or bridged at night (to the extent that otters could use either bank or the bed of the ditch); and
- any excavations/trenches/open pipe systems will be backfilled or capped at the end of each working day. Where this is not practical, an escape ramp will be provided to allow egress for any animals which become trapped in excavations. The ramp will be positioned at a 45˚ angle.

7.2.3.25 Baseline surveys found no evidence of water vole in any ditches that will be directly impacted. However, low water vole activity was recorded in the Energy Park Land and moderate activity within the Railway Reinstatement Land to the north of Flixborough Industrial Estate. Mitigation for water vole will comprise pre-commencement surveys of all ditches within the working area undertaken within the appropriate survey period (two visits April to September). If signs of water vole are observed along any ditches subject to diversion, removal, culverting or trenching/ducting works, the displacement of water voles will be undertaken under a class licence in line with the methods and steps listed in the Strachan et al. (2011). Mitigation for disturbance outlined above in relation to otter also applies to water vole. All these measures will be set out in detail in the CEMP.

Other mammals

7.2.3.26 Mitigation for SPI mammals, including brown hare and hedgehog, and non-SPI mammals will include the incorporation of the following into the CEMP:

- any debris from works will not be left within the Application Land;
- any excavations associated with works will be covered overnight or fitted with egress boards to prevent animals becoming trapped; and

- any small mammals found within the works area during construction will be carefully relocated to sheltered and undisturbed locations with plenty of vegetation cover.

Marine mammals

7.2.3.27 Pollution mitigation measures described in the CoCP (**Document Reference 6.3.7**) (Dust Management Plan and Spill Response Plan appendices) and in ES Chapter 9 Water Resources and Flood Risk (**Document Reference 6.2.9**) (and to be developed in detail in the CEMP) will minimise the possibility of dust pollution and fuel/chemical spillage affecting the River Trent during the construction and operational phases. No other mitigation measures regarding marine mammals are required.

Fish

7.2.3.28 Pollution mitigation measures outlined in the CoCP (**Document Reference 6.3.7**) (and to be developed in detail in the CEMP) will minimise the possibility of dust pollution and fuel/chemical spillage affecting the River Trent during the construction and operational phases. Three ponds and part of the ditch network will be removed/modified within the Energy Park Land. Whilst no fish were recorded during surveys, ECoW supervision will be in place for the draining down of any water features. An experienced ECoW will oversee fish welfare and to support the relocation of any stranded fish or associated aquatic wildlife to a suitable undisturbed channel outside of the working area.

Invertebrates

7.2.3.29 The disused railway line has been identified as a valuable habitat for invertebrate species. A targeted series of species-specific mitigation measures will be incorporated as part of habitat creation (see Section 7.3). This will include:

- Provision of a mosaic of habitats along the railway line which feature open, sunny areas, bare ground, disturbed ground and grassland; and
- Promotion of food plants, including viper's bugloss and common rock rose, for key species identified in the invertebrate survey.

7.3 Habitat Creation

7.3.1.1 This section sets out the habitat compensation measures incorporated into the Project design and which will be implemented from the commencement of the construction phase through to the commencement of operations. Measures are shown on the Indicative Landscape and Biodiversity Plans **(Document Reference 4.10**) and an outline LBMMP is provided (**Document Reference 5.7**). Habitat creation has been informed by the baseline habitat surveys and the range of protected and notable species within the site and comprise necessary compensation for habitat losses and disturbance.

7.3.1.2 The following key areas of habitat creation are those which deliver significant biodiversity units and contribute towards no net loss (as

assessed by the Defra Biodiversity Metric 3.0, see Appendix I for full details). The indicative location of all areas of habitat creation are presented within Appendix I. Whilst some short-term management of retained habitats will be undertaken during the construction phase, for simplicity all management measures are covered in the Habitat Management section under 'Operational Mitigation'.

Woodland

7.3.1.3 Extensive areas (14 ha) of new native woodland will be created on arable farmland within the Railway Reinstatement Land, to the north of Flixborough Industrial Estate and extending east along the reinstated railway. This will significantly increase the amount of woodland habitat in the area and build off the ancient woodland in Burton Wood LWS, situated 0.38 km north of the site. The new woodland will be designed to be in keeping with the landscape character of the 'Lincolnshire Edge'. It will be planted prior to the construction phase, allowing the habitat to begin establishing in advance of initial impacts on habitats and species.

7.3.1.4 Additional urban tree planting within the Energy Park Land will be undertaken during the construction period. Blocks of woodland around the Energy Park will provide both ecological and landscape functions, and are designed to complement areas of nearby and adjoining areas of new scrub and grassland habitat.

7.3.1.5 The condition of new areas of woodland will be maximised based on the Forestry Commission new native woodland design principles (Rodwell & Patterson 1994) and criteria set out in the Defra Biodiversity Metric 3.0 (with an aim of achieving moderate condition). This will be achieved by:

- planting native tree and shrub species characteristic of lowland mixed deciduous woodland, including a rich mix of understorey and canopy species, and using transplants of local provenance;
- with the exception of more formal blocks of proposed urban tree planting around the Energy Park Land, using varied planting patterns and spacings to encourage structural diversity and areas of open space;
- featuring wide scrubby margins; and
- protecting newly planted trees and shrubs from browsing damage; where necessary transplants will be protected by stock-proof fencing, rabbit-proof fencing and/or protective guards (preferably made of bio-degradable material).

Wetland and Swales

7.3.1.6 A large area of wetland is to be created to the west of the new access road within the Energy Park Land. This will include ponds with shallow variable margins, swales, wet lowland grassland, areas of reedbed and scattered wet woodland and scrub. Ponds will serve as attenuation basins for surface water run-off from the Energy Park, however they will be designed to maximise their ecological and biodiversity value. Of key importance is creating a mosaic of permanent, semi-permanent and seasonal ponds to

encourage the greatest diversity of plants, invertebrates, amphibians and mammals and to provide a buffer against pollution or the invasion of non-native species. Ponds and swales will also be created adjacent to the Energy Park buildings and either side the access road. Habitat creation principles in relation to wetland features include:

- the proposed wetland area will be characterised by areas of open water and saturated surface soil. Where ground water levels are variable, surface water input will be used to prevent larger permanent ponds from drying out;
- a complex of ponds will be created, with a range of maximum depths and surface areas. Ponds will be linked by undulating wetland areas and will feature wide drawdown zones;
- pond design will incorporate underwater bars and shoals to benefit aquatic plants;
- the creation of wide, shallow margins (preferably less than 1:20) around ponds will encourage the establishment of reedbed areas. Reedbeds will be dominated by stands of common reed (between 60 and 80% cover) with a diverse assemblage of herbs and marginal vegetation;
- good water quality is maintained within all wetland areas through appropriate monitoring and maintenance (see operational mitigation below);
- ponds and swales will support a range of emergent, submerged and floating leaved plants; and
- natural colonisation of wetland habitats will be aided by the introduction of locally collected seed or transplanting species including common reed from nearby sources, such as the Far Ings National Nature Reserve.

Lowland Meadow and Lowland Calcareous Grassland

7.3.1.7 Areas of new grassland are to be created in a number of locations:

- neutral Species-rich grassland is to be created adjacent to areas of formal woodland planting around the main ERF buildings and other new facilities, east of the new access road, and north of the A1077 Phoenix Parkway adjacent to the southern perimeter of the Energy Park Land;
- significant areas of Lowland Meadow HPI will be created within: (i) the two blocks of grassland-scrub mosaic habitat to be created close to the southern perimeter of the Energy Park Land; (ii) the area of proposed grassland-scrub mosaic to the north of the Flixborough Industrial Estate, adjacent to the proposed woodland edge; (iii) as part of the mosaic of habitats within the new wetland area – some of this will be damp grassland that grades into the ponds, reedbeds, etc.; and (iv) extending along Lysaght's drain; and

- areas of Lowland Calcareous Grassland HPI are to be created along the railway embankments and adjacent to the proposed woodland planting within the Railway Reinstatement Land.

7.3.1.8 Grassland creation will be guided by the advice given in the Natural England Lowland Grassland Management Handbook (Crofts & Jefferson, 1999), several Natural England Technical Information Notes (Stevenson et al., 2008; Jefferson, 2009; Smith, 2010a, 2010b), and the Save Our Magnificent Meadows partnership This is a key measure to compensate for the loss of: (i) arable land and associated areas of species-poor grassland and field margins; and (ii) areas of calcareous grassland along the trackbed when the railway is reinstated. It will significantly add to the overall extent of semi-natural grassland in the area and provide a habitat that is a national priority for nature conservation.

7.3.1.9 The aim is to establish a variety of herb-rich grassland types, depending on the underlying type of soil and hydrology, which will provide habitat for multiple species, including bats, brown hare, common lizard, ground-nesting and wintering farmland birds (notably grey partridge, skylark, yellowhammer and yellow wagtail), and a wide-range of invertebrate species. The target is to create areas of grassland in fairly good to good condition based on the criteria set out in the Defra Biodiversity Metric 3.0.

7.3.1.10 The grassland creation may require ‘soil nutrient stripping’ including removal of the top layer of soil. Wildflower grassland establishment methods will be evaluated and the most suitable used for each location. This may include using ‘green hay’ from a local area of species-rich meadow, seeding commercially bought seed mixes, and broadcasting locally collected seed (e.g. along the railway line). Regular assessment of the establishing sward will be undertaken to inform ongoing management needs, including grazing levels, stock types, mowing regimes, weed control and further wildflower introduction. This will ensure that the value of the new grassland areas is maximised.

Mixed scrub

7.3.1.11 Stands of mixed native-species scrub will be created in the Energy Park Land, including below pylons and as scattered scrub within fields to the west and east of the proposed access road close to Neap House. The approach will follow the Forestry Commission new native woodland design principles (Rodwell & Patterson 1994) and aim to create stands of scrub in good condition (based on the criteria set out in the Defra Biodiversity Metric 3.0). This will be achieved by:

- using a varied mix of native shrub and small-sized tree species, characteristic of lowland mixed deciduous scrub and of local provenance;
- using varied planting patterns and spacings to encourage structural diversity and sinuous edges that contain sheltered glades and grade into other vegetation (grassland, tall herb communities and woodland); and

- protecting transplants from browsing damage; where necessary transplants will be protected by stock-proof fencing, rabbit-proof fencing and/or protective guards (preferably made of bio-degradable material).

7.4 Operational Phase Mitigation

7.4.1.1 This section sets out the mitigation measures (including habitat management and monitoring) that will be applied during the operational phase of the Project. Whilst some short-term improvement of retained habitats will be undertaken during the construction phase, for simplicity all management measures are covered in this section under 'Habitat Management' These will ensure that key features continue to the protected and that the value of newly and retained created habitats is maximised. Operational mitigation is applicable to the Energy Park Land and Railway Reinstatement Land. As entirely buried services, the DHPWNs will only generate minimal maintenance and inspection traffic. Operational mitigation will be secured through implementation of the LBMMP. An outline LBMMP is provided (**Document Reference 5.7**).

7.4.2 Designated Wildlife Sites and HPI

7.4.2.1 Disturbance impacts associated with air quality, noise and artificial lighting within the Energy Park Land and Railway Reinstatement Land may affect international, national and local designated wildlife sites in the vicinity, as well as HPI and other existing/new habitats. Mitigation to address this includes:

- measures to limit emissions to air, including the use of appropriate stack heights to optimise dispersion of pollutants and emissions monitoring to demonstrate compliance with emission limit values (ELV) determined by the Environment Agency. Mitigation for air emissions are fully set out in Chapter 5 – Air Quality (**Document Reference 6.2.5**);
- measures to limit noise pollution, the primary sources of which will be loading and unloading operations, operational traffic movements around the site, the air-cooled condensers, turbine hall and compressors. Full assessment and mitigation for noise impacts are set out in Chapter 7 – Noise (**Document Reference 6.2.7**); and
- measures to limit light pollution, which includes a sensitive lighting scheme around the Energy Park Land that will implement operational lighting meeting the minimum requirements. Lighting design will minimise light spill onto key ecological receptors, particularly habitats used by light sensitive species including bats, badger, water vole and birds.

7.4.2.2 Mitigation for the operational effects of increased traffic and human presence on site has been incorporated into the Project design. Operational deliveries will be made via road, rail and river freight to reduce pressure on individual delivery routes. The reinstated railway will be a single line, with two-way movements; it is anticipated that there will be one movement approximately every 4 - 5 hours.

7.4.2.3 Water required for operation of the ERF and other buildings within the Energy Park Land will be derived from the main Anglian Water utilities network; there will be no abstractions or discharges from or to the River Trent. Treated process water will be discharged to sewer. Oil interceptors and measures to reduce the potential for contamination within surface water will be established, ensuring no direct or secondary pollution of any watercourse and adjoining land. During site operation, strict environmentally sensitive working will be employed to prevent and control incidents of pollution resulting from chemical and fuel spillages.

7.4.3 Species

7.4.3.1 General operational mitigation set out above will minimise ongoing disturbance impacts for a range of species. This section covers species-specific mitigation, monitoring and maintenance to be undertaken during the operational phase of the Project.

7.4.3.2 The badger tunnel beneath the access road will be checked regularly, particularly during the first two years, to ensure that the feature is functioning properly and to confirm that badgers are using it (through setting out trail cameras or clay mats). Any badger fencing established in this area will be monitored to ensure it remains effective.

7.4.3.3 Maintenance works along the reinstated railway will require occasional pruning of overhanging trees and scrub. These maintenance works will be carried out outside of the breeding bird season. Brash will be piled in suitably undisturbed areas of the railway corridor to provide refugia for amphibians, reptiles and small mammals.

7.4.3.4 Any future requirements for in-channel maintenance works to ditches in the Energy Park Land (e.g. dredging/ desilting) will be subject to established statutory regulatory procedures to limit impacts on fish, amphibians and other aquatic biodiversity.

7.4.4 Habitat Management

7.4.4.1 A range of on-going management measures will be used to ensure that the biodiversity value of both newly created habitats and retained habitats is secured for a minimum of 30 years. These are outlined below. Detailed management and monitoring prescriptions will be set out in the LBMMP. An outline LBMMP is provided (**Document Reference 5.7**). These will need to be adapted to take account of the success of planned measures (e.g. grassland wildflower seeding, tree planting, bracken control, pond creation) and most appropriate responses (e.g. grazing of grassland).

Woodland

7.4.4.2 Woodland management will be applied to the extensive areas of new native woodland within the Railway Reinstatement Land, the tree planting areas within the Energy Park Land, and where wet woodland is established as part of the wetland habitat complex to the west of the new access road within the Energy Park Land. This will be guided by the advice set out by the Forestry Commission (Rodwell & Patterson, 1994; Ferris & Carter, 2000; Forestry Commission England, 2010) and guidance on management

for invertebrates (Kirby, 2013). It will focus on ensuring that an adequate density of transplanted trees and shrubs is established, fences are maintained, protective tree guards are removed when no longer needed, and potential issues are monitored and responded to in an appropriate manner (including excessive deer browsing, grey squirrel debarking, and invasive non-native species). Opportunities to create a varied canopy structure will be identified, including periodic coppicing/mowing/strimming of woodland edges and glades/rides to ensure areas of young-growth, open and sinuous edge habitats are maintained. Minimum intervention is likely to be most appropriate for areas of wet woodland. Options to enhance the ground flora will be considered once the woodland as established (see Worrell et al., 2021).

Reedbeds

7.4.4.3 The creation of reedbed areas is proposed within the wetland habitat complex west of the new Energy Park access road. These areas will be manged to enhance their value based on the advice set out by the RSPB (White et al., 2013) and on management for invertebrates (Kirby, 2013). This will focus on ensuring that areas of new reed become established and appropriate ground water levels are maintained. Other small-scale management measures that might be required occasionally include dredging of accumulated litter and silt; targeted removal of vegetation and root systems to restore open water; cutting of reeds; and removal of invading willow scrub.

Grassland

7.4.4.4 New areas of grassland will be created in various locations, together with other areas of retained grassland that will be enhanced. This includes areas of lowland meadow/neutral grassland within and surrounding the Energy Park Land; calcareous grassland within the Railway Reinstatement Land; and damper areas of grassland within the wetland habitat complex west of the new Energy Park access road. These grasslands will be managed to maximise the species-richness of the sward and provide a range of conditions suitable for ground nesting and foraging birds, brown hare, amphibians and reptiles, and a variety of invertebrates. Management will be guided by the Lowland Grassland Management Handbook (Crofts & Jefferson, 1999) and advice on management for invertebrates (Kirby, 2013). It will aim will be to create grasslands in fairly good to good condition (based on criteria in the Defra Biodiversity Metric 3.0). Regular assessment of the sward will be undertaken to inform ongoing management needs, including cutting and grazing regimes, introductions of wildflowers, control of invasive non-native and other undesirable species, and reductions of bracken and scrub. Measures to improve and potentially expand existing areas of Lowland Calcareous Grassland HPI will be a priority.

Scrub

7.4.4.5 Management of areas of new, replacement and retained scrub will broadly follow that of woodlands (see above). The overall aim will be to create stands of scrub in moderate to good condition (based on criteria in the

Defra Biodiversity Metric 3.0). The focus for new and replacement stands of scrub will be to ensure that an adequate density of transplanted shrubs establish, protective guards are removed when no longer needed, and potential issues are monitored and responded to (e.g. invasive non-native species). Action will be taken to create a varied canopy structure, including periodic coppicing and mowing/strimming of edges and glades. This will ensure that young-growth habitat and glades are maintained, as well as sinuous edge habitats that grade into grassland, tall herb and other communities. Options to enhance the ground flora will be considered (Worrell et al., 2021).

8. ASSESSMENT OF LIKELY SIGNIFICANT EFFECTS

8.1 Assessment of Likely Significant Effects Overview

8.1.1.1 The assessment of likely significant effects considers both the construction and operational phases of the Project, taking into account all of the embedded mitigation and compensation outlined in Section 7. It does not consider additional measures to enhance biodiversity. However, there is often a crossover between compensation and enhancement, depending on the ecological receptor in question. The assessment of likely significant effects is based upon a review of all survey data and additional information that has been gathered, together with feedback received from the consultation process and knowledge of the detailed project design. It also takes account of the factors outlined in Section 5, including the status, ecological requirements and sensitivities of habitats and species; and the scale, duration and severity of impacts.

8.1.1.2 The focus during the construction phase is upon the types of impacts that will arise from construction and decommissioning. The types of effects that could arise during construction include (but are not limited to):

- direct impacts through habitat removal and associated harm to species (including noise, lighting and other pollution); and
- secondary impacts (e.g. changes in hydrology or pollution due to dust and/or run-off) which could cause harm to habitats and species.

8.1.1.3 Effects during the operational phase includes maintenance and daily operation of the Project.

8.2 Energy Park Land

8.2.1 Potential Effects from Construction

International Wildlife Sites

8.2.1.1 An assessment of likely significant effects on the qualifying features of the Humber Estuary SAC, SPA and Ramsar Site has been undertaken in Report to inform Habitats Regulations Assessment **(Document Reference 5.9).** This includes construction effects arising from pollution from dust, surface water run-off and disturbance to functionally linked land (the adjacent River Trent and its immediate banks). Likely effects caused by dust and water pollution are assessed as not significant given that the adjacent section of the River Trent to the Energy Park Land will not be directly affected and is lined with raised earth embankments which provide flood defence; no discharges will be made into the river; and there will be no construction, operational or decommissioning interactions with the river. In addition, industry best practice techniques to minimise the potential for pollution will be followed for all surface water crossings and interactions, so any effects on water quality further downstream will be negligible and at most only amount to localised and small-scale impacts on reedbeds/saltmarsh habitat lining the River Trent.

8.2.1.2 Based on the findings of the breeding, migratory and wintering bird surveys, the HRA screened in potential disturbance to mallard using functionally linked land, comprising the River Trent and its immediate banks, associated with the Humber Estuary SPA. Wintering mallard may be disturbed due to additional vessel movements along the River Trent (an estimated 4 vessels per week), associated with the construction phase. Mallard may also be sensitive to increased noise, artificial lighting, traffic and human disturbance which could lead to the displacement of individuals. The raised embankments along the River Trent also provide some screening to construction activities within the Energy Park Land. The findings of the assessment in the HRA which take account of the effects of mitigation e.g. through the use of noise barriers around the construction works) conclude no adverse effect on mallard. This will be confirmed through implementation of the COMP a preliminary version of which is set out in the CoCP.

National and Regional Wildlife Sites

8.2.1.3 National and regional wildlife sites which border the Energy Park Land include the Phoenix Parkway LNR, Phoenix LNR and the Humber Estuary SSSI. Effects on the Humber Estuary SSSI are set out above as this site and its designated features overlap with the Humber Estuary SAC, SPA and Ramsar Site.

8.2.1.4 Phoenix LNR, Phoenix Parkway LNR and other national and regional wildlife sites in the area may be sensitive to potential impacts arising from construction activities including dust and the run-off of pollutants. However, these sites are located 800 m from the nearest area of development within the Energy Park Land and will not be subject to any land take impacts. Considering the distance and lack of connecting habitats, likely effects are considered **not significant.**

Non-statutory Designated Sites

8.2.1.5 No non-statutory designated sites fall within the Energy Park Land. Phoenix Parkway LWS and Slag Banks LWS are located adjacent to the eastern Order Limits, and partially overlap with Phoenix LNR and Phoenix Parkway LNR. As they are situated approximately 800 m from the nearest area of development within the Energy Park Land, secondary impacts are anticipated to be minimal at most. With the implementation of an effective CEMP, likely effects are considered **not significant**.

Habitats of Principal Importance

8.2.1.6 There is a small area of poor condition Lowland Dry Acid Grassland HPI located within the block of semi-natural habitat to the east of the Energy Park Land. This grassland is located 800 m from the nearest area of Energy Park development and will not be affected by the construction phase.

8.2.1.7 Several hedgerows qualifying as HPI are located within the Energy Park Land. Of these, none will be directly impacted except for two species-poor hawthorn hedgerows totalling 0.67 km (along Ferry Road West and south

of Stather Road). The Ferry Road West hedgerow will be reinstated and a number of additional compensatory species-rich hedgerows will be planted in the southern section of the Energy Park Land. Other retained hedgerows within the Energy Park Land may be subject to potential secondary impacts during construction, including dust, disturbance and run-off of pollutants. The CEMP will include appropriate pollution control measures and ensure the establishment of Root Protection Areas. Whilst effects on retained hedgerows are considered to be minimal, reinstated and replacement hedgerow will take a number of years to establish and reach the desired condition. Considering this, likely effects on hedgerows are considered **significant at a site level only**.

Arable and Poor Semi-improved Grassland

8.2.1.8 Development within the Energy Park Land will result in the permanent loss of approximately 62 ha of arable farmland and 4 ha of associated field margins and 'set-aside' grassland, comprising poor semi-improved grassland. The arable land is of low value ecologically, however field margins offer greater botanical diversity and vegetation cover. Areas of arable will also be converted as part of the habitat creation measures. Most will be transformed into either species-rich grassland or woodland, with smaller areas being turned into wetland or scrub habitats. The grassland, wetland and more open parts of the scrub will provide appropriate compensation for the loss of existing arable fields and field margins. Although these will cover a smaller total area, they will provide considerably higher ecological value in due course. Overall, likely effects on arable land and field margins are considered **significant at a site level only**.

Scrub, Tall Ruderal Vegetation and Bracken

8.2.1.9 Relatively small areas of scrub (1.2 ha in total), tall ruderal vegetation (1.2 ha in total) and a single area of bracken (0.1 ha) located within the Energy Park Land will be removed during the construction period. These habitats are species poor and of limited biodiversity value. Scrub is primarily located in the northern section of the Energy Park Land, and comprises scattered willow, bramble and elder, alongside some dense areas dominated by willow and bramble. Tall ruderal vegetation comprises willowherbs, creeping thistle, broad-leaved dock and common nettle in sections along drainage ditches towards the southern boundary of the Energy Park Land. Habitat creation will include large areas of scrub creation, which together with woodland areas will feature graded edges, creating opportunities for rapid natural regeneration of tall ruderals and bramble scrub. Overall, likely effects with respect to these habitats are considered **not significant**.

Watercourses, Standing Water and Marginal Vegetation

8.2.1.10 Approximately 600 m of existing field drains within the Energy Park Land require removal, diversion or culverting to facilitate the development, whilst over 4.8 km will be retained. The CEMP will contain detailed measures to mitigate impacts on retained watercourses relating to pollution are minimised to a negligible level. The ditches are generally steep sided with a low, shallow flow and variable amounts of species poor emergent and

marginal vegetation. They are currently subject to occasional dredging and are likely affected by pollution from agricultural run-off, limiting the existing water quality. Habitat losses will be offset through the creation of new swales and ditches within the proposed wetland area, as well as areas surrounding built development and the main access road. Three bodies of standing water within the Energy Park Land will be lost to accommodate the Project, compensated for by the creation of varied ponds within the proposed wetland area.

8.2.1.11 With appropriate embedded mitigation and habitat creation proposals, the likely effects resulting from the loss of sections of arable field drains is considered **not significant**.

Habitat Mosaic

8.2.1.12 The eastern mosaic of habitats located along the eastern boundary of the Energy Park Land will not be directly impacted by construction activities; likely effects are **not significant**.

Amphibians (including GCN)

8.2.1.13 No GCN breeding ponds will be lost as a result of the construction within Energy Park Land; of the three waterbodies to be removed, the eDNA survey of P2 confirmed absence, and neither P1 or P36 represent suitable habitat for the species. Additional ponds within the Energy Park Land are located to the east, surrounding the chicken sheds and within the block of semi-natural habitats. Whilst access restrictions and/or drying of ponds prevented a full population assessment from being undertaken, eDNA survey confirmed the presence of GCN within P26. It is therefore assumed that this cluster of ponds may support a meta-population of GCN.

8.2.1.14 These ponds are located 420 m from the nearest area of development at the closest point and have abundant good quality terrestrial habitat in close proximity. It is considered highly unlikely that GCN would cross arable fields and ditches to access small pockets of suitable terrestrial habitat within the Energy Park Land, therefore likely effects with respect to GCN are considered **not significant**.

8.2.1.15 Common amphibians, including smooth newt, common frog and SPI common toad were recorded in Pond 2 and may use available standing water in ponds and ditches, as well as terrestrial habitats within the Energy Park Land. Potential impacts on these species include disturbance, harm and mortality during site clearance (including the draining down of Pond 2) and construction. Mitigation contained within the CEMP will minimise impacts, specifically, staged strimming under ECoW supervision will ensure individuals are identified and safely relocated during site clearance. Compensatory habitat creation will create replacement aquatic and terrestrial habitats of greater value than the existing ponds and arable land. Once new wetland habitats suitable for breeding are established, common amphibians are expected to recolonise these features relatively quickly. Overall likely effects are therefore considered to be **not significant**.

Bats

8.2.1.16 No tree roosts were recorded within the Energy Park Land and so no impacts on known bat roosts are anticipated. Only a single tree with potential to support roosting bats was recorded within the eastern part of Energy Park Land, comprising a semi-mature oak with a low suitability feature. This tree will be retained.

8.2.1.17 Construction activities will result in the loss of scrub, grassland, arable land, standing and running water, marginal vegetation, tall ruderal vegetation and hedgerows. Habitat removal will reduce the insect biomass of the area and therefore lower the availability of bat foraging opportunities. The loss of hedgerows at the site entrance may negatively affect commuting bats, as certain species are potentially sensitive to gaps in hedgerows (such as *Myotis* bats) due to the nature of their flight pattern. However, of the other bats recorded at the site, noctule bats are known to fly high and in open habitats and therefore are unlikely to be impacted by hedgerow severance. The most abundant bats recorded were common pipistrelle and soprano pipistrelle; these are generalist species that can tolerate gaps in hedgerows. Compensatory habitat creation includes various species-rich habitats, including woodland, hedgerow, grassland and scrub, which once established will replace lost foraging opportunities for bats.

8.2.1.18 Proposed lighting, including temporary construction lighting (if works are required at night) and permanent security, operational and road lighting installed within the development has the potential to deter foraging and commuting bats. Sensitivity to light varies across species, with *Myotis* species considered the most light-sensitive bats. Lighting has the potential to discourage bats from using a hedgerow or reaching a favoured roosting site or foraging area. However, considering the low bat activity, very low number of *Myotis* bats records in the area, and mitigation incorporated into the lighting strategy, impacts from lighting are likely to be minimal.

8.2.1.19 Whilst foraging and commuting bats will be affected by habitat loss, overall effects will likely be **significant at a site level only**.

Birds

8.2.1.20 An assessment of likely significant effects on the qualifying breeding, overwintering and migratory birds of the Humber Estuary SPA and Ramsar Site has been undertaken in the Report to inform Habitats Regulations Assessment (**Document Reference 5.9**). The HRA screened in potential disturbance to mallard using functionally linked land (the River Trent and its immediate banks) associated with the Humber Estuary SPA. However, taking account of the limited numbers of overwintering mallard that have been recorded in the area and likely tolerance of the species to disturbance given the industrial location of the site, paired with the availability of alternative habitat, no long-term adverse effects are expected.

8.2.1.21 During the construction period, the removal of hedgerows, scrub and tall ruderal vegetation will affect breeding birds through a reduction in potential nesting sites and foraging opportunities. Similar impacts apply to the loss of potential nesting and foraging habitat for ground-nesting birds, particularly those using the arable farmland and the associated field margins, ‘set-

aside' grassland and field drains. Notable birds recorded as possible, probable or confirmed breeding within the arable farmland include skylark, reed bunting, yellowhammer, linnet, grey partridge, yellow wagtail and meadow pipit. The river and marginal vegetation provide breeding habitat for the following confirmed, probable, and possible breeding birds: Schedule 1 Cetti's warbler, grasshopper warbler and reed bunting. Secondary impacts are also likely to arise from increased noise, activity and visual disturbance during construction. This may reduce the number of species and individuals nesting close to works.

8.2.1.22 On completion of construction, hedgerow restoration and the creation of new grassland, scrub, wetland and woodland habitats within the Energy Park Land will restore and replace nesting and foraging opportunities for birds. However, it will take time for these to develop fully, especially structural habitats like scrub and woodland which will take a number of years to become suitable. Overall, likely effects on breeding birds arising from construction are considered negative and **significant up to local level**.

8.2.1.23 Impacts on wintering birds relate to the disturbance or displacement of bird species feeding or roosting within the vicinity of construction activity. The wintering bird surveys showed that the existing intensively managed arable farmland provides limited refuge and foraging habitat for wintering waterbirds, with only occasional and small numbers of waterbirds recorded in the arable fields, including lapwing, golden plover, mallard, teal and oystercatcher. On a single occasion, a marsh harrier was observed foraging over the stubble crop fields, close to the River Trent, and to the north of the Flixborough Industrial Estate. The surveys concluded that the adjacent area of the River Trent and its immediate banks can be considered functionally linked land for wintering mallard associated with the Humber Estuary SPA (see paragraph 8.2.1.20 above). The wintering bird surveys also identified a number of other notable farmland birds, including fieldfare, meadow pipit, redwing, reed bunting, skylark, starling, tree sparrow and yellowhammer. These species may be sensitive to increased noise, artificial lighting, traffic and human disturbance, which will likely lead to a moderate amount of disturbance and displacement of individuals. Taking into consideration the assemblages of birds recorded, the initial disturbance impacts during construction and temporal delay whilst new habitats establish, the overall likely effects on wintering birds are considered negative and **significant at a local level**.

Reptiles

8.2.1.24 No reptile surveys were undertaken within the Energy Park Land, as dominant habitats are largely unsuitable. However, limited cover is available in the form of hedgerows, scrub and tall ruderal, as well as opportunities for basking and foraging in the above habitats plus field margins, marginal vegetation and field drains. Reptiles could be harmed during vegetation clearance and removal of the hedgerow adjacent to Ferry Road West. Impacts associated with the loss of habitat may result from vegetation clearance, which could restrict the breeding success of localised populations, if present. However, given the mitigation and low likelihood of

reptiles being present within the Energy Park Land, injury of individual reptiles and damaging population effects are considered extremely unlikely. Overall, likely effects are considered **not significant**.

Badger

8.2.1.25 An active main badger sett was found on the banks of Ditch 16. Four outlying setts were also recorded within the Energy Park Land, comprising: two active outliers along Ditch 17; one partially used outlier along Ditch 11 and a final active outlier sett at Ditch 9. Of these, the sett on Ditch 9 is located well away from construction areas and will not be impacted. The outlier sett at Ditch 11 is located close to proposed infrastructure, including the access road and SuDS ponds, therefore is likely to require temporary closure carried out under a licence from Natural England. The remaining two outliers on Ditch 17 are located approximately 30 m from an areas of proposed buildings/ hardstanding.

8.2.1.26 The main sett at Ditch 16 is located adjacent to the proposed wetland area and 130 m from buildings and proposed hardstanding. As such, there are no high noise/vibration activities anticipated within 100 m of the sett and earthworks will be avoided within 30 m of the sett. The construction of a badger tunnel beneath the proposed access road will allow badgers to access foraging resources east of the development. This tunnel will be checked regularly to ensure it is functioning properly and confirm badgers are using it.

8.2.1.27 Impacts on badger may also arise from temporary construction lighting and the permanent lighting scheme, which could disrupt foraging and commuting behaviour. Security lighting within the Energy Park including lighting along the proposed link road has potential to deter badgers commuting east to available foraging habitats. Lighting will avoid excess spillage onto adjacent habitats and badger commuting routes leading from setts to the badger tunnels and beyond, with scrub and tree planting offering additional screening.

8.2.1.28 Overall, likely effects on badgers arising from construction are considered to be negative and **significant at a site level only**.

Otter and Water Vole

8.2.1.29 Evidence of otter recorded during the field surveys was limited: a set of otter prints were found along the banks of the River Trent immediately adjacent to the ship dock at Flixborough Wharf; and an otter was seen laying up in the long grass next to a ditch at the eastern side of the Energy Park Land (NGR: SE 87363 13558). Impacts on otters arising from construction includes disruption to movement/foraging along ditches and the possible disturbance at resting or breeding places. However, the otter laying up site identified was on the eastern edge of the Energy Park Land away from construction areas and no confirmed holts were found during surveys. Mitigation measures will include pre-works surveys, measures to limit potential disturbance to otters, and ensuring potential otter commuting routes are kept open. Likely effects on otter are therefore considered **not significant**.

8.2.1.30 Evidence of water vole was recorded along three ditches within the Energy Park Land: Ditch 11 (prints), Ditch 8 (feeding remains) and Ditch 18 (three burrows and a single latrine). This suggests a low level of water vole activity. Ditch 8 and Ditch 18 are located in the eastern section of the Energy Park Land which will not be affected by construction. Ditch 11 is the main Lysaght's Drain which crosses the site east to west. However, no evidence of water vole was found along the western sections in close proximity to the Project, and the record of prints had no additional signs to corroborate the presence of water vole. Pre-commencement surveys will be undertaken in the appropriate season and a mitigation strategy developed if necessary, and included in the CEMP. Based on current baseline surveys, likely effects on water voles through loss of habitat and injury to individuals are considered **not significant**.

Other Mammals

8.2.1.31 Brown hare and European hedgehog likely utilise habitats within the Order Limits (both are SPI). The same applies to other non-SPI mammals, including roe deer, field vole, wood mouse and common shrew. Impacts on these species include potential disturbance of/harm to individuals and loss of foraging, breeding, refuge and hibernation habitats. Compensatory habitats will be established to replace initial losses arising from construction, although there will be a temporal delay whilst these establish. Overall, likely effects on other mammals are considered to be **significant at site level only**.

Invertebrates

8.2.1.32 The arable farmland within the Energy Park Land is generally of limited value for invertebrates. The compensatory habitat creation plans will establish a range of semi-natural habitats (including species-rich grassland, mixed native scrub and a variety of wetland habitats) which will be of considerably greater value for invertebrates. Likely effects on invertebrates are therefore considered **not significant**.

8.2.2 Potential Effects from Operation

International Wildlife Sites

8.2.2.1 The HRA assessment of likely significant effects on the qualifying features of the Humber Estuary SAC, SPA and Ramsar Site, see Report to inform Habitats Regulations Assessment (**Document Reference 5.9**) has considered operational effects arising from emissions to air; disturbance or displacement of qualifying interest bird species; recreational disturbance and changes to water quality.

8.2.2.2 Effects arising from emissions to air quality were informed by atmospheric dispersion modelling undertaken within a buffer of 15 km from the proposed ERF stack locations, and by making comparisons with established critical loads and critical levels for different habitat types. This revised report has taken account of the modelling data for the ROC. As a result, no likely significant effects have been concluded from air emissions for the Project

alone on European sites, with all predicted PC levels / loads being <1% of the relevant critical level, or load.

8.2.2.3 In-combination effects of air emissions within the HRA were screened in for the Keadby 2 and Keadby 3 developments. This included likely effects of ammonia and nitrogen deposition on the Humber Estuary SAC and Ramsar Site, and took account of predicted improvements in baseline air quality and emissions being offset by the decommissioning of Keadby 1. The conclusion reached was that the likely impacts will not have any long-term adverse effects on these sites.

8.2.2.4 The Air Quality assessment concluded that the likely impacts of increased traffic emissions during construction are negligible and were therefore not considered further with respect to European designated sites (see Chapter 5: Air Quality (**Document Reference 6.2.5**)).

8.2.2.5 The HRA also examined the potential for disturbance on functionally linked land used by qualifying bird species of the Humber Estuary Ramsar and SPA, using data from breeding, migratory and wintering bird surveys. In general, only small numbers of qualifying waterbirds were recorded in the arable fields around the Project during the surveys. Peak counts of 41-42 mallards were recorded along the River Trent; this species forms part of the qualifying non-breeding waterbird assemblage of the Humber Estuary SPA and was therefore brought forward for further appropriate assessment. Considering the limited number of mallard recorded, limited increase in vessel movements (1-3 per day) associated with site operation, the mobility and low sensitivity to disturbance of mallard populations, and the extensive areas of similar habitat in the local area, it was concluded that no long-term adverse effects were likely. The HRA concluded the same for in-combination disturbance effects.

8.2.2.6 Potential recreational disturbance to qualifying interest birds during operation of the scheme was also considered in the HRA. Again, it was concluded that no long-term significant effects were likely, primarily due to screening provided by the raised earth embankments around the River Trent and the likely lowered sensitivity and limited numbers of Ramsar and SPA birds recorded. As such, any effects will likely to be temporary and localised.

8.2.2.7 In addition to recreational disturbance, the HRA concluded no significant effects on water quality due to a lack of operational interactions with the River Trent.

National and Regional Wildlife Sites

8.2.2.8 The Phoenix Parkway LNR, Phoenix LNR and Humber Estuary SSSI border the Energy Park Land. Effects on the Humber Estuary SSSI are set out above as this site and its designated features overlaps with the Humber Estuary SAC, SPA and Ramsar Site.

8.2.2.9 The Phoenix Parkway LNR and Phoenix LNR are located 800 m east of the Energy Park. Marginal increases in traffic and human presence are not anticipated to significantly affect the LNRs or other SSSI sites located

further from the Order Limits. Emissions and their impact on air quality are assessed in Appendix A and are summarised in Section 8.6 below.

Non-statutory Designated Sites

8.2.2.10 Phoenix Parkway LWS and Slag Banks LWS are situated 800 m from the nearest area of development, therefore no direct impacts are expected to arise from operational activities. Emissions and their impact on air quality present the greatest risk as regards potential secondary impacts. Effects of changes in air quality are addressed in Appendix A and summarised in Section 8.6 below.

Habitats of Principal Importance

8.2.2.11 Areas of Lowland Dry Acid Grassland HPI are located only within the eastern mosaic area of the Energy Park Land. These are of limited extent and at some distance from the nearest area of Energy Park development. Dry Acid Grassland is associated with several national and locally designated sites in the surrounding area, for which Appendix A addresses the effects resulting from air emissions. Findings are summarised in Section 8.6 below.

8.2.2.12 Retained and created hedgerows within the Application Land will be managed and maintained in line with the LBMMP and best practice guidance. The potential for increased traffic and pollutant emissions during operation is unlikely to affect hedgerows, which are all located along existing roads and subject to associated pollution. Likely effects on hedgerows during operation are therefore considered **not significant**.

Other Habitats

8.2.2.13 Other retained habitats include arable land and field margins; small pockets of tall ruderal vegetation and scrub; and standing/running water and marginal vegetation. In addition, newly created habitats will include species-rich grassland, scrub, wetland and ponds, and woodland. Potential impacts arising from operation include runoff containing contaminants; an increase in human disturbance to habitats located close to the development; and effects related to pollutant emissions (Chapter 5: Air Quality (**Document Reference 6.2.5**)). A range of on-going management measures will ensure that the biodiversity value of newly created and retained habitats is secured (see Section 7.4 for details). Overall, likely effects on other habitats are considered **not significant**.

Species

8.2.2.14 Operational impacts on species associated with the site comprise operational noise (as detailed Chapter 7: Noise (**Document Reference 6.2.7**)), increased artificial lighting, traffic and human presence.

8.2.2.15 An increase in ambient noise levels may impact breeding birds and their ability to hold and defend territories if the audibility of singing is reduced. Noise may also affect both breeding and wintering birds by deterring them from using suitable habitats adjacent to the development, including new areas of wetland, scrub and woodland, and nearby arable land and the

River Trent. Effects vary depending upon the species involved, the level and type of disturbance, the degree to which populations become habituated to regular background noise, and distance from the source of the noise (with levels showing a marked decline moving away from the point of origin).

8.2.2.16 Lighting, including vehicle headlights and lighting along the new access road, may result in the illumination of adjacent habitats, affecting the natural behaviours and breeding success of birds, bats, badger, water vole, reptiles (if present) and otter within the site. The Indicative Lighting Strategy at Annex 4 to the ES **(Document Reference 6.3.4)** is based on the minimum requirements for operation and incorporates measures to reduce light spillage onto adjacent habitats, including the created wetland area, tree and shrub planting throughout the development and the River Trent. In particular, the position of lighting columns has been designed to ensure that light spill surrounding the badger pass location and crossing over the Lysaght's Drain does not exceed 0.32 maximum lux. Smart lighting control systems will also be applied to ensure non-essential lighting will not be working 24 hours a day. As new habitats establish, they will offer increased screening from any light spillage and glare, helping to further reduce negative impacts.

8.2.2.17 Process buildings within the Energy Park Land will be operational 24 hours a day. Increased disturbance from traffic and human presence has the potential to deter species from using available habitats, including breeding and wintering birds in adjacent arable land, new wetland, scrub and woodland habitats, and the River Trent. Birds and other species may suffer increased stress levels due to increased visual disturbance, potentially affecting their breeding ability and success. Nocturnal species such as otter and badger may be deterred from using commuting routes across the site as a result of increased visual disturbance. Again, effects vary depending upon the species involved and the type and distance from the disturbance.

8.2.2.18 The operational phase also has the potential to result in occasional, accidental harm to species through increased traffic collisions. The provision and maintenance (including monitoring to determine effectiveness) of a badger tunnel beneath the new access road will offer an alternative route for badger and other species crossing the road at one location. Increases in traffic will be modest and enforced speed limits will help to minimise the likelihood of collisions, therefore traffic-related mortality will be of negligible risk.

8.2.2.19 Whilst some impacts on species are inevitable when the Project becomes operational, it is expected that these will be localised and largely effect the immediate area around the main Energy Park buildings. In addition, at least some level of habituation to regular background noise and changes in lighting is to be expected, mitigated further by the planned lighting strategy, traffic management measures and screening as new habitats establish. Overall, likely effects on species during operation are considered significant at a site level only.

8.3 Railway Reinstatement Land

8.3.1 Potential Effects from Construction

International Wildlife Sites

8.3.1.1 Construction to reinstate the railway line and Dragonby Sidings is relatively small scale, with works confined to a narrow area of hardstanding at Dragonby and the corridor formed by the existing trackbed extending west. Most of the works will take place some distance away from the River Trent which marks the boundary Humber Estuary SAC, SPA and Ramsar Site. The development of a new railhead to the south of Flixborough Wharf will involve a larger area of habitat loss and disturbance adjacent to the River Trent. An assessment of likely significant effects on the qualifying features of the SAC, SPA and Ramsar Site has been undertaken in the Report to inform Habitats Regulations Assessment **(Document Reference 5.9)**. The HRA addressed the construction phase as a whole and, based on the findings of the bird surveys, screened in possible disturbance effects to wintering birds (mallard) associated with the Humber Estuary SPA. However, mallard is generally regarded as being less sensitive to disturbance and individuals were mostly found to be using the River Trent channel and banks adjacent to the site. These habitats are screened from the new railhead by the raised earth embankments along the river and will not be affected by habitat loss. Considering the small number of mallard recorded within the Application Land and the availability of extensive alternative habitat, the HRA concluded no adverse long-term effects are likely.

National and Regional Wildlife Sites

8.3.1.2 Construction impacts arising from the railway reinstatement works on the Humber Estuary SSSI are set out above, as this overlaps with the Humber Estuary SAC, SPA and Ramsar Site.

8.3.1.3 The Phoenix LNR runs immediately adjacent to a 0.38 km stretch of the existing railway, along which excavation and track-laying works will take place. A limited number of shrubs/trees along the LNR boundary may need to be cut and/or pruned back to ensure good visibility and reduce safety risks associated with the branch line. It is anticipated that a minimum 5 m corridor will be kept permanently clear of any lineside or overhanging vegetation. Mitigation to minimise impacts will be adopted, including for the minimum area along the LNR boundary; agreeing access routes to avoid damaging habitats within the LNR; and measures in the CEMP related to disturbance and pollution of adjacent habitats. Likely effects on the Phoenix LNR are therefore considered **not significant**.

8.3.1.4 The Conesby Quarry LNR is located adjacent to the western section of the proposed access track, which is currently used by various parties. With appropriate mitigation to be incorporated into the CEMP to avoid pollution and accidental encroachment into the LNR, effects are considered **not significant.**

Non-statutory Designated Sites

8.3.1.5 Small areas of non-statutory designated sites overlap the Railway Reinstatement Land, including Slag Banks LWS (0.1 ha), Conesby Quarry LWS/LGS (0.45 ha) and Yorkshire East Gullet LWS (0.47 ha). Scrub within 5 m of the railway will require pruning/removal and small areas of grassland may be disturbed by construction activities. Construction activities may also result in secondary impacts, including dust deposition, disturbance from additional human presence and pollution. However, overlaps are restricted to very small strips of land within LWS/LGS. Core areas will be protected from direct impacts and secondary impacts will be reduced through appropriate pollution and dust control measures outlined in the CoCP (**Document Reference 6.3.7**). Within the Yorkshire East Gullet LWS, the creation of Lowland Calcareous Grassland will be carried out under ecological guidance and supervision, with any scrub removal within the LWS undertaken using hand tools and under ecological supervision, with the appropriate pre-works surveys. Overall, likely effects on non-statutory designated sites are considered **not significant**.

Habitats of Principal Importance

8.3.1.6 Although flagged by the desk study, Phase 1 Habitat surveys confirmed the absence of Lowland Dry Acid Grassland HPI within the Railway Reinstatement Land. However, unmanaged Lowland Calcareous Grassland HPI is present over thin soils and pebble substrate, both within and adjacent to the trackbed along two sections of the rail line. Although generally described as poor quality, pockets of this grassland did support a rich flora and notable species, including individual northern, southern and bee orchid, as well as a diverse assemblage of terrestrial invertebrates. Lowland calcareous grassland is a nationally rare habitat and high importance for nature conservation. Construction activities will result in the permanent loss of some areas of this habitat along the trackbed and associated banking. Adjacent areas of lowland calcareous grassland are also at risk of secondary impacts from dust, disturbance and pollution during construction, for which appropriate mitigation will be included with the CEMP. The permanent loss of grassland along the trackbed is proposed to be offset by the expansion and creation of new areas of lowland calcareous grassland, both along the railway and bordering woodland to the west. Nevertheless, considering the importance of this nationally rare habitat, likely effects on this HPI are considered **significant at a district level**.

8.3.1.7 A group of four hedgerows qualifying as HPI are present within the Railway Reinstatement Land. However, no direct impacts are anticipated as they are located along roadsides at a crossing point away from the tracks. Any secondary impacts on hedgerows from construction activities will be temporary and appropriate mitigation set out in the CEMP will be implemented. Likely effects on hedgerow HPI are considered to be **not significant.**

Arable and Poor Semi-improved Grassland

8.3.1.8 The construction of a new railhead located to the south of Flixborough Wharf will result in the loss of arable land and modified grassland. These habitats will also be lost to the north of Flixborough Industrial Estate, associated with the railway reinstatement works and the proposed creation of broadleaved woodland. Suitable compensation will be delivered within the Energy Park Land, in the form of species-rich grassland, scrub, wetland and hedgerows. Elsewhere within the Railway Reinstatement Land, narrow sections of arable and strips of semi-improved neutral grassland are present, which are unlikely to be affected by works to restore the branch line. Overall, considering the limited biodiversity value of arable and species-poor grassland, construction related effects are considered **not significant**.

Scrub and Tall Ruderal Vegetation

8.3.1.9 Areas of scrub and tall ruderal vegetation are common along the existing rail corridor, having colonised the disused trackbed and associated banking since the line was last in use (2012). Dominant scrub species include willow, hawthorn, bramble, blackthorn and rose, with scattered gorse frequent to the east. Ruderal vegetation comprises common nettle, rosebay and great willowherb, teasel, broad-leaved dock, false oat grass and creeping thistle. Existing areas of scrub and tall ruderal vegetation will be removed across the trackbed and to 5 m on both sides to ensure safe running of the branch line. These habitats are species-poor and of limited biodiversity value. Suitable compensation involves extensive creation of native scrub and woodland within the wider development, which will feature graded margins capable of supporting tell herb vegetation. As such, overall likely effects on these habitats are considered **not significant**.

Woodland

8.3.1.10 Several sections of woodland are present along the embankments of the railway line. The trees vary in age from young to semi-mature, with sycamore and ash largely dominant, over an understorey that includes hawthorn, bramble and rose. The tree and shrub canopy overhangs parts of the railway tracked. The ground is largely bare and composed of pebbles/stones with little soil. This woodland is not considered to be of sufficient quality to qualify as HPI. Vegetation removal will affect trees and shrubs located within the 5 m of the tracks, including felling and pruning of overhanging limbs. However, few trees are growing over existing ballast, therefore losses are anticipated to be minimal and will be compensated for by the extensive creation of new woodland. Measures to be detailed in the CEMP will be implemented to protect retained trees from root damage and to limit secondary impacts affecting retained woodland. Felled branches/trees will be retained and stacked to form deadwood habitat piles. Overall, likely effects on woodlands stemming from construction along the railway are considered **not significant**.

Watercourses and Standing Water

8.3.1.11 There is no standing water located within the Railway Reinstatement Land, although several ponds are within close proximity, including four areas of standing water within 50 m. Two arable field drains north of Flixborough Industrial Estate are present and two narrow swales are located adjacent to the proposed access track off Normanby Road. No ponds and ditches will be directly affected by construction works, however those within close proximity will be sensitive to runoff containing contaminants and excess sediment. Given that appropriate pollution control measures will be put in place via the CEMP, likely effects on the water environment along the railway are considered **not significant**.

Invasive plant species

8.3.1.12 Small stands of Himalayan balsam are present along parts of the railway line to the north of the Flixborough Industrial Estate. An INNS management plan as outlined in the CoCP (**Document Reference 6.3.7**), will address invasive plants. Mitigation and continued monitoring and control of this invasive species will ensure that likely effects are **not significant**.

Amphibians (including GCN)

8.3.1.13 There are a number of ponds within 0.25 km of the Railway Reinstatement Land, and small and medium populations of GCN have been confirmed as present. As such, construction works will be carried out under licence from Natural England, informed by repeat surveys where necessary. No ponds will be directly affected by the railway reinstatement works, however areas of scrub, grassland, woodland, railway tracks, ballast and associated infrastructure provide suitable terrestrial and refuge habitat for GCN and common amphibians. Vegetation removal, ground clearance and renewal of the railway tracks has the potential to cause harm and/or injury of individuals. Runoff of sediments from disturbed ground and pollutants from machinery could negatively affect ponds within close proximity of the railway reinstatement works that are used by GCN and common amphibian. However, with the implementation of mitigation and careful working methods to be detailed in the CEMP, including a method statement for works within 0.25 km of a confirmed GCN pond, likely effects are considered to be **significant at a site level only**.

Bats

8.3.1.14 Works to fell or prune trees with bat roost suitability have the potential to directly affect roosting bats and reduce roosting opportunities for the local bat population. However, only two trees along the railway were found to have suitable roosting features, one of which supported bat boxes which can be easily relocated. Mitigation for direct impacts will involve pre-commencement surveys (of these and other trees to be removed), which will provide an updated assessment and rule out the presence of roosting bats immediately prior to works. The compensatory provision of roosting features will mean likely effects on roosting bats are **not significant**.

8.3.1.15 Construction activities associated with the proposed railhead, reinstated tracks and Dragonby Sidings will result in the loss of scrub, neutral and calcareous grassland, arable land and tall ruderal vegetation. This vegetation removal may reduce insect prey availability for the local bat population, although is not anticipated that it will significantly fragment habitats or negatively affect the function of the railway as a commuting corridor for bats. Vegetation loss will be minimised to only that necessary to ensure safe running of the branch line. Bat activity recorded along the railway was relatively low and comprised four species, of which *Myotis* bats are considered the most sensitive to the proposed construction activities, including the establishment of any overnight temporary construction lighting where necessary. Railway reinstatement works will install permanent lighting at the railhead and Dragonby Sidings only, therefore the track will remain unilluminated as per existing site conditions.

8.3.1.16 Overall, impacts on roosting, foraging and commuting bats will mainly arise from habitat loss. However, the integrity of the railway as a commuting corridor will not be affected and there are large areas of woodland creation proposed. As such, likely effects on foraging and commuting bats are considered **not significant**.

Birds

8.3.1.17 The loss of small areas of scrub, woodland, tall ruderal vegetation and grassland along the railway line may affect breeding birds through a reduction in potential nesting sites. Loss of arable farmland to the north of Flixborough Industrial Estate and at the new railhead location may also limit nesting opportunities for ground-nesting species. If site clearance and construction activities begin within the breeding season (March-August for most species) this could result in the direct destruction and/or damage to nests. Notable red-listed bird species recorded as possible, probable or confirmed breeding, include grey partridge, house sparrow, song thrush, skylark and yellowhammer. Recorded amber-list breeding birds comprised bullfinch, reed bunting, tawny owl and willow warbler. Disturbance during works, due to increased noise, activity and human presence, could affect birds and lead to a decrease in the number of species and abundance of birds around working areas. However, such impacts will likely be localised and relatively short-term.

8.3.1.18 Proposed habitat creation, including new woodland, scrub and grassland areas, as well as wetland habitats, will restore and increase nesting opportunities for breeding birds. Structural habitats suitable for nesting will take longer to establish and become suitable for breeding birds than open grassland and wetland habitats. Overall, impacts on breeding birds arising from construction are therefore considered **significant at a site level only**.

8.3.1.19 Impacts on wintering and migratory birds comprise the disturbance or displacement of birds feeding or roosting within the vicinity of construction activity. The Report to inform Habitats Regulations Assessment (**Document Reference 5.9**) assessed disturbance to wintering mallard as a part of the qualifying non-breeding waterbird assemblage of the Humber Estuary SPA. Other notable species recorded during the wintering bird

surveys included oystercatcher, marsh harrier (brief flight over arable land), golden plover, lapwing, reed bunting, skylark and yellowhammer. However, only reed bunting was recorded in significant numbers within the Railway Reinstatement Land. Construction of the new railhead will contribute to impacts on wintering birds in the adjacent Energy Park Land and potentially increase disturbance levels. Compensatory habitats will be provided in the new wetland area adjacent to the railhead, as well as species-rich grassland and scrub planting, taking into account the foraging preference of recorded bird species. Overall likely effects on wintering birds arising from construction are therefore considered negative and **significant at a site level only**.

Reptiles

8.3.1.20 There is potential for direct impacts on common lizard when vegetation is cleared during the railway reinstatement works, including removal of grassland and scrub, together with lifting of railway materials such as sleepers and ballast. Mitigation and careful working methods outlined in the CoCP (**Document Reference 6.3.7**), including ecological supervision, will be implemented to minimise direct impacts.

8.3.1.21 Impacts associated with loss of habitats may reduce foraging and shelter opportunities available to the local common lizard population. However, habitat loss will be minimal and new habitats will be created, including areas of calcareous grassland and sheltered edges and glades within scrub and woodland, featuring suitable open banks for basking and log piles providing refugia. Overall, likely effects on common lizard are considered **not significant**.

Badger

8.3.1.22 An active main badger sett was found approximately 10 m south of the railway within a woodland area. Provided that the sett does not expand into any working areas and no excavation is required, the sett will be retained and appropriate mitigation and monitoring implemented to minimise disturbance to the badger clan. In particular, there will be no night working which may discourage badger from emerging from their sett to forage.

8.3.1.23 Badgers foraging and commuting along the railway line may be disturbed by temporary construction lighting, as well as increased noise and human presence, although it is anticipated that night working will not be required. Furthermore, permanent lighting will only be installed at Dragonby Sidings and the new railhead, maintaining the railway as an unlit corridor.

8.3.1.24 Overall, likely effects on badgers arising from construction are considered to be **significant at a site level only**.

Otter and Water Vole

8.3.1.25 No evidence of otter was recorded along watercourses within the Railway Reinstatement Land, and most of the ditches are considered suitable for the species (due to shallow nature and lack of connectivity to other watercourses). The exceptions are short sections of Ditch 5 and Ditch 39 to the north of Flixborough Industrial Estate, which are exempt from direct

impacts. Measures to be detailed in the CEMP will ensure appropriate pre-works surveys for otter are carried out in these areas. Based on the current survey information, likely effects on otter are considered **not significant**.

8.3.1.26 Evidence of water vole was recorded only at Ditch 5 within the Railway Reinstatement Land (multiple latrines, burrows, runs and feeding stations). The ditch is located to the north of Flixborough Industrial Estate within the proposed woodland landscaping area, and terminates approximately 15 m north of the railway line. Hence, there will be no direct impacts on the ditch and no water vole licence is required. Landscaping proposals have taken water vole into account along the 36 m section of the ditch that falls within the Application Land. Tree planting will not be undertaken within 10 m of the bank tops, to prevent excessive shading. The buffer zone will be seeded and species-rich grassland created, along with other areas around the perimeter of the woodland. With this mitigation, likely effects on water voles arising from construction within the Railway Reinstatement Land are considered **not significant**.

Other Mammals

8.3.1.27 Brown hare is present and European hedgehog likely utilise habitats within the Railway Reinstatement Land (both are SPI). The same applies to other non-SPI mammals, including roe deer, field vole, wood mouse and common shrew. Impacts on these species include potential disturbance/harm of individuals and loss of foraging, breeding, refuge and hibernation habitats. Compensatory habitats will be established to replace initial losses arising from construction, although there will be a temporal delay whilst these establish. Likely effects on other mammals are therefore considered to be **significant at site level only**.

Invertebrates

8.3.1.28 The railway corridor was found to be of conservation value for terrestrial invertebrates (235 species were recorded in total), with the open grassland and areas of disturbed ground in particular supporting several notable species. Habitat loss along the railway trackbed and adjacent 5 m strip will result in a loss of invertebrates and supporting habitats. However, habitat areas beyond this will be retained and provide sources for the colonisation of newly created habitats. In particular, establishment of new areas of relatively open calcareous grassland (in part replacing existing stands of scrub) will compensate for impacts on rare species. Nevertheless, likely effects on terrestrial invertebrates are considered **significant at a local level**.

8.3.2 Potential Effects from Operation

International Wildlife Sites

8.3.2.1 The HRA assessment of likely significant effects on the qualifying features of the Humber Estuary SAC, SPA and Ramsar Site has considered operational effects arising from emissions to air; disturbance or displacement of qualifying interest bird species; recreational disturbance and changes to water quality. Of these, operation of the reinstated railway

and new railhead south of Flixborough Wharf will result in emissions to air produced by diesel-powered trains, operating at the port to deliver and export freight from the ERF. Trains will run along the 6 km railway an average of 3 times per day. Given the limited number of train movements per day, the impact from emissions are anticipated to be minimal and below the levels which would significantly affect the Humber Estuary SAC/Ramsar Site/SPA.

National and Regional Wildlife Sites

8.3.2.2 National and regional wildlife sites which overlap the Railway Reinstatement Land include small areas of the Phoenix LNR. Scrub and overhanging trees and shrubs within 5 m of the reinstated railway line will occasionally be cut back and low growing vegetation will be sprayed with a glyphosate-based herbicide, including along the perimeter of Phoenix LNR. This will not exceed the amount required to ensure good visibility and reduce safety risks and herbicide spraying will not be carried out further than 1 m from the tracks. Periodic removal of such vegetation is not anticipated to have a damaging effect on wildlife interests, and may potentially have beneficial effects by maintaining useful areas of relatively open vegetation and regenerating scrub. Secondary impacts associated with runoff of pollutants are expected to be minimal due to the infrequent movement of trains along the branch line and regular maintenance of locomotives.

8.3.2.3 The Conesby Quarry LNR is located adjacent to the western section of the proposed access track and will not be subject to any additional impacts during operation of the railway. Overall, likely effects on national and regional designated sites are considered to be **not significant**.

Non-Statutory Designated Wildlife Sites

8.3.2.4 Of the non-statutory designated sites which overlap the Railway Reinstatement Land, the boundary of the Slag Banks LWS does not extend to the area that will be subject to direct operational impacts. The margins of Conesby Quarry LWS and Yorkshire East Gullet LWS will also be subject to maintenance works detailed above to remove vegetation within 5 m of the railway. Provided this is not undertaken too frequently and appropriate checks for nesting birds are undertaken, this could have beneficial effects by maintaining useful areas of relatively open vegetation and regenerating scrub. Overall, likely effects from operation on non-statutory designated sites are considered **not significant**.

Habitats of Principal Importance

8.3.2.5 Following construction, Lowland Calcareous Grassland HPI will remain adjacent to certain areas of the railway banking, outside of the 5 m buffer of the tracks (and where construction activities have avoided impacts on this habitat). As such, retained areas are unlikely to be directly affected by railway maintenance works and the potential for run-off containing pollutants and herbicides is considered to be of minimal impact. Operational mitigation will comprise management of existing areas of grassland, enhancing and increasing their extent through seeding and the

targeted removal of encroaching scrub. New grassland will also be created and managed within proposed landscaping areas to the north of the railway. Overall, operational effects are considered to be **not significant**.

8.3.2.6 The cluster of four roadside hedgerows within the Railway Reinstatement Land will not be affected by the operational railway and road traffic is not expected to increase in this area. Likely effects on hedgerow HPI are therefore considered to be **not significant**.

Other Habitats

8.3.2.7 Other habitats associated with the Railway Reinstatement Land include retained arable land, poor semi-improved grassland, tall ruderal vegetation, scrub, semi-natural broadleaved and mixed woodland, and standing/running water. The latter includes a small number of ponds and ditches located adjacent to the Order Limits, which may be subject to secondary impacts arising from pollution during operation of the railway. Any tall ruderal and regenerating woodland and scrub will be controlled along the trackside as part of an annual maintenance programme to ensure rail safety and good visibility. Specifically, contractors will weed spray twice per year (March and July), using glyphosate-based herbicide. Spraying along the track bed will extend up to 1 m either side of the running rail. If required, after the application of herbicide, vegetation will be strimmed or cut back once or twice per year. Appropriate checks will be carried out for nesting birds. Retained arable and poor semi-improved grassland is located on the periphery of the Application Land and is highly unlikely to be affected by maintenance activities. Overall, likely effects from operation of the railway on other habitats are considered **not significant**.

Species

8.3.2.8 Operational impacts on species associated with the reinstated railway comprise noise, vibration, artificial lighting, increased traffic, increased human presence and management of trackside vegetation. These impacts are primarily focussed at the railhead south of Flixborough Wharf and Dragonby Sidings, which will be capable of operating 24 hours a day, facilitating the movement of rail freight. Train movements will also create a source of disturbance, however this is expected to be minimal due to the low number of movements (up to 4 trains per day).

8.3.2.9 Noise and vibration will be generated by the moving trains and vehicles used for loading and unloading. Where there is suitable habitat for breeding and wintering birds in close proximity to operations, including the proposed wetland habitat east of the new railhead and scrub surrounding Dragonby Sidings, increased noise and vibration levels may deter birds and negatively affect their ability to hold and defend territories. Other species may be affected, including bats, badger and amphibians, through a change in foraging and commuting behaviours. However, it is anticipated that trains will run during daylight hours only, and at least some species will become habituated to regular noise and vibration which is not perceived as a threat. Furthermore, at any one location the noise and vibration will be a transitory event and effects will diminish moving away from the course of the railway.

8.3.2.10 Artificial lighting will be in constant operation at the railhead. Along the railway, a series of permanent low level bollards (1 m high) directing light onto a 0.5 km section of the track is proposed to the north of Dragonby Sidings. The lights will be operational only when the train is using the section of track to assist visibility, therefore they are considered to have negligible impact on species within the vicinity. Light spillage at the railhead, which is located close to the Energy Park and created habitats, will result in a degree of light spill, potentially impacting the natural behaviours of birds, bats, badger, amphibians and reptiles. However, approximately 5.5 km of the route will remain without permanent lighting, including those sections which support the badger sett, nearby ponds with GCN presence, and scrub and woodland edges likely to be favoured by foraging bats. The occasional passage of trains with headlights is not anticipated to create a significant source of disturbance for these species.

8.3.2.11 Increased disturbance from human presence will be most evident at the railhead and Dragonby Sidings, comprising operatives undertaking loading and unloading of vehicles and trains. This will likely deter badgers, birds, reptiles and perhaps other species from using available habitats. However, effects will be localised and there is abundant alternative habitat in the wider area. Along the tracks, human presence associated with maintenance of trackside vegetation will be minimal and is highly unlikely to generate negative impacts. There is a risk of fatalities arising due to collisions with moving trains, however this is considered low as trains will be moving slowly (maximum anticipated speed 25 mph) and any losses are unlikely to threaten the viability of whole populations.

8.3.2.12 Overall, likely effects on species during operation are considered **significant at a site level only**.

8.4 Northern DHPWN Land

8.4.1 Potential Effects from Construction

International Wildlife Sites

8.4.1.1 The trenching and cable installation works operations to install the Northern DHPWN will take place at some distance from the boundaries of the Humber Estuary SAC, SPA and Ramsar Site and will not affect any inter-linking watercourses. It is therefore not likely that these works will have any significant effects on these designated sites.

National and Regional Wildlife Sites

8.4.1.2 Impacts arising from the construction of the Northern DHPWN on the Humber Estuary SSSI are set out above, as this overlaps with the Humber Estuary SAC, SPA and Ramsar Site.

8.4.1.3 Phoenix Parkway LNR and Atkinson's Warren LNR extend north and south of the Phoenix Parkway road respectively. Narrow bands of both LNRs fall within the Northern DHPWN Land . Construction of the Northern DHPWN will involve the excavation of a trench, anticipated to require an average working width of 10 m. Although the working area will be minimised, it is

possible that a small number of trees/shrubs and minimal areas of ground vegetation along the LNR boundaries may be removed and reinstated after construction. These impacts are temporary and will affect the periphery of the LNRs only. Mitigation measures will ensure that the working area is minimised; cut material will stacked into habitat piles; stripped turves and soil will be carefully reinstated; replacement trees and shrubs will be planted; an ECoW will oversee the work; and suitable mitigation for secondary impacts to be detailed in the CEMP will be adhered to, including the use of Root Protection Areas if necessary. No other statutory designated sites will be affected by the Northern DHPWN construction. As such, likely effects are considered **not significant**.

Non-statutory Sites

8.4.1.4 Bessermar Way Brownfield Site LWS is located adjacent to Option B of the Northern DHPWN Land. The working corridor will not encroach within this LWS and suitable mitigation for secondary impacts to be detailed in the CEMP will be adhered to. Likely effects on non-statutory sites are therefore considered **not significant**.

Habitats of Principal Importance

8.4.1.5 Approximately 0.62 km of hedgerow will require removal along Phoenix Parkway to facilitate construction of the Northern DHPWN. These hedgerows will be fully reinstated upon completion of construction. Potential secondary impacts on other sections of retained hedgerows during construction include dust and run-off of pollutants. Suitable mitigation for secondary impacts within the CEMP will be adhered to, including the use of Root Protection Areas if necessary. Whilst effects on retained hedgerows are considered to be minimal, the reinstated hedgerow will take a number of years to establish and reach the desired condition. Overall, likely effects on hedgerows are considered temporary and **significant at a site level only**.

Other Habitats

8.4.1.6 In addition to the woodland and hedgerow detailed above, other habitats present within the Northern DHPWN Land include small areas of modified and semi-natural grassland and patches of scrub. Grassland areas include intensively managed amenity grassland associated with commercial units, as well as two small strips of species-poor grassland situated north and south of Phoenix Parkway. Areas of scrub are located close to roundabouts on Phoenix Parkway and within the ground of the substation of Normanby Road. The scrub is generally species-poor and dominated by willow, silver birch, bramble and hawthorn.

8.4.1.7 Grassland and scrub will be avoided where possible, however small amounts may require removal in order to facilitate construction. All habitats will be reinstated once trenching and cabling is complete and measures outlined in the CoCP (**Document Reference 6.3.7**) to address potential pollution will be adhered to. Considering the limited ecological value of these roadside habitats, overall likely effects arising from construction are **not significant**.

Invasive plant species

8.4.1.8 A large stand of Japanese knotweed and occasional cotoneaster bushes are present within the Northern DHPWN Land. However, construction activities that could spread these non-native invasive plant species are low risk, and appropriate mitigation will be implemented through an Invasive Non-Native Species Management Plan (outlined in the CoCP (**Document Reference 6.3.7**)), including continued monitoring and control particularly of Japanese knotweed. Likely effects are therefore considered **not significant**.

Amphibians (including GCN)

8.4.1.9 There is no suitable aquatic habitat for GCN within the Northern DHPWN Land, therefore their presence is discounted. Common amphibians may be present and may be at risk from disturbance, harm and entrapment within trenches. However, mitigation within the CEMP will minimise impacts, therefore likely effects are considered **not significant**.

Bats

8.4.1.10 No tree roosts or trees with potential to support roosting bats were recorded within the Northern DHPWN Land, therefore no impacts on bat roosts are anticipated.

8.4.1.11 Construction of the Northern DHPWN will involve the establishment of site compounds and excavation of a trench, anticipated to require an average working width of 10 m. Where possible, works will be sited within the existing road network, with vegetation removal generally restricted to small areas of roadside grassland, mixed scrub and pruning of woodland edges. The loss of 0.62 km of hedgerow and small areas of other species-poor habitats will lower foraging opportunities for bats. However, the Phoenix Parkway and connecting roads are busy and well-lit, therefore existing conditions for commuting and foraging bats are limited. Likely effects arising from construction of the Northern DHPWN are therefore considered **not significant**.

Birds

8.4.1.12 The loss of a hedgerow to the north of Phoenix Parkway and small areas of scrub and woodland edge has the potential to directly affect breeding birds and will reduce the availability of nesting sites. However, the presence of a busy road may deter certain bird species from breeding in the area and there is abundant alternative habitat further from the road, such as woodland within Phoenix Parkway and Atkinson's Warren LNRs. The hedgerow and other habitats will be reinstated following construction, therefore likely effects on breeding birds are considered **not significant**.

8.4.1.13 Localised habitat loss and temporary construction activities within the Northern DHPWN Land are not anticipated to pose any impacts on migratory or wintering birds; likely effects are considered **not significant**.

Reptiles

8.4.1.14 Roadside habitats within the Northern DHPWN Land are frequently disturbed and unlikely to be used by reptiles; likely effects are considered **not significant**.

Badger

8.4.1.15 Suitable habitat for badger is present surrounding the Northern DHPWN Land, however temporary impacts on small sections bordering the roadside are highly unlikely to affect setts or foraging/commuting behaviour. Overall, likely effects are considered **not significant**.

Otter and Water Vole

8.4.1.16 There is no habitat for otter or water vole within the Northern DHPWN Land, therefore likely effects are **not significant**.

Other Mammals

8.4.1.17 Construction may result in the disturbance and harm of European hedgehog and non-SPI mammals if animals are caught in excavations. Minor losses of habitat along roadsides are not anticipated to have any negative impact upon the foraging capabilities of mammals, considering the small scale of removal and proximity of other alternative habitats. With appropriate construction mitigation included in the CEMP and reinstatement of habitats, likely effects on other mammals are considered to be **not significant.**

Invertebrates

8.4.1.18 Habitats within the Northern DHPWN Land are of limited value for invertebrates, and impacts will be limited and losses temporary, as all habitats will be reinstated. Likely effects are therefore considered **not significant**.

8.4.2 Potential Effects from Operation

8.4.2.1 The Northern DHPWN comprises buried services and no operational impacts are anticipated. Occasional monitoring visits may be required; access for which is not anticipated to disturb any habitats within the Northern DHPWN Land. Likely effects on designated sites, habitats and species arising from these activities are considered **not significant**.

8.5 Southern DHPWN Land

8.5.1 Potential Effects from Construction

International Wildlife Sites

8.5.1.1 Construction of the Southern DHPWN involves trenching works and cable installation to the west of the A1077 and M181 roads. This includes crossing a number of ditches, of which some appear to connect to the River Trent. However, ditch crossings are located over 1 km from the Humber Estuary SAC/Ramsar boundary and industry best practice techniques to

minimise the potential for pollution will be followed for all surface water crossings. Construction of the Southern DHPWN is therefore not expected to have any significant effects on the Humber Estuary SAC, SPA and Ramsar Site.

National and Regional Wildlife Sites

8.5.1.2 Impacts arising from the construction of the Southern DHPWN on the Humber Estuary SSSI are set out above, as this overlaps with the Humber Estuary SAC, SPA and Ramsar Site.

8.5.1.3 No other statutory designated sites will be affected by the Southern DHPWN construction. As such, likely effects are considered **not significant**.

Non-statutory Sites

8.5.1.4 No non-statutory sites will be affected by construction activities within the Southern DHPWN Land, therefore likely effects are considered **not significant**.

Habitats of Principal Importance

8.5.1.5 No HPI will be directly affected by the Southern DHPWN cable trenching works. Small areas of woodland are located adjacent to the Order Limits at certain locations, however micro-siting of the cable trench, together with mitigation outlined within the CoCP (**Document Reference 6.3.7**), will minimise impacts. Overall likely effects on woodland HPI are therefore considered **not significant**.

Watercourses and Marginal Vegetation

8.5.1.6 A number of ditches cross the Southern DHPWN Land, all comprising arable field drains to the west of the A1077 and M181 roads. Tall herbs and grasses dominate the banks, whilst marginal vegetation is restricted to common reed, reedmace and yellow iris. Impacts on ditches will be temporary in nature, involving over pumping whilst in-channel works install cable ducts. Alternatively, a thrust boring technique will be used where appropriate. Watercourse crossings may also need to be established for construction machinery, which risk causing physical damage to banks and run-off of sediments and pollutants when in use. Pollution control measures outlined in the CoCP (**Document Reference 6.3.7**) will be adhered to at all times. Once construction is complete, ditches will be fully reinstated to their original condition. Considering the localised and temporary nature of works, likely effects on ditches are considered **not significant**.

Other Habitats

8.5.1.7 Arable land is the dominant habitat within the Southern DHPWN Land (11 ha), together with small areas of modified grassland comprising field margins (1.6 ha), tall ruderal vegetation (0.3 ha) and scrub (0.5 ha). All habitats are typical of the network of arable fields throughout the surrounding area and hold limited biodiversity value. The installation of the Southern DHPWN will involve temporary disturbance of habitats along a

narrow working area and access routes within the Southern DHPWN Land. Following construction, all areas will be fully reinstated. Only scrub is associated with a temporal delay as planted areas will take a number of years to re-establish, however affected areas of scrub are small and poorly connected to other value habitats. Considering this, overall effects on other habitats arising from construction of the Southern DHPWN are **not significant**.

Invasive plant species

8.5.1.8 No non-native invasive plant species were recorded within the Southern DHPWN Land, therefore impacts are **not significant**.

Amphibians (including GCN)

8.5.1.9 There are no ponds within the Southern DHPWN Land and GCN were found to be absent in ponds located west of the A1077 and M181 roads. As such, likely effects with respect to GCN are considered **not significant**.

8.5.1.10 Common amphibians may be present within nearby ponds, ditches and areas of dense vegetation. Site clearance and construction activities risk causing disturbance, harm and entrapment within trenches. However, embedded mitigation will minimise effects, including staged strimming of scrub, ruderal and grassland and ECoW supervision to relocate any amphibians that are discovered. Overall, likely effects on common amphibians are considered **not significant**.

Bats

8.5.1.11 No tree roosts or trees with potential to support roosting bats were recorded within the Southern DHPWN Land, therefore no impacts on bat roosts are anticipated.

8.5.1.12 Construction within the Southern DHPWN Land will result in the loss of arable land, grassland and small areas of tall herbs and scrub, with no significant effect on habitat connectivity. The Southern DHPWN avoids any direct impacts on adjacent higher value habitats, including woodland and areas of standing water. All habitats affected by the works will be reinstated to previous condition or better upon completion of works, therefore likely effects on foraging and commuting bats are considered **not significant**.

Birds

8.5.1.13 Construction of Southern DHPWN risks directly impacting breeding birds within the nesting season, therefore works will be timing appropriately or subject to pre-clearance checks. Construction will result in a reduction of nesting opportunities; however, affected habitats will be reinstated in full. Furthermore, the working area is small and is unlikely to affect the overall availability of nesting sites. Therefore, likely effects on breeding birds are considered **not significant**.

8.5.1.14 Arable fields, grassland, tall herbs and scrub may be used by migratory and wintering birds, with construction activities deterring birds from using adjacent habitats. However, the working area is small and habitats will be

reinstated following works. Likely effects on wintering and migratory species are considered **not significant**.

Reptiles

8.5.1.15 Habitats within the Southern DHPWN Land are largely unsuitable for reptiles and the area is isolated from higher quality reptile habitats to the north and east. As reptiles are highly unlikely to be present, likely effects are considered **not significant**.

Badger

8.5.1.16 Suitable habitat for badger is present surrounding the Southern DHPWN Land and pre-works surveys will be carried out to check if any new setts have been excavated. If active setts are found between the Southern DHPWN Land and the A1077/M181 roads to the east, mitigation measures will be implemented to ensure badgers are able to commute across the working area to reach foraging habitats. Based on current survey data, likely effects on badger are considered **not significant**.

Otter and Water Vole

8.5.1.17 Baseline surveys found no evidence of otter or water vole along any of the ditches located within the Southern DHPWN Land. Appropriate repeat surveys will be undertaken in the season prior to the commencement of works and a mitigation strategy developed if signs of either species are found. Overall, likely effects are considered **not significant**.

Other Mammals

8.5.1.18 Construction may result in the disturbance and harm of European hedgehog and non-SPI if animals are caught in trenched excavations. However, appropriate embedded mitigation, including provision of escape ramps and checking trenches prior to the commencement of works, will reduce the risk of impacts. The temporary loss of habitats within the Southern DHPWN Land may disrupt small mammals during and shortly after construction, however all habitats will be reinstated. Overall, likely effects on small mammals are considered to be **not significant**.

Invertebrates

8.5.1.19 Habitats within the Southern DHPWN Land are of limited value for invertebrates, and impacts will be limited and losses temporary, as all habitats will be reinstated. Likely effects on invertebrates are considered **not significant**.

8.5.1.20 Habitats within the Southern DHPWN Land are of limited value for invertebrates, and impacts will be limited and losses temporary, as all habitats will be reinstated. Likely effects are therefore considered **not significant**.

8.5.2 Potential Effects from Operation

8.5.2.1 The Southern DHPWN comprises buried services and no operational impacts are anticipated. Occasional monitoring visits may be required,

using off-road vehicles where necessary within the Southern DHPWN Land. However, likely effects on designated sites, habitats and species arising from these activities are considered **not significant**.

8.6 Effect of Air Emissions on Nationally and Locally Designated Sites

8.6.1.1 The assessment of the effects of emissions to air on sites designated for their national and local importance for nature conservation (Appendix A) has shown that the Project emissions are not predicted to result in likely significant effects on any of the European (SAC, SPA and Ramsar), nationally (SSSIs) or locally designated sites (LWSs, LNRs and AW) except for Risby Warren SSSI for acid deposition.

8.6.1.2 For the Project alone, Risby Warren SSSI was predicted to be greater than1% threshold for acid deposition against the minimum end of the CL range (1.5%), however less than the 1% Critical Load (0.23%) if assessed against the maximum end of the Critical Load range. Discussions with Natural England confirmed that the site must be assessed against the CL (min) due to the sensitivity of the qualifying features, their extensive loss and its Unfavourable-Declining Status across most of the site. Therefore further consideration was given to deposited acid loads at Risby Warren SSSI, which is a nationally important site.

6.8.1.46 The findings of the revised modelling assessment show that the potential for cumulative likely significant effects with Keadby 2 and Keadby 3 at Risby Warren SSSI only could not be excluded for ammonia, nitrogen deposition and acid deposition (see Chapter 18: Cumulative Effects, Revision Number 1, APP-066).

9. FURTHER BIODIVERSITY ENHANCEMENT

9.1 Further Mitigation Overview

9.1.1.1 This section refers to planned measures which will contribute to an overall net gain in biodiversity units. It has been informed by an assessment of net gain using the Defra Biodiversity Metric 3.0, and includes measures that aim to increase the extent of habitats (through habitat creation) and to improve the condition of both retained and new areas of habitat. Species-specific enhancement measures, not included within the net gain calculations, are also outlined within this section. All measures will be applied to the Application Land, as shown in Appendix I. The sections below separate the measures for HPI, other habitats, and species-specific enhancements.

9.1.2 Habitats of Principal Importance

9.1.2.1 Habitat creation within the Energy Park Land will result in an increase in the amount and quality of hedgerow HPI, with the net gain assessment for hedgerows showing a 34% increase in hedgerow units. New hedgerows will be located around the development in the southern section of the Energy Park, providing connectivity to ditches and the existing/reinstated hedgerow along Ferry Road West, as well as other areas of created woodland, scrub and grassland. All hedgerows will be planted with a species-rich mix of native broadleaved shrubs and trees. Management during operation to maximise their value for wildlife will be set out in the LBMMP (see also the outline LBMMP (**Document Reference 5.7**)). Once established, new hedgerows will improve habitat availability for amphibians, badgers, bats, breeding birds and reptiles.

9.1.2.2 Grassland creation and management will aim to create new areas of Lowland Meadow HPI and Lowland Calcareous Grassland HPI within the Energy Park Land and the Railway Reinstatement Land. This will produce a far richer and variable habitat than the existing arable land, demonstrating the value of natural, biodiverse landscaping over a traditional intensively managed approach. On-going management of these habitats will, in part, contribute to the delivery of further biodiversity enhancements. Further to this, areas of Lowland Acid Grassland HPI, a habitat not directly affected by the scheme, will be expanded as part of the habitat enhancement proposals within the eastern mosaic area of semi-natural habitat (to the east of the Energy Park Land). Combined with bracken management (see below), this will help restore a nationally scare habitat and improve connectivity to areas of acid grassland in Phoenix Parkway and Atkinson's Warren LNRs.

9.1.2.3 Pond and HPI Reedbed habitat will be significantly increased as a result of the proposals. The extent of these HPI in the Application Land is currently low and limited to small pockets of poor condition habitats. Through the creation of a new wetland area within the Energy Park Land (see Section 7.3.1.6) and enhancement of existing ponds within the eastern mosaic, these habitats will increase in extent and quality. Appropriate management and monitoring set out in the outline LBMMP (**Document Reference 5.7**)

will ensure good habitat condition is achieved and maintained. Management of these habitats undertaken within the eastern mosaic will be undertaken sensitively with respect to the likely presence of GCN. Works to ponds and wetland areas will be carried out in September to November inclusive, undertaking vegetation and silt removal by hand and using spades/rakes, in line with the Great Crested Newt Conservation Handbook (Langton et al., 2001).

9.1.3 Other Habitats

9.1.3.1 The eastern mosaic area also supports areas of mature scrub and scattered trees alongside dense stands of bracken. The proposed enhancement of this block of common land will aim to improve the condition of all component habitats; further details are provided below.

9.1.3.2 Management of scrub in the eastern mosaic will focus on maintaining a varied canopy structure, with patches of young and older scrub, glades and sinuous edge habitats. This will require occasional coppicing/pollarding and mowing/strimming. Considering the presence of GCN, scrub areas will be divided into compartments, and felled or coppiced on a small scale rotational bases to minimise disturbance. Some shrubs and trees will be allowed to grow into veterans. In places it might be beneficial to reduce the dominance or remove scrub, particularly where it is invading areas of reed swamp or dry acid grassland or overgrowing ponds. Minimum intervention is likely to be most appropriate for areas of established wet scrub dominated by willow.

9.1.3.3 Management of bracken within the eastern mosaic will aim to break up and reduce overall dominance and vigour of bracken, in favour of acid grassland. This will likely involve repeated cutting and removal of bracken; mechanical removal during May – June is recommended in order to minimise potential disturbance to GCN in this area. Management and control measures will be guided by the advice set out in Section 7.8 of the Lowland Grassland Management Handbook (Crofts & Jefferson, 1999) and advice on management for invertebrates (Kirby, 2013). Priority will be given to preventing any further invasion of bracken onto areas supporting dry acid grassland; and, where practical, management will aim to expand this type of grassland as a replacement for bracken.

9.1.3.4 A number of ditches throughout the Energy Park Land will be enhanced and new swales created (see Section 7.3.1.6), including along the length of the new access road. These measures are shown to deliver a net gain of 66% in river biodiversity units, according to the Biodiversity Metric. Enhancement of the Lysaght's drain will be achieved through creating a buffer of adjacent species-rich grassland habitat, serving to reduce runoff and helping to improve water quality within the ditches. Other measures include aquatic planting to increase species diversity and encourage a fringe of marginal vegetation along the majority of the ditch.

9.1.4 Species

Amphibians

9.1.4.1 The wetland creation and SuDS within the Energy Park Land will be designed to benefit amphibian species. This includes GCN, which are not currently present within the western section of the Energy Park Land. However, with improved connectivity along enhanced ditches, there is potential for GCN to colonise new ponds and wetland areas. Key considerations include the provision of ponds which are suitable for breeding (creating a range of pond sizes and depths, some with permanent open water and species-rich aquatic flora); the provision of commuting routes (areas of wet scrub, dense marginal vegetation and grassland); and creating areas of suitable refugia (log and brash piles and other hibernacula).

Bats

9.1.4.2 A range of bat boxes will be installed within the eastern mosaic area and adjacent woodland bordering the railway, with the aim of providing bat roosting features in areas where existing trees and buildings are largely unsuitable for roosting bats. This will complement the establishment of improved foraging habitats and encourage greater numbers of bats to utilise available habitats. The LBMMP will set out the types of boxes to be provided, including those suitable for day roosts, maternity colonies and hibernating bats.

Birds

9.1.4.3 Habitat improvement and creation will be designed to encourage the natural colonisation of protected and priority bird species. Examples include:

- creation of artificial sand martin (*Riparia riparia*) colony nesting banks/walls in the wetland or areas close to open water;
- wetland creation, SuDS areas and new swales to incorporate planting of species with winter seeds e.g., common reed, thistles, fat hen, teasel, canary grass, to create ‘weedy grassland’, a valuable food source for overwintering birds; and
- provision of tree sparrow nest boxes in small groups close to areas of woodland or scrub.

Reptiles

9.1.4.4 The low population of common lizard recorded on the Railway Reinstatement Land will benefit from species-specific habitat improvements. These include the creation of ‘basking banks’, i.e., open, south facing banks within areas of Lowland Calcareous Grassland/scrub mosaic. Banks may be long and straight, or crescent-shaped, or sinusoidal, with a diverse vegetation structure. Suitable breeding habitat will also be created by retaining piles of cut vegetation and woodchips (warm, humid decomposing organic material suitable for egg laying) within suitable

undisturbed areas. Log and brash piles covered in clay/soil will also offer hibernation opportunities for common lizard, other reptiles and amphibians.

Small mammals

9.1.4.5 In addition to habitat enhancement and measures set out above, specific improvements for mammals will include the provision of log and brash piles and/or artificial or natural hedgehog homes in the block of semi-natural habitat (eastern Energy Park Land; subject to landowner consent), newly created scrub/grassland mosaic in the southern section of the Energy Park Land, and within new woodland to the north of Flixborough Industrial Estate.

Otter and Water vole

9.1.4.6 The enhancement of Lysaght's drain will aim to increase the diversity and abundance of marginal vegetation adjacent to still water along this watercourse, benefiting both water vole and otter. Unshaded banks with a water depth of at least 0.3 m are preferable to allow for water vole to excavate underground burrows. Areas of scrub with dead wood and/or log piles close to the ditches and in line with IDB requirements can provide potential holt habitat for otters. Monitoring and control of the invasive American mink is also proposed, as this species can negatively affect water vole populations in particular.

Invertebrates

9.1.4.7 Enhancement habitat creation for invertebrates will be focused on the establishment of varied micro-habitats. Specific measures to improve habitat for invertebrates include:

- the formation of butterfly banks on south-facing slopes;
- creating log piles from felled material;
- providing areas of bare sloping ground for burrowing bees/wasps; and
- the creation of ponds/wetland areas featuring wide marginal zones, areas of wet lowland grassland, reedbed and scattered wet woodland and scrub habitat suitable for many species of invertebrate.
- woodland/scrub creation will use a rich mix of understorey and canopy species, with varied planting patterns and spacings to encourage structural diversity, areas of open space and sinuous edges with sheltered glades that grade into other vegetation; and
- new areas of herb-rich grassland will be varied in composition providing food plants and cover for a wide-variety of invertebrates.

10. RESIDUAL EFFECTS

10.1.1.1 A summary of the value, anticipated impacts, likely significant effects, mitigation and enhancement measures, and residual effects for all of the main ecological receptors identified within the Application Land is provided in Table 13. The assessment of likely significant effects summarises the conclusions of Section 8, taking into account the construction and operational phases of the Project, the status and ecological sensitivities of habitats and species; and all of the embedded mitigation set out within Section 7. The significance of residual effects takes account of these factors, in addition to the further biodiversity enhancements detailed in Section 9.

Table 13: Summary of Likely Significant Effects, Mitigation and Residual Effects

Ecological Feature	Value	Impact and Location	Potential Effect	Assessment of Likely Significant Effects	Mitigation and Further Biodiversity Enhancements (set out in sections 7 and 9)	Residual Effects
Humber Estuary SAC Humber Estuary SPA Humber Estuary Ramsar Site	International	■ Changes in air quality from air emissions within the Energy Park Land. ■ Disturbance of qualifying features (birds) due to construction and operation of the Energy Park.	■ Pollution of qualifying aquatic and terrestrial habitats due to increased deposition, resulting in degraded habitats. ■ Reduction in population viability of qualifying species.	No significant effect	■ Mitigation measures incorporated into CEMP to include measures to limit noise, vibration, chemical, sediment, litter, dust and light pollution. ■ Landscape design to reduce impacts of light, noise, emissions to air and human disturbance on the River Trent. ■ Indicative Landscape and Biodiversity Plans (**Document Reference 4.10**) detail habitat improvement measures for birds.	No significant effect overall
Humber Estuary SSSI	National			No significant effect		No significant effect overall
Risby Warren SSSI	National	■ Changes in air quality from air emissions within the Energy Park Land	■ Pollution of terrestrial habitats due to increased nitrogen deposition, resulting in degraded habitats.	Adverse significant effect at a site level	■ Mitigation measures incorporated into the CEMP to include measures to limit air pollution. ■ NLGEP Ltd are in discussion with NE about mitigation / compensation options.	Adverse significant effect at a site level
Phoenix LNR	County	■ Loss of scrub/trees and overhanging branches within 5 m of the reinstated trackbed along the Railway Reinstatement Land. ■ Disturbance and pollution during construction (no significant operational effects).	■ Reduction in extent/modification of habitat within designated site. ■ Habitat degradation due to pollution.	No significant effect	■ Mitigation measures incorporated into the CEMP related to disturbance and pollution of habitats: minimising the area affected along the boundary of the LNR; clearance of vegetation outside of the nesting bird season and under the direction of a ECoW; use of handheld machinery to fell scrub/trees; and cut branches to be stacked into habitat piles. ■ Ongoing maintenance of vegetation will not remove areas beyond those required to ensure good visibility and reduce safety risks. ■ Compensatory woodland creation within the planned woodland landscape area.	No significant effect overall
Phoenix Parkway LNR/LWS Atkinson's Warren LNR/LWS	LNR: County LWS: Local	■ Loss of woodland edge habitat within the Northern DHPWN Land. ■ Disturbance and pollution due to construction activities.	■ Reduction in extent of habitats within designated sites. ■ Habitat degradation due to pollution.	No significant effect	■ Mitigation measures incorporated into the CEMP related to disturbance and pollution of habitats: minimising the area affected; clearance of vegetation outside of the nesting bird season and under the direction of a ECoW; use of handheld machinery to fell scrub/trees; cut branches to be stacked into habitat piles; and stripped turves/soil stored and carefully reinstated; planting replacement trees and shrubs. ■ Habitats will be fully reinstated on completion of construction.	No significant effect overall
Conesby Quarry LNR/LWS	LNR: County LWS: Local	■ Disturbance due to vehicle and machinery movement along access track to Railway Reinstatement Land. ■ Loss of scrub/trees and overhanging branches within 5 m of the reinstated trackbed along the Railway Reinstatement Land (LWS only). ■ Disturbance and pollution due to construction activities.	■ Potential for disturbance of habitat within designated sites. ■ Habitat degradation due to pollution.	No significant effect	■ Mitigation measures incorporated into the CEMP related to disturbance and pollution of habitats: minimising the area affected; clearance of vegetation outside of the nesting bird season and under the direction of a ECoW; use of handheld machinery to fell scrub/trees; and cut branches to be stacked into habitat piles. ■ CEMP measures will enforce a suitable speed limit and ensure construction traffic stay within the confines of the track. Required passing places, contractor welfare units and/or refuelling sites will be located outside of the designated sites, over species-poor grassland to the south.	No significant effect overall
Slag Banks LWS Yorkshire East Gullet LWS	Local	■ Loss of scrub/trees and overhanging branches within 5 m of the reinstated trackbed along	■ Reduction in extent of habitat within designated site.	No significant effect	■ Mitigation measures incorporated into the CEMP related to disturbance and pollution of habitats: minimising the area affected; clearance of vegetation outside of the nesting bird season and under the direction of a	No significant effect overall

Ecological Feature	Value	Impact and Location	Potential Effect	Assessment of Likely Significant Effects	Mitigation and Further Biodiversity Enhancements (set out in sections 7 and 9)	Residual Effects
		the Railway Reinstatement Land. ■ Disturbance and pollution due to construction activities.	■ Habitat degradation due to pollution.		ECoW; use of handheld machinery to fell scrub/trees; and cut branches to be stacked into habitat piles. ■ Compensatory woodland creation within the planned woodland landscape area.	
Bessemer Way Brownfield Site LWS	Local	■ Disturbance and pollution due to construction activities.	■ Habitat degradation due to pollution.	No significant effect	■ Appropriate mitigation measures to be incorporated into the CEMP to avoid disturbance of habitats within the adjacent LWS.	No significant effect overall
Habitats of Principal Importance						
Lowland Dry Acid Grassland HPI	County	■ Changes in air quality from air emissions within the Energy Park Land.	■ Pollution due to increased acid and nitrogen deposition, resulting in degraded habitats.	Adverse significant effect at a site level.	■ Enhancement and expansion of existing areas of dry acid grassland within the block of semi-natural habitat to the east of the Energy Park Land.	Adverse significant effect at a site level
Lowland Calcareous Grassland HPI	District	■ Loss of habitat within and immediately surrounding the trackbed within the Railway Reinstatement Land. ■ Secondary impacts arising from construction activities, including dust, disturbance and other pollution.	■ Reduction in extent of HPI and a nationally scarce habitat. ■ Disturbance of adjacent areas of habitat. ■ Habitat degradation due to pollution.	Adverse significant effect at a district level	■ Mitigation measures incorporated into CEMP to include measures to minimise disturbance and pollution of habitats, including establishment of exclusion zones with appropriate signage and impacting minimum area of habitat. Habitat will be removed under the direction of an ECoW; retaining stripped turves/soil for reinstatement. ■ Compensatory expansion and creation of new areas of Lowland Calcareous Grassland, both along the railway embankments and bordering woodland to the west using translocated turfs where appropriate.	Adverse significant effect at a site level
Hedgerows HPI	County	■ Loss of hedgerows within the Energy Park and the Northern DHPWN Land. ■ Secondary impacts arising from construction activities, including dust, disturbance and other pollution.	■ Reduction in extent of HPI. ■ Disturbance of adjacent areas of habitat. ■ Habitat degradation due to pollution.	Adverse significant effect at a site level	■ Mitigation measures outlined in the CoCP (**Document Reference 6.3.7**) and to be detailed in the CEMP related to disturbance and pollution of habitats and use of Root Protection Areas to safeguard retained hedgerows close to works. ■ Clearance of vegetation outside of nesting bird season and under direction of a supervising ECoW. ■ Reinstatement and replacement of lost hedgerows with native broadleaved species, including reusing topsoil and using protective fencing or guards to protect transplants. ■ Creation of new native species-rich hedgerows within the Energy Park Land.	No significant effect overall
Other Habitats						
Arable and poor semi-improved grassland	Site	■ Loss of 62 ha of arable and 4 ha of poor semi-improved field margins within the Energy Park Land and Railway Reinstatement Land. ■ Disturbance of arable farmland within the Southern DHPWN Land. ■ Secondary impacts arising from construction activities and pollution.	■ Reduction in extent of habitat. ■ Habitat degradation due to pollution.	Adverse significant effect at a site level	■ Mitigation measures incorporated into CEMP related to disturbance and pollution of habitats. ■ Creation and enhancement of habitats, including species-rich grassland, scrub, woodland and wetland habitats will compensate for the loss of existing arable fields and field margins. Although these will cover a smaller total area, they will provide considerably higher biodiversity value in due course. ■ Areas of arable and field margins within the Southern DHPWN Land will be fully reinstated.	No significant effect overall
Scrub, tall ruderal vegetation and bracken	Site	■ Loss of small areas of species-poor stands of scrub, tall ruderal	■ Reduction in extent of habitats.	No significant effect	■ Mitigation measures incorporated into CEMP related to disturbance and pollution of habitats.	No significant effect overall

Ecological Feature	Value	Impact and Location	Potential Effect	Assessment of Likely Significant Effects	Mitigation and Further Biodiversity Enhancements (set out in sections 7 and 9)	Residual Effects
		vegetation and bracken within the Energy Park Land and Railway Reinstatement Land. ■ Removal of small areas to facilitate DHPWN construction. ■ Secondary impacts arising from construction activities and pollution.	■ Habitat degradation due to pollution.		■ Use of Root Protection Areas to safeguard retained scrub close to works (as defined in British Standard: BS: 5837:2012). ■ Unavoidable losses of scrub, tall ruderal vegetation and bracken will be compensated for by the creation of substantial new areas of scrub, species-rich grassland, wetland and woodland. ■ Along the DHPWN, reinstatement of scrub will be sited where vegetation has been cleared. ■ Existing scrub and bracken habitats within the block of semi-natural habitat to the east of the Energy Park Land will be enhanced.	
Woodland	Site	■ Loss of habitat at the periphery of Northern DHPWN Land and Railway Reinstatement Land. ■ Secondary impacts arising from construction activities, including dust, disturbance and other pollution.	■ Reduction in extent of habitat. ■ Disturbance of adjacent areas of habitat. ■ Habitat degradation due to pollution.	No significant effect	■ Mitigation measures incorporated into the CEMP related to disturbance and pollution of habitats: minimising the area affected along the site boundaries; clearance of vegetation outside of the nesting bird season and under the direction of a ECoW; use of handheld machinery to fell scrub/trees; and cut branches to be stacked into habitat piles. ■ Ongoing maintenance of vegetation within the Railway Reinstatement Land will not remove areas beyond those required to ensure good visibility and reduce safety risks. ■ Reinstatement of habitat within the Northern DHPWN Land and compensatory woodland creation within the planned woodland landscape area.	No significant effect overall
Watercourses	Site	■ Removal, diversion and culverting of ditches within the Energy Park Land. ■ Temporary watercourse crossings and cabling ducting works within the Southern DHPWN Land. ■ Pollution of ditches located close to construction works.	■ Reduction in extent of habitats. ■ Changes in hydrology and change in functional habitat for species. ■ Habitat degradation due to pollution.	No significant effect	■ Strict adherence to mitigation measures incorporated into CEMP related to disturbance, pollution and sedimentation of watercourses. ■ Full reinstatement of ditches directly affected by construction of the Southern DHPWN. ■ Creation of swales and ditches within wetland areas within the Energy Park. ■ Enhancement of ditches including the main Lysaght's drain.	Beneficial significant effect at a site level
Ponds	Site	■ Removal of three poor condition ponds within the Energy Park Land. ■ Secondary disturbance and pollution of ponds located close to works in the Railway Reinstatement Land.	■ Reduction in extent of habitat and degradation of retained habitats.	No significant effect	■ Strict adherence to mitigation measures incorporated into CEMP related to disturbance, pollution and sedimentation of ponds. ■ CEMP method statement to be followed for draining down of ponds. ■ Creation of new ponds within the proposed wetland area and surrounding development within the Energy Park Land. ■ The creation of multiple new ponds within the proposed wetland area and surrounding development within the Energy Park Land will compensate for habitat loss. ■ Existing pond and reedbed habitats within the block of semi-natural habitat to the east of the Energy Park Land will be enhanced.	Beneficial significant effect at a site level
Species						
Invasive non-native species (INNS)	N/a	■ Spread of INNS including: Himalayan balsam along the Railway Reinstatement Land and Japanese knotweed and cotoneaster within the Northern DHPWN Land.	■ Degradation of semi-natural habitats through invasion of INNS.	No significant effect	■ CEMP to include management plan covering control of INNS and biosecurity measures to prevent import or spread of INNS.	No significant effect overall
Amphibians (including GCN)	Site	■ Loss of terrestrial habitats within 250 m of GCN ponds along the Railway Reinstatement Land.	■ Reduction in suitability and extent of terrestrial and aquatic habitats.	Adverse significant effect at a site level	■ A licence from Natural England will be sought for works considered likely to affect GCN. District level licensing will be considered as a potential option.	No significant effect overall

Ecological Feature	Value	Impact and Location	Potential Effect	Assessment of Likely Significant Effects	Mitigation and Further Biodiversity Enhancements (set out in sections 7 and 9)	Residual Effects
		■ Secondary pollution of ponds and ditches supporting GCN along the Railway Reinstatement Land. ■ Loss of terrestrial and aquatic habitats suitable for common amphibians (ponds and ditches) and disturbance and harm/mortality of individuals during habitat removal.	■ Degradation of aquatic habitats used by breeding amphibians. ■ Reduction in viability of resident amphibian populations.		■ The CEMP will include a method statement for GCN and common amphibians, detailing pre-construction surveys, appropriate timing of works, staged vegetation removal, careful dismantling of refugia, and pollution control measures related to disturbance, pollution and sedimentation of ponds and watercourses. ■ ECoW supervision for the draining down of ponds and the removal/diversion of ditches within the Energy Park Land, to oversee amphibian welfare and support the relocation of amphibians to undisturbed habitats outside working area. ■ Reinstatement of affected hedgerows and creation of woodland, scrub and grassland to compensate for terrestrial habitat loss and improve connectivity throughout the site. ■ Pond and swale created within the proposed wetland area, providing suitable breeding habitats for GCN and common amphibians. ■ Existing pond and reedbed habitats within the block of semi-natural habitat to the east of the Energy Park Land will be enhanced, with works undertaken sensitively in respect of GCN presence.	
Bats	Site	■ Loss of potential roosting habitat provided by one tree and bat boxes along the Railway Reinstatement Land. ■ Loss of bat foraging and commuting habitats within the Energy Park Land and Railway Reinstatement Land. ■ Loss of foraging habitat within the DHPWN Land. ■ Disturbance to foraging and commuting bats through artificial light spillage and noise levels.	■ Reduction in potential roosting opportunities. ■ Severance of commuting routes and reduction in availability of foraging opportunities. ■ Potential for a reduction in viability of resident bat populations.	Adverse significant effect at a site level	■ Mitigation measures incorporated into CEMP to limit habitat loss and disturbance. ■ Pre-works inspections and provision of compensatory bat boxes if trees supporting potential bat roost features within the Railway Reinstatement Land are impacted. ■ Pre-commencement walkovers for any tree felling/pruning to identify need for further surveys/roost inspections. ■ Woodland creation and tree planting to improve links between existing areas of woodland and expand foraging/commuting corridors for bats. ■ Reinstatement of hedgerow within the Northern DHPWN Land and reinstatement and creation of hedgerows within the Energy Park Land. ■ The creation of varied wetland, scrub and grassland habitats and enhancement of existing habitats within the block of semi-natural habitat within the Energy Park Land will compensate for habitat loss and improve foraging opportunities for bats.	No significant effect overall
Breeding birds	County	■ Potential for destruction/damage of nests, disturbance and displacement of breeding birds, and loss of foraging and nesting habitat across the Energy Park Land, DHPWNs and Railway Reinstatement Land.	■ Loss of habitat and reduction in breeding potential and population viability of SPI, birds of conservation concern and other breeding bird species.	Adverse significant effect at a site level	■ Mitigation measures incorporated into CEMP to limit habitat loss and disturbance. ■ Vegetation removal/ground clearance undertaken outside the breeding bird season (unless there are constraints for GCN); if this is not possible, pre-works inspections for breeding birds will be carried out and appropriate exclusion zones will be established by site ECoW around active nests. ■ The reinstatement of all impacted hedgerows, creation of woodland, scrub, wetland habitats and grassland and enhancements to existing habitats within the block of semi-natural habitat to the east of the Energy Park Land will compensate for loss and increase habitat for breeding birds. ■ LBMMP to include specific habitat improvements and creation for key bird species.	Adverse significant effect at a site level
Wintering and migratory birds	County	■ Disturbance and displacement of foraging and resting birds using habitats within and adjacent to the Energy Park Land, DHPWNs and Railway Reinstatement Land. ■ Loss of suitable cover and foraging habitats.	■ Loss of habitat and reduction in population viability of SPI, birds of conservation concern and other wintering and migratory bird species.	Adverse significant effect at a site level	■ Mitigation measures incorporated into CEMP to limit habitat loss and disturbance. ■ Measures to reduce noise/vibration/light pollution and human disturbance on key receptors, including the River Trent. ■ Specific habitat enhancement/creation for key bird species which require compensation. ■ The creation of wetland, grassland, scrub and woodland and enhancements to existing habitats within the block of semi-natural habitat to the east of the Energy Park Land will compensate for loss of habitat for wintering and migratory birds.	Adverse significant effect at a site level

Ecological Feature	Value	Impact and Location	Potential Effect	Assessment of Likely Significant Effects	Mitigation and Further Biodiversity Enhancements (set out in sections 7 and 9)	Residual Effects
Reptiles	Site	■ Direct loss of habitat, harm to individuals during habitat removal, and loss and degradation of habitats suitable for reptiles across the Railway Reinstatement Land, and potentially the Energy Park Land and DHPWNs.	■ Loss of habitat and reduction in breeding success and viability of existing reptile populations.	No significant effect	■ CEMP to include measures to reduce noise, vibration, light pollution and human disturbance. ■ CEMP to include a method statement for reptiles using a precautionary approach to works in areas of confirmed and potential reptile presence, including staged vegetation removal and hand dismantling of potential refugia to be carried out under ECoW supervision; encouraging reptiles to move out of the working area; and maintenance of the degraded habitats to ensure they remain unsuitable. ■ Reinstatement of suitable habitats and basking/shelter opportunities within the Railway Reinstatement Land. ■ Compensatory habitats will be created for the loss of habitats used by common lizards, including: areas of grassland and scrub; 'basking banks' on south-facing embankments along the railway; breeding habitat from piles of cut vegetation and woodchips; hibernation stacks from retained log and brash piles covered in clay/soil; and enhancements to existing habitats within the block of semi-natural habitat to the east of the Energy Park Land.	No significant effect overall
Badger	Site	■ Loss of outlier setts, commuting routes and foraging habitat within the Energy Park Land. ■ Loss of scrub and trees within 10-30 m of a main sett located within the Railway Reinstatement Land. ■ Disturbance due to noise, lighting and human presence and risk of direct harm to individuals during construction across the Energy Park Land, DHPWNs and Railway Reinstatement Land.	■ Fragmentation of suitable badger sett building and foraging habitats. ■ Reduction in breeding success of existing clans.	Adverse significant effect at a site level	■ CEMP to include a badger method statement, detailing pre-construction survey and monitoring requirements, temporary closure of any setts to be affected and reasonable avoidance measures to minimise impacts. ■ A licence from Natural England will be sought for direct impacts on badger setts. A revised mitigation strategy and/or licence would be required for new setts or changes to the existing situation. ■ A badger tunnel will be included in design of the access road to provide an alternative commuting route for badgers moving east across the Energy Park Land. Planted trees and scrub will offer suitable cover along the route to encourage use. ■ Implementation of a sensitive lighting scheme during construction and operation. ■ Compensatory habitat creation will include suitable foraging and connecting habitats for badger, including grassland, scrub and wetland areas.	Adverse significant effect at a site level
Otter and water vole	Site	■ Loss of habitat through removal, culverting and diversion of ditches within the Energy Park Land. ■ Pollution of existing watercourses within the Energy Park Land and Railway Reinstatement Land. ■ Disturbance due to noise, lighting and human presence and risk of direct harm to individuals during construction across the Energy Park Land and Railway Reinstatement Land.	■ Reduction in available habitats and degradation of suitable habitats through pollution. ■ Fragmentation of habitats and commuting routes.	No significant effect	■ Mitigation measures incorporated into CEMP to limit physical disturbance to watercourse banks and pollution (including sedimentation) when working in or near water. ■ Pre-construction surveys to be undertaken to identify any additional mitigation and/or licensing requirements. ■ Night-time working near watercourses will be avoided or minimised, with no obstructions to otter movement along watercourses at night, and excavations/trenches/open pipe systems backfilled or capped at the end of each working day or an escape ramp provided. ■ Implementation of a sensitive lighting scheme during construction and operation to limit light spill onto watercourses with no direct illumination. ■ Compensatory habitat creation and enhancement will improve condition of the retained ditch network and provide substantial areas of new and varied wetland habitats suitable for otter and water vole.	No significant effect overall
Other mammals	Site	■ Habitat loss, degradation of suitable habitats through pollution, direct harm during removal of	■ Reduction in available foraging, breeding, refuge and hibernation habitats.	No significant effect	■ CEMP to include measures to reduce noise, vibration, light pollution and human disturbance; ensure debris is removed from work areas; excavations associated with works are covered overnight or provided	No significant effect overall

Ecological Feature	Value	Impact and Location	Potential Effect	Assessment of Likely Significant Effects	Mitigation and Further Biodiversity Enhancements (set out in sections 7 and 9)	Residual Effects
		habitat, and disturbance due to noise, lighting and human presence across the Energy Park Land, DHPWNs and Railway Reinstatement Land.			escape boards; and small mammals found during construction works are relocated. ■ LBMMP to include species-specific habitat improvements for hedgehog. ■ Compensatory habitat creation and enhancement, including grassland, scrub and woodland, will improve habitats for hedgehog, brown hare and other small mammals.	
Fish	Site	■ Habitat loss, secondary impacts from pollution and direct harm during removal of habitat (ponds and ditches within the Energy Park Land and ditches within the Southern DHPWN Land).	■ Loss of habitat and reduction in viability of resident fish populations.	No significant effect	■ Mitigation measures incorporated into CEMP to limit physical disturbance and pollution (including sedimentation) when working in or near water. ■ ECoW supervision required during habitat removal/degradation, and crossing point/cable duct installation. ■ Reinstating and creating habitats potentially suitable for freshwater fish/	No significant effect overall
Terrestrial invertebrates	County	■ Direct harm, disturbance and displacement of common invertebrate assemblages across the Energy Park Land, DHPWNs and Railway Reinstatement Land. ■ Disturbance, displacement and harm to notable invertebrate species along the Railway Reinstatement Land.	■ Loss of habitat and reduction in population size and diversity.	Adverse significant effect at a local level	■ CEMP measures to limit disturbance and loss of habitats, particularly along the railway line. ■ LBMMP to include mitigation and features for invertebrates, including species-specific measures. ■ Compensatory habitat creation and enhancement with specific design measures targeted at invertebrates, which will provide a wide range of habitats of considerably greater value for invertebrates, notably species-rich grassland, mixed native scrub and a variety of wetland habitats.	No significant effect overall
Aquatic invertebrates	Site	■ Direct harm, disturbance and displacement where works are in close proximity to watercourses (Energy Park Land and the Southern DHPWN Land). ■ Secondary effects from pollution.	■ Loss of habitat and reduction in population size along affected watercourses.	No significant effect	■ Mitigation measures incorporated into the CEMP to limit physical disturbance and pollution (including sedimentation) when working in or near water. ■ Replacement of lost aquatic habitat through new swales, ponds and wetland areas.	No significant effect overall

11. CONCLUSIONS

11.1.1.1 This ES presents a summary of findings from the desk-based study and a wide range of comprehensive field surveys completed up to and including October 2021.

11.1.1.2 Using this information, mitigation has been incorporated into the construction and operational phases of the Project to avoid significant effects on important ecological features. Key ecological features identified by the assessment include the Humber Estuary Ramsar Site, SAC, SPA; nationally and locally designated sites; HPI (including hedgerows, Lowland Acid Grassland and Lowland Calcareous Grassland); and legally protected and notable species (including water vole, GCN, badger, reptiles, bats, and birds).

11.1.1.3 An assessment of likely significant effects on the qualifying features of the Humber Estuary SAC, SPA and Ramsar Site has been undertaken in a separate HRA (Annex 5). This concluded that there will be no adverse effects at the Humber Estuary SAC / Ramsar site in terms of NOx (24 hour), ammonia and deposited nitrogen (for saltmarsh habitats). Furthermore, the potential effects of disturbance on mallard using functionally linked land (the River Trent and its immediate banks) associated with the Humber Estuary SPA will be short term and small scale, resulting in no significant adverse effect.

11.1.1.4 Appendix A extended the assessment of changes in air quality to nationally and locally designated sites, concluding that the only site subject to significant effects from the Project alone will be Risby Warren SSSI due to acid deposition. The findings of the revised modelling assessment show that the potential for cumulative likely significant effects with Keadby 2 and Keadby 3 at Risby Warren SSSI only could not be excluded for ammonia, nitrogen deposition and acid deposition (see Chapter 18: Cumulative Effects, Revision Number 1, APP-066).

11.1.1.5 Residual effects are considered not significant for the majority of ecological receptors. Residual effects on Lowland Acid Grassland and Lowland Calcareous Grassland HPIs are assessed at adverse at a site level, due to the loss of calcareous grassland along the railway and changes in air quality. Residual effects on badger, breeding birds and migratory/wintering birds have been assessed as adverse at a site level, due to the range of bird species present across the site and the presence of two main badger setts close to construction areas within the Energy Park Land and the Railway Reinstatement Land. However, the design has incorporated the establishment of a range of habitats offering nesting, foraging and resting opportunities for a variety of bird species and the installation and monitoring of a badger tunnel beneath the new access road. The successful implementation of these measures will ensure impacts are minimised and effects are restricted to a site level only. Residual effects for pond, wetland and watercourses are considered to be beneficial at a site level, due to the small amount of habitat to be lost in comparison to the extensive areas of proposed new wetland east of the River Trent.

11.1.1.6 The ES includes details of the target for 10% net-gain of biodiversity. Use of the Defra Metric 3.0 has demonstrated the Project is able to achieve this through minimising loss, habitat creation, reinstatement, and enhancement of habitats. Overall, there is potential for mitigation, compensation, enhancement to deliver an overall positive impact for wildlife.

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APPENDIX A EFFECT OF AIR QUALITY ON NATIONALLY AND LOCALLY DESIGNATED SITES

Date: March 2022

NORTH LINCOLNSHIRE GREEN ENERGY PARK

Planning Act 2008

Infrastructure Planning (Applications Prescribed Forms and Procedure) Regulations 2009

North Lincolnshire Green Energy Park

Appendix A: Effects of Air Quality on European, Nationally and Locally Designated Sites

Chapter 10 Ecology and Nature Conservation

April 2023

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The business of sustainability

ERM

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April 2023

North Lincolnshire Green Energy Park

Appendix A: Effects of Air Quality on European, Nationally and Locally Designated Sites

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Acronyms and Abbreviations

Name	Description
APIS	Air Pollution Information System
EIA	Environmental Impact Assessment
ES	Environmental Statement
HRA	Habitats Regulations Assessment
LNR	Local Nature Reserve
LWS	Local Wildlife Sites
MAGIC	Multi-Agency Geographic Information for the Countryside
NLGEP	North Lincolnshire Green Energy Park
NNR	National Nature Reserves
PEC	Predicted Environmental Contributions
PEIR	Preliminary Environmental Information Report
ROC	Reasonable Operating Case
SAC	Special Area of Conservation
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest

1. EFFECT OF AIR QUALITY ON EUROPEAN, NATIONALLY AND LOCALLY DESIGNATED SITES

1.1 Introduction

1.1.1.1 This Appendix provides an assessment of the likely effects of predicted Project emissions on European, nationally and locally designated sites for nature conservation during operation. The effects on European designated sites are assessed further in the Report to inform Habitats Regulations Assessment (HRA) **(Document Reference 5.9, Revision 2)**.

1.2 Approach to the Air Quality Assessment of Designated Sites

1.2.1 Overview to Screening Assessment

1.2.1.1 The approach taken follows the guidance set out in the Planning Inspectorate's Advice Note 10[1] and guidance produced by Defra / Environment Agency (EA) (see Section 2.1) on screening risks from emissions to air on protected areas for nature conservation.

1.2.1.2 The approach taken is similar to the HRA process, by initially screening to identify the likely effects of the Project on a designated site and then assessing whether there are likely to be significant adverse effects.

1.2.1.3 The Report contains updates to the version (Revision Number 0) from March 2022, to take account of further written representations by and engagement with Natural England and other stakeholders as part of the Examination in Public process. The updates take account of revised air dispersion modelling based on a Reasonable Operating Case (ROC), rather than the previous modelling that was based on multiple worst-case scenarios. The ROC is for illustration and is intended to provide an understanding of the likely impacts from air quality and what can be expected to be achieved at the Environmental Permit (EP) stage. Further explanation of the ROC is provided in Appendix A.

1.2.2 Designated Sites

1.2.2.1 Designated sites that were included in the assessment are detailed below, along with their Areas of Search (AoS) around the Project:

- European sites (Special Areas of Conservation (SAC), Special Protection Areas (SPA) and Ramsar sites) and Sites of Special Scientific Interest (SSSI) within 15 km of the main emission source at the Energy Recovery Facility (ERF). This 15 km search area was requested by Natural England (NE) (Chapter 10 Ecology, **Document Reference 6.2.10**, Table 3), in line with Defra / EA guidance (see Section 2.1) for larger emitters; and

[1] Advice Note 10: *Habitats Regulations Assessment relevant to nationally significant infrastructure projects*. The Planning Inspectorate. Republished November 2017, Version 8.

- National Nature Reserves (NNR), Local Nature Reserves (LNR), Local Wildlife Sites (LWS) and ancient woodland (AW) within 2 km of the main emission source.

1.2.2.2 There are five European sites and 15 SSSIs designated for biological interest within 15 km of the main emission source at the ERF, as listed in Table 1 and Table 2 respectively. There are also four LWSs, two LNRs and one ancient woodland within 2 km of the main emission source (see Table 3).

Table 1: European Sites

European Site Name, Site Code and Area	Distance from stack (km)	Qualifying Features of Interest (Species and Annex I Habitats)	Link to Citation and Conservation Objectives
Humber Estuary SAC (UK0030170) 36657.15 ha	0.1 km west	Annex I habitats that are a primary reason for selection of the site: H1130: Estuaries H1140: Mudflats and sandflats not covered by seawater at low tide Annex I habitats and Annex II species present as a qualifying feature, but not a primary reason for site selection: H1110: Sandbanks which are slightly covered by sea water all the time H1150: Coastal lagoons H1310: *Salicornia* and other annuals colonising mud and sand H1330: Atlantic salt meadows (Glauco-Puccinellietalia maritimae) H2110: Embryonic shifting dunes H2120: Shifting dunes along the shoreline with *Ammophila arenaria* (marram grass) ("white dunes") H2130: Fixed coastal dunes with herbaceous vegetation ("grey dunes") H2160: Dunes with *Hippophae rhamnoides* (sea buckthorn) S1095: Sea lamprey (*Petromyzon marinus*) S1099: River lamprey (*Lampetra fluviatilis*) S1364: Grey seal (*Halichoerus grypus*)	European Site Conservation Objectives for Humber Estuary SAC - UK00300170 (naturalengland.org.uk)
Humber Estuary Ramsar (UK11031) 37987.8 ha	0.1 km west	Near natural estuary, supporting dune systems, estuarine waters, intertidal mud and sand flats, saltmarshes and saline lagoons. The Humber Estuary supports a breeding colony of grey seals at Donna Nook and a breeding site for natterjack toad in the dune slacks at Saltfleetby-Theddlethorpe. It is an important migration route for river and sea lamprey and supports an assemblage of waterfowl of international importance. Individual water bird qualifying species are: common shelduck (*Tadorna tadorna*), golden plover (*Pluvialis apricaria*), red knot (*Caladris canutus*), dunlin (*Caladris alpina*), black tailed godwit (*Limosa limosa*), bar-tailed godwit (*Limosa lapponica*) and common redshank (*Tringa totanus*).	Humber Estuary | Ramsar Sites Information Service

European Site Name, Site Code and Area	Distance from stack (km)	Qualifying Features of Interest (Species and Annex I Habitats)	Link to Citation and Conservation Objectives
Humber Estuary SPA (UK9006111) 37630.24 ha	6.5 km north	**Annex I Species:** avocet (*Recurvirostra avosetta*), great bittern (*Botaurus stellaris*), hen harrier (*Circus cyaneus*), golden plover, bar-tailed godwit, ruff (*Philomachus pugnax*), Eurasian marsh harrier (*Circus aeruginosus*) and little tern (*Sterna albifrons*). **Regularly Occurring Migratory Species:** common shelduck, knot, dunlin, black tailed godwit and redshank. **Waterbird Assemblage:** 153,934 individual waterbirds (non-breeding) including pink-footed goose (*Anser brachyrhynchus*), dark-bellied brent goose (*Branta bernicla bernicla*), shelduck, wigeon (*Anas penelope*), teal (*Anas crecca*), mallard (*Anas platyrhynchos*), pochard (*Aythya ferina*), scaup (*Aythya marila*), goldeneye (*Bucephala clangula*), great bittern, oystercatcher (*Haematopus ostralegus*), avocet, ringed plover (*Charadrius hiaticula*), golden plover, grey plover (*Pluvialis squatarola*), lapwing (*Vanellus vanellus*), knot, sanderling (*Calidris alba*), dunlin, ruff, black-tailed godwit, bar-tailed godwit, whimbrel (*Numenius phaeopus*), curlew (*Numenius arquata*), redshank, greenshank (*Tringa nebularia*) and turnstone (*Arenaria interpres*).	European Site Conservation Objectives for Humber Estuary SPA - UK9006111 [redacted]
Thorne Moor SAC (UK0012915) 1911.02 ha	10.1 km west	Annex I habitats that are a primary reason for selection of the site: 7120: Degraded raised bogs still capable of natural regeneration	European Site Conservation Objectives for Thorne Moor SAC - UK0012915 [redacted]
Thorne & Hatfield Moors SPA (UK9005171) 2449.2 ha	10.1 km west	**Annex I Species:** European nightjar (*Caprimulgus europaeus*) - breeding	European Site Conservation Objectives for Thorne & Hatfield Moors SPA - UK9005171 [redacted]

1.2.2.3 Sites designated for geological interest are not sensitive to air quality impacts. Four SSSIs designated for geological interest were identified within 15 km of the main emission source (Castlethorpe Tufas SSSI, Conesby (Yorkshire East) Quarry SSSI, Manton Stone Quarry SSSI and South Ferriby Chalk Pit SSSI. These sites have been screened out of the assessment and have not been included in the table below.

Table 2: SSSIs within 15 km of the Emissions Sources

SSSI	Distance from Stack (km)	Citation Features
Humber Estuary	0.1 km west	Large estuary complex comprising the estuary, intertidal mudflats and sandflats, coastal saltmarsh and the associated saline lagoons, sand dunes and standing waters. It supports colonies of breeding grey seal, river lamprey and sea lamprey in addition to supporting nationally important assemblages of breeding, wintering and passage birds.
Risby Warren	5.1 km east	Designated for its extensive heathland, grassland and dune formations with associated important plant communities.
Eastoft Meadow	7.3 km west	A small herb-rich hay meadow with botanical interest, in particular the presence of locally declining orchid species.
Crowle Borrow Pits	7.9 km southwest	Designated for habitats including alder carr, scrub, fen and open water which support several locally uncommon plant species.
Hatfield Chase Ditches	8.4 km southwest	A large area of former marsh and wetland which has been drained and split into a complex network of ditches. The ditches retain elements of the former marshland.
Thorne, Crowle and Goole Moors	10.1 km west	These moors form the largest extent of lowland raised mire in England. The site is important for its insect fauna and for its breeding and wintering bird populations.
Broughton Far Wood	10.3 km southeast	Part of an extensive block of commercial mixed woodland with a species rich understorey. Also includes an old quarry with a rich limestone flora.
Broughton Alder Wood	10.8 km southeast	An alder woodland in a shallow valley with fen and woodland flora species.
Manton and Twigmoor	10.9 km southeast	The site comprises three separate sections containing important areas of heathland, grassland and wetland on coversand (wind-blown sand deposits).
Messingham Heath	11.0 km south	An important example of coversand heathland. The site mainly comprises of sand hills with dry heath, scattered birch and acid grassland vegetation.
Messingham Sand Quarry	11.6 km southeast	A mosaic of habitats in an old quarry including open water, wetland and woodland, with natural heathland vegetation. The site is particularly important for its insect fauna.
Belshaw	12.6 km southwest	A short length of land along a disused railway supporting a colony of the nationally rare plant Rhinanthus angustifolius (greater yellow rattle) in neutral grassland.

SSSI	Distance from Stack (km)	Citation Features
Tuetoes Hills	12.9 km south	A mosaic of dry acid grassland vegetation including a locally rare example of an inland acid dune grassland dominated by Carex arenaria (sand sedge).
Scotton and Laughton Forest Ponds	14.4 km south	A number of peaty heathland pools associated with open acid grassland and birch woodland. Importantly, the site holds a distinctive marginal wetland vegetation (a type of base-poor fen/mire), with a nationally scarce plant community.
Epworth Turbary	14.6 km southwest	An area of relict peat vegetation supporting birch woodland, heathland and fen habitats.

Table 3: Locally Designated Sites within 2 km of the Emissions Sources

Designated Site	Distance from Stack (km)	Citation Features
Local Wildlife Sites (LWS)		
Burton Wood, Burton upon Stather LWS	1.0 km north	A long stretch of broadleaved woodland surrounded by arable land. Comprises native and non-native plantation on an ancient woodland site with plant species typical of good quality woodland.
Paupers' Drain LWS	1.3 km northwest	A 7 km stretch of canalised watercourse, rich with wetland plants, with some surrounding scrub and neutral grassland.
Slag Banks LWS	1.5 km east	The site comprises wetland and grassland habitats on the margins of an infilled ironstone quarry, as well as a botanically-rich sandy area. Within Phoenix Parkway LNR.
Phoenix Parkway LWS	1.8 km southeast	A complex of dry habitats on sand and a short stretch of shaded stream. Predominantly broadleaved woodland with other habitats including scrub and acid grassland.
Local Nature Reserves (LNR)		
Phoenix LNR	1.5 km east	Structurally diverse, species-rich sandy dry habitats including semi-natural woodland, scattered and dense scrub and acid grassland. Immediately north of Phoenix Parkway LNR/LWS.
Phoenix Parkway LNR	1.8 km southeast	Structurally diverse, species-rich sandy dry habitats including semi-natural woodland, scattered and dense scrub and acid grassland. Includes the Phoenix Parkway LWS within its boundary.
Ancient Woodland (AW)		
Burton Wood AW	1.0 km north	Native and non-native broadleaved plantation on an ancient woodland site. Overlies the Burton Wood, Burton upon Stather LWS.

1.2.2.4 The locations of these designated sites are shown in Figures 1 and 2 (see Appendix B).

1.2.2.5 The approach to assessing the effects on habitats and species from emissions to air is detailed below.

2. APPROACH TO ASSESSING THE EFFECTS ON HABITATS AND SPECIES FROM EMISSIONS TO AIR

2.1 Guidance

2.1.1.1 The approach to the assessment has taken account of the following guidance:

- DEFRA / EA guidance on *Air Emissions Risk Assessment for Your Environmental Permit* (2023).
- DEFRA/ EA guidance on *Environmental Permitting: Air Dispersion Modelling Reports* (2021)
- *A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites* (Version 1.0, June 2019). Institute of Air Quality Management (IAQM).
- CIEEM (2021) *Advice on Ecological Assessment of Air Quality Impacts.* Chartered Institute of Ecology and Environmental Management. Winchester, UK.
- Natural England Internal Guidance (2018) *Approach to advising competent authorities on Road Traffic Emissions and HRAs* V1.4 Final. NE.

2.1.1.2 Information about the relative sensitivity of qualifying interest habitats and plant species, and habitats supporting qualifying interest fauna species, was obtained from the Air Pollution Information System (APIS)[4].

2.2 Critical Loads and Levels

2.2.1.1 The critical loads[5] and critical levels[6] for each habitat type were also obtained from APIS and used as tools to assess the potential for effects of air pollutants on habitats. The critical load refers to the quantity of pollutant deposited from air to the ground, while the critical level is the gaseous concentration of a pollutant in the air.

2.2.1.2 Effects resulting from nitrogen and acid deposition have been assessed on a habitat and species-specific approach against critical loads listed in APIS. These specific loads are provided in the relevant tables in the Screening of Potential Significant Effects (see Section 2.4.2.9).

2.2.1.3 Critical levels (for the effects of NO_x, SO_2, NH_3 and HF) have been assessed against environmental standards that apply either across all habitat types (for NO_x and HF), or across lichens/bryophytes and vascular plants (for SO_2 and NH_3) as set out in Table 4. The original report assessed daily NOx (24 hrs) against the standard of 75 µg m^{-3}. This updated report has assessed short-term NOx against a standard of 200 µg m^{-3}. The use of the higher standard is set out in the 2020 IAQM

[4] Air Pollution Information System | Air Pollution Information System (apis.ac.uk) – accessed up to March 2023.

[5] Critical Loads are defined as: *"a quantitative estimate of exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge"*

6 Critical levels are defined as *"concentrations of pollutants in the atmosphere above which direct adverse effects on receptors, such as human beings, plants, ecosystems or materials, may occur according to present knowledge"*.

guidance (air-quality-impacts-on-nature-sites-2020.pdf (iaqm.co.uk) – see extract below).

"*The WHO guidelines include a short term (24-hour average) NOx critical level of 75 µg/m^3. Originally set at 200 µg/m^3 as a four-hour mean, the more detailed CD-ROM version of the 2000 WHO guidelines comments: "Experimental evidence exists that the CLE decreases from around 200 µg/m^3 to 75 µg/m^3 when in-combination with O3 or SO2 at or above their critical levels. In the knowledge that short-term episodes of elevated NOx concentrations are generally combined with elevated concentrations of O3 or SO2, 75 µg/m^3 is proposed for the 24 h mean." Ozone and SO2 concentrations are typically low in the UK compared to many other countries. If a regulator does require the use of the short-term NOx critical level, given the low UK SO2 concentrations IAQM consider it is most appropriate to use 200 µg/m^3 as the short-term critical load*."

Table 4: Emissions and Relevant Environmental Standards

Substance	Emission Period (Means)	Standard
Nitrogen oxides (NO_x)	Annual	30 micrograms per cubic metre (µg m^{-3})
	Daily	75 µg m^{-3} / 200 µg m^{-3}
Sulphur dioxide (SO_2)	Annual	10 µg m^{-3} – where lichens / bryophytes are present
	Annual	20 µg m^{-3} – for all other vegetation
Ammonia (NH_3)	Annual	1 µg m^{-3} – where lichens / bryophytes are present
	Annual	3 µg m^{-3} – for all other vegetation
Hydrogen fluoride (HF)	Weekly	0.5 µg m^{-3}
	Daily	5 µg m^{-3}

2.3 Screening Methodology

2.3.1.1 The Process Contribution (PC) is the environmental concentration at a receptor location of each substance emitted to air as a result of the Project.

2.3.1.2 Atmospheric dispersion modelling was undertaken to predict the short and long-term PC against the respective environmental standards. The screening approach to determine whether the PCs for the Project were insignificant, or required further assessment, was undertaken by comparing the PCs, and where necessary Predicted Environmental Contributions (PECs)[7], against the threshold percentages of the critical levels / loads for each habitat as set out in the Defra / EA guidance (see Table 5).

2.3.1.3 The approach also takes account of the contribution of the Project along with other projects and plans as part of the cumulative effects assessment (see Chapter 18, **Document Reference 6.2.18**).

[7] The PEC consists of the project PC and the background concentration of the pollutant being assessed.

Table 5: Assessment Criteria for Habitats and Species

Criterion	Assessment
Long Term / Short Term	
PC < 1% of CL (long) and / or PC <10% of CL (short) or PC >1% of CL (long) and / or >10% of CL (short) but PEC<70% of CL	Insignificant contribution8 and no further assessment required. Considered in the assessment to have no likely significant effect.
PC > 1% of CL (long) and / or >10% of CL (short) and PEC > 70% of CL	Cannot be considered as an insignificant contribution. Further assessment is required to determine the effects on habitats and species and whether, or not, they are likely to have an adverse effect on the integrity of a designated site.

2.3.1.4 For locally designated sites, the criteria are less stringent and PCs are regarded as insignificant if they are <100% of the short and long-term standards.

2.3.1.5 The levels and loads of air pollutants at habitats in the European and national sites (within a 15 km radius from the main emission source at the ERF) and local sites (within a 2 km radius of the ERF) were predicted by the atmospheric dispersion modelling. Details about the model and its input data can be found in Chapter 5 Air Quality (**Document Reference 6.2.5**). The model parameters forming an illustrative ROC can be found in Appendix A.

2.3.1.6 To assess the likely effects on designated sites, the methods listed below were undertaken.

- Habitats that were not sensitive to specific air pollutants were screened out.
- Account was taken at this stage of the sensitivity of faunal species to potential effects on their supporting habitat. For example, APIS confirms that the qualifying interest bird species of the Humber Estuary SPA and SSSI are not sensitive to the effects of acid deposition on their broad habitat types, so effects on these species were not considered further.
- Where qualifying interest features were only present in locations where they would clearly not be affected, they were excluded from consideration.
- In terms of nitrogen and acid deposition, the most sensitive habitat type amongst the qualifying interest features was selected initially on a worst-case basis. If the effects on this habitat type were found to be insignificant, it was assumed that effects on other qualifying features (with less stringent critical loads) would be similarly insignificant.

[8] The term 'significant' is used here in the context of its meaning within the Environment Agency guidance (ie making a 'significant contribution') and not within the context of the EIA Regulations 2017 (ie not necessarily leading to a 'likely significant effect').

- Where the most sensitive qualifying interest feature of a designated site could not be screened out, the PCs were then predicted at other less sensitive habitats to assess the potential effect on all relevant habitats associated with the site.
- Where there were no identified critical loads on APIS, a view was taken on how likely the feature was to be affected and the likelihood of a real risk occurring as a result of the effects of air pollutants. For example, in the case of water-based features, the nutrient nitrogen will be influenced overwhelmingly by waterborne nutrient loadings and agricultural run-off rather than by deposition from the atmosphere, so these features were screened out. In the case of species with no critical loads (such as vascular plant or invertebrate assemblages), the supporting habitats were used as a proxy.
- The APIS tool does not cover Ramsar sites. As the Humber Estuary Ramsar site protects the same habitats and species as the SAC and SPA designations, it was assumed that the modelling results for the SAC and SPA could be similarly applied to the Ramsar designation too.
- Predicted levels and loads on some designated sites could not be screened out through the approach above. In many cases, this was due to a number of overlying worst case assumptions around for example, the use of emission limits, modal split of traffic, comparison with the minimum range value of the critical load. As a result, an illustrative Reasonable Operating Case (ROC) was drawn up (see Appendix A) and the screening assessment revisited. Updated modelling results for the ROC are presented where appropriate to inform the revised assessment.

2.4 Further Assessment Methodology

2.4.1.1 Where designated sites could not be screened out (including taking account of the cumulative assessment), further consideration was given to whether adverse effects on the integrity of the site were likely.

2.4.1.2 The analysis of the effects on site integrity was based on the effects of air emissions on particular habitats and the conservation objectives of each site. This was based on professional judgement as there are no published criteria to determine whether a PC > 1% / PEC > 70% will result in an adverse effect on the integrity of a designated site. The assessment took account of the factors listed below.

- The extent to which the PC was greater than 1% of the critical level / load.
- The background level of each pollutant and the Predicted Environmental Concentration (PEC) (i.e. PC + background) and whether the background levels / loads were sufficiently low to accommodate the predicted PC loads. As with the PC, there are no published criteria to determine whether a PEC of any level will be insignificant, or result in an adverse effect.

- The location of the relevant qualifying interest feature within the designated site, the extent of this feature affected by PCs > 1% and the variability in the occurrence of PCs > 1% over that area.
- The sensitivity within a habitat type. For example, saltmarsh that is exposed for longer periods (e.g. mature upper saltmarsh) is likely to be more sensitive to effects from pollutant concentrations in the air than those parts of the saltmarsh that are subject to regular inundation by water (e.g. lower to middle saltmarsh).
- The effects of Keadby 2 and Keadby 3, and other developments, were considered cumulatively (see Chapter 18, **Document Reference 6.2.18**).

2.4.2 Qualifying Interest Locations and Sensitivity to Air Emissions

2.4.2.1 As noted above, designated sites (or habitats and species within a site) were screened out where they were not sensitive to air pollutants, or where their qualifying interests would not be affected.

2.4.2.2 The air quality modelling approach for nitrogen and acid deposition is habitat-specific. The locations of qualifying interest habitats and species were reviewed for the larger designated sites. Where features were only present at considerable distances from the scheme they were screened out of the assessment.

2.4.2.3 For the Humber Estuary SAC, Ramsar and SSSI, many of the qualifying habitats and species are coastal or marine features, which do not occur within 15 km of the Project. All the SAC/Ramsar/SSSI sand dune habitats and associated plant species, coastal lagoons, Salicornia and other annuals colonising mud and sand, and grey seal (*Halichoerus grypus*) habitats occur in the outer estuary at least 45 km from the Project and were therefore screened out10. The Ramsar designation included a breeding site for natterjack toads on dune slacks which was also excluded due to distance.

2.4.2.4 Review of the Humber Estuary SAC, Ramsar and SSSI citations and the distribution of priority habitats established that the qualifying habitats and species that occur within 15 km of the Project are:

- estuaries and their component Atlantic salt meadows (saltmarsh);
- mudflats and sandflats not covered by seawater at low tide;
- sandbanks which are slightly covered by seawater all the time;
- river lamprey (*Lampetra fluviatilis*); and
- sea lamprey (*Petromyzon marinus*).

2.4.2.5 The qualifying interest habitats and species were then reviewed using information from APIS to establish their sensitivity to atmospheric pollutants. Estuaries and Atlantic salt meadows (saltmarsh) were identified

10 Based on citation information and spatial data showing the distribution of designated habitats on the MAGIC website.

as sensitive to nitrogen deposition, but were not sensitive to acid deposition.

2.4.2.6 For flowing water habitats, or habitats that are regularly inundated with water in the Humber Estuary SAC, Ramsar and SSSI, the nutrient nitrogen and acidity inputs will be predominantly from waterborne sources and agricultural run-off rather than air pollutants[11]. APIS confirms that 'sandbanks which are slightly covered by seawater all the time' are not considered to be sensitive to any of the pollutants in the assessment, therefore effects on this habitat type were screened out. 'Mudflats and sandflats not covered by seawater at low tide', and river / sea lamprey do not have sensitivity information or CLs on APIS. However, as mudflats are regularly inundated with water and lamprey use freshwater and marine habitats, 'mudflats and sandflats not covered by seawater at low tide' and river / sea lamprey are not considered sensitive to airborne air pollutants and have been screened out. This approach has previously been agreed with the Environment Agency (EA) and Natural Resources Wales (NRW) on submissions for other developments which have subsequently been approved.

2.4.2.7 Key impacts on river and sea lamprey include river pollution, engineering works that can create obstacles to upstream migration (e.g. dams, weirs) and destruction of their spawning gravels and other habitat[12]. The River Trent will be affected only by a slight increase in boat traffic movement due to the Project. The Project will not represent a new source of impact but will add (potentially) to any impacts from the existing level of vessel movements on the River Trent. Over the years 2000 to 2019 vessel movements ranged between 999 and 2,637 (see Table 3.2 of ES Annex 6: Navigation Risk Assessment, APP-073, noting 2020 value omitted as likely to have been an artefact of the COVID pandemic). The numbers have declined in recent years ranging between 999 and 1,216 over the past five years. In theory the Project could result in 580 additional vessel movements at Flixborough wharf per year (APP-073, Section 7.1). The total (Project plus more recent baseline) number of movements would be comfortably within the recent (past 20 years) baseline levels of vessel movements along the River Trent. It is reasonable to assume that even should the scientific evidence base suggest potential effects on lamprey as a result of vessel passage, that effects against background fluctuations would be indiscernible.

2.4.2.8 The existing access road to the Flixborough Industrial Estate along Stather Road, adjacent to the River Trent embankments on its eastern side, will be stopped up. It will be replaced by a new access road that is located over 200 m east of the designated sites. In accordance with NE's guidance (June 2018 – see Section 3.1), roads at such a distance do not present "*…a credible risk of a significant effect which might undermine a site's conservation objectives*". Given the above, significant impacts from

[11] APIS notes that 'In most lowland rivers and burns, nitrogen inputs from catchment land-use, not deposition from the atmosphere, are likely to be much more significant'.

[12] Maitland, P.S. (2003) *Ecology of the River, Brook and Sea Lamprey.* Conserving Natura 2000 Rivers Ecology Series No. 5. English Nature, Peterborough.

construction / operational traffic are not predicted either alone or in combination with other project emissions and this has been excluded from further assessment.

2.4.2.9 For the Humber Estuary SPA, Ramsar and SSSI and Thorne & Hatfield Moors SPA, acid deposition is not expected to have a negative effect on any of the qualifying bird species. In all cases, APIS confirmed that the birds' broad habitat types were not sensitive to acid deposition, or there were no expected negative effects on the species as a result of effects on the species' broad habitat type. However, a number of the qualifying bird species of the designated sites were sensitive to the potential effects of nitrogen deposition on their broad habitat types so the effects of nitrogen deposition were assessed further.

2.4.2.10 The degraded raised bog habitat at Thorne Moor SAC is sensitive to both nitrogen and acid deposition so the effects of these emissions were assessed further.

2.4.2.11 In summary, the sensitive qualifying interest habitats and species for each designated site that were taken forward for assessment of the effect of emissions to air on the European sites are listed in Table 6.

Table 6: European Site Sensitive Qualifying Interest Features

Designated Site	Qualifying Annex I Habitats and Annex II Species	Sensitive to nitrogen (APIS)?	Sensitive to acidity (APIS)?
Humber Estuary SAC / Ramsar /SSSI	Estuaries	Yes	No
	Atlantic salt meadows	Yes	No
Humber Estuary Ramsar	Birds species including black tailed godwit & golden plover	Yes	No
Humber Estuary SPA /SSSI	Bird species including avocet, black tailed godwit, curlew, dark-bellied brent goose, golden plover, great bittern, little tern (SPA only), marsh harrier & wigeon	Yes	No
Thorne Moor SAC	Degraded raised bogs still capable of natural regeneration	Yes	Yes
Thorne & Hatfield Moors SPA	European nightjar	Yes	No

2.4.2.12 Hatfield Chase Ditches SSSI was excluded from the assessment as the site has no sensitive features, or associated critical loads for nitrogen or acid deposition on APIS. The SSSI citation states the designated features as ditches (relevant to the 'standing water and canals' category on APIS) with aquatic plant species including pondweeds and duckweeds, emergent reedbed and banks of common grasses and herbs[13]. As the designated features are predominantly based on aquatic biodiversity, the main influences are likely to be from agricultural activities, rather than from nitrogen and acid deposition from the Project's emissions to air.

[13] Natural England Stite Designation, File ref: SE 70

2.4.2.13 Broughton Alder Wood SSSI was not considered to be sensitive to the effects of nitrogen or acid deposition (as detailed on APIS), so it was excluded from the assessment of those emissions.

3. SCREENING FOR POTENTIAL SIGNIFICANT EFFECTS ON EUROPEAN, NATIONALLY AND LOCALLY DESIGNATED SITES

3.1 Overview

3.1.1.1 This section summarises the predicted effects of the air pollutants from the Project alone on the European, nationally and locally designated sites. A summary of the worst-case air dispersion modelling results (described in more detail in Chapter 5 Air Quality, **Document Reference 6.2.5**) is presented below. The modelled results from the ROC are included in this report where appropriate.

3.1.1.2 A summary of the PCs, and where necessary PECs, as a percentage of the critical levels / loads for each designated site is presented. For nutrient nitrogen and acid deposition, only the qualifying interest habitats and species that are sensitive to the effects of these emissions are listed (see Section 2.4.2). In addition, potential impacts are set out only for the qualifying features with the most sensitive Critical Loads (CLs), although all habitats with CLs were included in the modelling. This is due to the large number of data required to present results for each receptor and every qualifying feature. Where the PC exceeded 1% of the CL, then a breakdown showing relevant habitat types was included in the table to allow a review of all potential effects on habitats.

3.2 Assessment of Effects on European Sites

3.2.1 Effects of NO_x on European Sites

3.2.1.1 The predicted PCs for long-term (annual mean) and short-term (24 hour) NO_x are listed in Table 7.

3.2.1.2 At the Humber Estuary SAC / Ramsar and SPA, the long-term environmental standard was exceeded (annual PC was > 1% of critical level), but the PEC, taking account of background levels, was well below 70% of the critical level. The levels for the ROC further reduced the percentages. Therefore, the emissions from the Project alone were still considered to be insignificant according to the assessment criteria. Consequently, no likely significant effects on the Humber Estuary SAC, Ramsar site or the Humber Estuary SPA are expected as a result of annual NO_x emissions.

3.2.1.3 The PC was < 1% of the critical level (for annual mean) at Thorne Moor SAC and Thorne & Hatfield Moors SPA indicating that emissions of NO_x are insignificant at these sites.

3.2.1.4 For 24 hr NO_x, the data for the original submission showed that the PC was > 10% of the critical level at the Humber Estuary SAC and Ramsar site, therefore effects could not be screened out as insignificant.

3.2.1.5 Further assessment was undertaken using the higher standard for NOx 24 hr (i.e. 200 μg^{-3}) which found the PC comprised only 8.8% of the critical level and hence it too could now be screened out.

Table 7: European Sites - Predicted PCs for NO_x and Percentages of Critical Levels

European Site	Baseline NO_x ($\mu g\ m^{-3}$)	Critical Level ($\mu g\ m^{-3}$)	PC ($\mu g\ m^{-3}$)	PC as % of Critical Level	PEC as % of Critical Level
NO_x Annual Mean					
Humber Estuary SAC, Ramsar					
Multiple Worst Cases (Original Assessment)	13.5	30	2.0	6.8%	51.7%
Reasonable Operating Case	13.5	30	0.91	3.03%	48%
Humber Estuary SPA					
Multiple Worst Cases (Original Assessment)	13.5	30	0.3	1.0%	45.9%
Reasonable Operating Case	13.5	30	0.27	0.89%	-
Thorne Moor SAC	13.2	30	0.03	0.1%	-
Thorne & Hatfield Moors SPA	12.9	30	0.03	0.1%	-
NO_x 24hr					
Humber Estuary SAC, Ramsar					
Multiple Worst Cases (Original Assessment)	27.0	75	36.5	48.7%	-
Reasonable Operating Case	27.0	200	17.58	8.8%	-
Humber Estuary SPA	27.0	75	3.0	4.0%	-
Thorne Moor SAC	26.4	75	1.1	1.5%	-
Thorne & Hatfield Moors SPA	25.8	75	1.1	1.5%	-

The PC is considered to be an insignificant contribution where:

- *For NO_x Annual Mean: PC < 1% of CL and / or PC > 1% but PEC < 70% of CL*
- *For NO_x 24hr: PC < 10% of CL (short term)*

3.2.2 Effects of Ammonia on European Sites

3.2.2.1 The predicted PCs for ammonia (NH_3) are listed in Table 8.

3.2.2.2 The critical levels used are those for vascular plants (3 µg m^{-3}) for all the European sites except for Thorne Moor SAC, where lichens are present and the more stringent CL for lichen and bryophyte presence was used (1 µg m^{-3}).

3.2.2.3 Ammonia levels in the previous assessment exceeded the percentage PC threshold of 1% and the PEC threshold of 70% at the Humber Estuary SAC and Ramsar site. Further screening assessment was undertaken using the ROC.. This assessment found the PC to comprise only 0.65% of the critical level and hence on this basis it could be screened out.

3.2.2.4 Levels are insignificant (PC < 1% of critical level) at the other European sites and no likely significant effects are expected as a result of emissions of ammonia.

Table 8: European Sites - Predicted PCs for NH_3 and Percentages of Critical Levels

European Site	Baseline NH_3 (µg m^{-3})	Critical Level (µg m^{-3})	PC (µg m^{-3})	PC as % of Critical Level	PEC as % of Critical Level
Humber Estuary SAC, Ramsar					
Multiple Worst Cases (Original Assessment)	3.6	3	0.05	1.6%	120.9%
Reasonable Operating Case	3.6	3	0.02	0.65%	-
Humber Estuary SPA	3.6	3	0.02	0.7%	-
Thorne Moor SAC	2.6	1	0.002	0.2%	-
Thorne & Hatfield Moors SPA	3.5	3	0.002	0.1%	-

The PC is considered to be an insignificant contribution where:

- *PC < 1% of CL and / or PC > 1% but PEC < 70% of CL*

3.2.3 Effects of SO_2 on European Sites

3.2.3.1 The predicted PCs for SO_2 (annual) are listed in Table 9. As for ammonia, the more stringent critical level for lichen or bryophyte presence (10 µg m^{-3} for SO_2) was used at Thorne Moor SAC only, with a critical load of 20 µg m^{-3} applied to all other sites. The PC did not exceed 1% at any of the European sites and therefore emissions of SO_2 were considered insignificant. No likely significant effect on the European sites are predicted.

Table 9: European Sites - Predicted PCs for SO_2 and Percentages of Critical Levels

European Site	Baseline SO_2 (µg m^{-3})	Critical Level (µg m^{-3})	PC (µg m^{-3})	PC as % of Critical Level
Humber Estuary SAC, Ramsar	7.5	20	0.1	0.7%
Humber Estuary SPA	7.5	20	0.1	0.3%
Thorne Moor SAC	1.3	10	0.01	0.1%
Thorne & Hatfield Moors SPA	1.6	20	0.01	0.03%

The PC is considered to be an insignificant contribution where:

- *PC < 1% of CL and / or PC > 1% but PEC < 70% of CL*

3.2.4 Effects of HF on European Sites

3.2.4.1 The predicted PCs for short-term HF at the European sites are listed in Table 10. The PC was < 10% of the critical level for both weekly and 24 hr emissions (both considered to be short term). Therefore emissions of HF are considered to be insignificant and no likely significant effects on the European sites are expected.

Table 10: European Sites - Predicted PCs for HF and Percentages of Critical Levels

European Site	Baseline HF (µg m^{-3})	Critical Level (µg m^{-3})	PC (µg m^{-3})	PC as % of Critical Level
HF Weekly				
Humber Estuary SAC, Ramsar	3.6	0.5	0.04	7.7%
Humber Estuary SPA	3.6	0.5	0.01	1.3%
Thorne Moor SAC	3.2	0.5	0.002	0.3%
Thorne & Hatfield Moors SPA	3.2	0.5	0.002	0.3%
HF 24hr				
Humber Estuary SAC, Ramsar	3.6	5	0.1	1.9%
Humber Estuary SPA	3.6	5	0.02	0.4%
Thorne Moor SAC	3.2	5	0.01	0.1%

European Site	Baseline HF ($\mu g\ m^{-3}$)	Critical Level ($\mu g\ m^{-3}$)	PC ($\mu g\ m^{-3}$)	PC as % of Critical Level
Thorne & Hatfield Moors SPA	3.2	5	0.01	0.1%

The PC is considered to be an insignificant contribution where:

- *PC < 10% of CL (short term)*

3.2.5 Effects of Deposited Nitrogen on European Sites

3.2.5.1 The predicted PCs for deposited nitrogen are listed in Table 11. The PC exceeded 1% of the critical load and the PEC exceeded the 70% threshold for Atlantic saltmeadow (saltmarsh) and estuary habitat types at the Humber Estuary SAC / Ramsar site, so further screening assessment was undertaken using the ROC. This assessment found the PC to comprise only 0.96% of the critical level and hence on this basis has been screened out.

3.2.5.2 Contributions of nutrient nitrogen are insignificant (PC < 1% of critical load) at all other European sites and no likely significant effects are expected.

3.2.6 Effects of Acid Deposition on European Sites

3.2.6.1 Thorne Moor SAC was the only European site with qualifying interest features located within 15 km of the Project that was identified as sensitive to acid deposition.

3.2.6.2 The predicted PCs for acid deposition at Thorne Moor SAC are listed in Table 12. The PC did not exceed 1% of the critical load and therefore the effects of acid deposition on the SAC were considered insignificant. No likely significant effects on Thorne Moor SAC are predicted.

3.2.7 Summary of Effects on European Sites

3.2.7.1 The PCs for all of the pollutant types at Thorne Moor SAC and Thorne & Hatfield Moors SPA are predicted to be insignificant. Therefore no likely significant effects on these European sites are predicted and no further assessment is required.

3.2.7.2 This revised report has taken account of the modelling data for the ROC. As a result, no likely significant effects have been concluded from air emissions for the Project alone on European sites, with all predicted PC levels / loads being <1% of the relevant critical level, or load.

Table 11: European Sites - Predicted PCs for Deposited Nitrogen and Percentages of Critical Loads

European Site	Qualifying Interest Feature	Background Nitrogen Deposition (kg N /ha /yr)	Critical Load (CL) (kg N/ha /yr)		PC (kg N /ha /yr)	PC as % of CL (min)		PEC as % of CL	
			Min	Max		Min	Max	Min	Max
Humber Estuary SAC, Ramsar									
Multiple Worst Cases (Original Assessment)	Atlantic salt meadows Estuaries	28.9	20	30	0.5	2.3%	1.5%	146.8%	98%
Reasonable Operating Case	Atlantic salt meadows Estuaries	28.9	20	30	0.19	0.96%	0.64%	-	-
Humber Estuary SPA	Pioneer, low-mid and mid-upper saltmarshes supporting a wide range of wetland bird species. Low and medium altitude hay meadows – golden plover, curlew, ruff, wigeon, lapwing, teal, oystercatcher & redshank.	28.9	20	30	0.1	0.70%	0.46%	-	-
	Rich fens supporting hen harrier, great bittern, marsh harrier	28.9	15	30	0.1	0.93%	0.46%	-	-
Thorne Moor SAC	Degraded raised bogs still capable of natural regeneration	21.3	5	10	0.01	0.27%	0.13%	-	-

European Site	Qualifying Interest Feature	Background Nitrogen Deposition (kg N /ha /yr)	Critical Load (CL) (kg N/ha /yr)		PC (kg N /ha /yr)	PC as % of CL (min)		PEC as % of CL	
			Min	Max		Min	Max	Min	Max
Thorne & Hatfield Moors SPA	Dwarf shrub heath supporting European nightjar	46.2	10	20	0.01	0.13%	0.07%	-	-

The PC is considered to be an insignificant contribution where:

- *PC < 1% of CL and / or PC > 1% but PEC < 70% of CL*

Table 12: European Sites - Predicted PCs for Acid Deposition and Percentages of Critical Loads

European Site	Qualifying Interest Feature	Background Acid Deposition (keq ha^{-1} yr^{-1})		Critical Load (CL) (keq ha^{-1} yr^{-1})			PC (keq ha^{-1} yr^{-1})		PC as % of CL (min)
		S baseline	N baseline	CL max S	CL min N	CL max N	Total S	Total N	
Thorne Moor SAC	Degraded raised bogs still capable of natural regeneration	0.2	1.5	0.1	0.3	0.5	0.001	0.001	0.4%

The PC is considered to be an insignificant contribution where:

- *PC < 1% of CL and / or PC > 1% but PEC < 70% of CL*

3.3 Assessment of Effects on National Sites (SSSIs)

3.3.1.1 This section summarises the predicted effects of the emissions to air on Sites of Special Scientific Interest (SSSIs).

3.3.2 Effects of NO_x on National Sites

3.3.2.1 The predicted PCs for long-term (annual mean) and short-term (24 hour) NO_x at the SSSIs are listed in Table 13. At the Humber Estuary SSSI, the annual PC was >1% of the long-term environmental standard, but the PEC, taking account of background levels, was well below 70% of the critical level. Therefore the PCs were still considered to be insignificant according to the assessment criteria and no likely significant effects on the Humber Estuary SSSI are expected as a result of annual NO_x emissions from the Project.

3.3.2.2 For short-term NO_x for the original submission, the 10% threshold was exceeded at the Humber Estuary SSSI only, therefore effects could not be screened out as insignificant. Further assessment was undertaken using the higher standard for NOx 24 hr which found the PC comprised only 8.8% of the critical level and hence it too could now be screened out.

3.3.2.3 The PC was <1% of the critical level (for annual mean) and <10% of the critical level (for 24 hours) at all of the remaining SSSIs. Therefore emissions of NO_x are considered to make an insignificant contribution at all of these sites and no likely significant effects on the SSSIs are expected from the Project.

Table 13: SSSIs - Predicted PCs for NO_x and % of Critical Level

Designated Site	Baseline NO_x (µg m^{-3})	Critical Level (µg m^{-3})	PC (µg m^{-3})	PC as % of Critical Level	PEC as % of Critical Level
NO_x Annual Mean					
Humber Estuary SSSI	13.5	30	2.0	6.8%	51.7%
Risby Warren SSSI	13.5	30	0.3	0.9%	-
Messingham Sand Quarry SSSI	12.3	30	0.1	0.4%	-
Broughton Alder Wood SSSI	12.9	30	0.1	0.3%	-
Broughton Far Wood SSSI	13.4	30	0.1	0.3%	-
Messingham Heath SSSI	11.1	30	0.1	0.3%	-
Crowle Borrow Pits SSSI	13.2	30	0.1	0.2%	-

Designated Site	Baseline NO_x (µg m^{-3})	Critical Level (µg m^{-3})	PC (µg m^{-3})	PC as % of Critical Level	PEC as % of Critical Level
Eastoft Meadow SSSI	12.9	30	0.05	0.2%	-
Manton and Twigmoor SSSI	12.4	30	0.1	0.2%	-
Scotton and Laughton Forest Ponds SSSI	10.7	30	0.1	0.2%	-
Thorne, Crowle and Goole Moors SSSI	13.2	30	0.03	0.1%	-
Tuetoes Hills SSSI	10.3	30	0.1	0.2%	-
Belshaw SSSI	12.9	30	0.03	0.1%	-
Epworth Turbary SSSI	10.6	30	0.03	0.1%	-
NO_x 24hr					
Humber Estuary SSSI					
Multiple Worst Cases (Original Assessment)	27.0	75	36.5	48.7%	-
Reasonable Operating Case	27.0	200	17.58	8.8%	-
Crowle Borrow Pits SSSI	26.3	75	2.7	3.7%	-
Risby Warren SSSI	27.0	75	2.6	3.5%	-
Messingham Sand Quarry SSSI	24.5	75	1.8	2.3%	-
Eastoft Meadow SSSI	25.8	75	1.6	2.1%	-
Broughton Alder Wood SSSI	25.8	75	1.5	2.0%	-
Broughton Far Wood SSSI	26.8	75	1.4	1.9%	-
Messingham Heath SSSI	22.2	75	1.4	1.9%	-

Designated Site	Baseline NO_x (µg m^{-3})	Critical Level (µg m^{-3})	PC (µg m^{-3})	PC as % of Critical Level	PEC as % of Critical Level
Manton and Twigmoor SSSI	24.9	75	1.2	1.6%	-
Thorne, Crowle and Goole Moors SSSI	26.4	75	1.1	1.5%	-
Tuetoes Hills SSSI	20.6	75	1.0	1.4%	-
Belshaw SSSI	25.8	75	1.0	1.3%	-
Epworth Turbary SSSI	21.3	75	0.9	1.2%	-
Scotton and Laughton Forest Ponds SSSI	21.4	75	0.8	1.1%	-

3.3.3 Effects of Ammonia on National Sites

3.3.3.1 The predicted PCs for ammonia (NH_3) are listed in Table 14. The more stringent critical level of 1 µg m^{-3} was used for all sites where APIS listed the presence of lichens / bryophytes (as set out in Section 2.2 Critical Loads and Levels).

3.3.3.2 The 1% of the critical level threshold for the PC was exceeded in the previous assessment at the Humber Estuary SSSI and Risby Warren SSSI, as was the PEC threshold of 70%. Further screening assessment was undertaken using the ROC. This assessment found the PC to comprise only 0.73% of the critical level at Risby Warren SSSI and 0.65% of the critical level at the Humber Estuary SSSI. Hence on this basis, both could be screened out.

3.3.3.3 The PC did not exceed 1% of the critical level at any of the other SSSIs and therefore emissions of NH_3 at these sites are insignificant.

Table 14: SSSIs - Predicted PCs for NH_3 and % of Critical Level

Designated Site	Baseline NH_3 (µg m^{-3})	Critical Level (µg m^{-3})	PC (µg m^{-3})	PC as % of Critical Level	PEC as % of Critical Level
Risby Warren SSSI					
Multiple Worst Cases (Original Assessment)	3.6	1	0.02	1.8%	359.8%
Reasonable Operating Case	3.6	1	0.01	0.73%	-
Humber Estuary SSSI					
Multiple Worst Cases	3.6	3	0.05	1.6%	120.9%

Designated Site	Baseline NH_3 (µg m^{-3})	Critical Level (µg m^{-3})	PC (µg m^{-3})	PC as % of Critical Level	PEC as % of Critical Level
(Original Assessment)					
Reasonable Operating Case	3.6	3	0.02	0.65%	-
Messingham Sand Quarry SSSI	2.8	1	0.01	0.8%	-
Messingham Heath SSSI	3.3	1	0.01	0.7%	-
Broughton Far Wood SSSI	3.0	1	0.01	0.6%	-
Manton and Twigmoor SSSI	2.8	1	0.01	0.5%	-
Scotton and Laughton Forest Ponds SSSI	3.3	1	0.005	0.5%	-
Tuetoes Hills SSSI	2.4	1	0.005	0.5%	-
Crowle Borrow Pits SSSI	2.6	1	0.004	0.4%	-
Broughton Alder Wood SSSI	3.5	3	0.01	0.2%	-
Epworth Turbary SSSI	2.2	1	0.002	0.2%	-
Thorne, Crowle and Goole Moors SSSI	2.6	1	0.002	0.2%	-
Belshaw SSSI	3.5	3	0.002	0.1%	-
Eastoft Meadow SSSI	3.5	3	0.003	0.1%	-

3.3.4 *Effects of SO_2 on National Sites*

3.3.4.1 The predicted PCs for SO_2 (annual) at the SSSIs are listed in Table 15. The more stringent critical level of 10 µg m^{-3} was used for all sites where APIS listed the presence of lichens / bryophytes (as set out in Section 2.2 Critical Loads and Levels). The PC did not exceed 1% of the critical level at any of the designated sites and therefore emissions of SO_2 were considered insignificant. No likely significant effects on any of the SSSIs are expected.

Table 15: SSSIs - Predicted PCs for SO_2 and % of Critical Level

Designated Site	Baseline SO_2 (µg m^{-3})	Critical Level (µg m^{-3})	PC (µg m^{-3})	PC as % of Critical Level
Humber Estuary SSSI	7.5	20	0.1	0.7%
Risby Warren SSSI	7.5	10	0.1	0.5%
Messingham Sand Quarry SSSI	1.5	10	0.03	0.3%
Broughton Far Wood SSSI	2.3	10	0.02	0.2%
Manton and Twigmoor SSSI	1.5	10	0.02	0.2%
Messingham Heath SSSI	1.3	10	0.02	0.2%
Broughton Alder Wood SSSI	1.6	20	0.02	0.1%
Crowle Borrow Pits SSSI	1.4	10	0.01	0.1%
Epworth Turbary SSSI	1.2	10	0.01	0.1%
Scotton and Laughton Forest Ponds SSSI	1.3	10	0.01	0.1%
Thorne, Crowle and Goole Moors SSSI	1.3	10	0.01	0.1%
Tuetoes Hills SSSI	1.2	10	0.01	0.1%
Eastoft Meadow SSSI	1.6	20	0.01	0.04%
Belshaw SSSI	1.6	20	0.01	0.03%

3.3.5 Effects of HF on National Sites

3.3.5.1 The predicted PCs for short-term HF at the SSSIs are listed in Table 16. The PC was <10% of the critical level at all of the SSSIs for both weekly and 24 hr emissions (as both are considered to be short term). Therefore emissions of HF are considered to be insignificant at all of these sites and no likely significant effects on the SSSIs are expected.

Table 16: Predicted PCs for HF and % of Critical Level

Designated Site	Baseline HF (µg m^{-3})	Critical Level (µg m^{-3})	PC (µg m^{-3})	PC as % of Critical Level
HF Weekly				
Humber Estuary SSSI	3.6	0.5	0.04	7.7%
Risby Warren SSSI	3.6	0.5	0.01	1.3%
Messingham Heath SSSI	3.2	0.5	0.01	1.2%
Messingham Sand Quarry SSSI	3.2	0.5	0.004	0.9%
Scotton and Laughton Forest Ponds SSSI	3.2	0.5	0.004	0.7%
Crowle Borrow Pits SSSI	2.6	0.5	0.003	0.6%
Broughton Alder Wood SSSI	3.2	0.5	0.003	0.5%
Broughton Far Wood SSSI	3.2	0.5	0.002	0.5%
Manton and Twigmoor SSSI	3.2	0.5	0.003	0.5%
Eastoft Meadow SSSI	3.2	0.5	0.002	0.4%
Belshaw SSSI	3.2	0.5	0.001	0.3%
Epworth Turbary SSSI	3.2	0.5	0.001	0.3%
Thorne, Crowle and Goole Moors SSSI	3.2	0.5	0.002	0.3%
HF 24hr				
Humber Estuary SSSI	3.6	5	0.1	1.9%
Risby Warren SSSI	3.6	5	0.02	0.3%
Broughton Alder Wood SSSI	3.2	5	0.01	0.2%
Broughton Far Wood SSSI	3.2	5	0.01	0.2%

Designated Site	Baseline HF (µg m^{-3})	Critical Level (µg m^{-3})	PC (µg m^{-3})	PC as % of Critical Level
Crowle Borrow Pits SSSI	2.6	5	0.01	0.2%
Eastoft Meadow SSSI	3.2	5	0.01	0.2%
Messingham Heath SSSI	3.2	5	0.01	0.2%
Messingham Sand Quarry SSSI	3.2	5	0.01	0.2%
Belshaw SSSI	3.2	5	0.01	0.1%
Epworth Turbary SSSI	3.2	5	0.01	0.1%
Manton and Twigmoor SSSI	3.2	5	0.01	0.1%
Scotton and Laughton Forest Ponds SSSI	3.2	5	0.01	0.1%
Thorne, Crowle and Goole Moors SSSI	3.2	5	0.01	0.1%
Tuetoes Hills SSSI	3.2	5	0.01	0.1%

3.3.6 Effects of Nitrogen Deposition on National Sites

3.3.6.1 The predicted PCs for deposited nitrogen are listed in Table 17. The ROC was applied at both the Humber Estuary SSSI and at Risby Warren SSSI. This allowed effects on the Humber Estuary to be screened out with PCs as percentages of the CLs (min) of 0.63% for saltmarsh and neutral grassland and 0.84% for fen, marsh and swamp[14]. At the Risby Warren SSSI, the ROC reduced the PC as % of Critical Load for acid grassland habitat to 0.77% (based on a minimum critical load) and hence on this basis it could be screened out.

3.3.6.2 The PC did not exceed 1% of the critical load for the most sensitive qualifying habitat types at any of the other SSSIs, therefore the contribution of deposited nitrogen as a result of the Project is considered insignificant and no likely significant effects on these SSSIs are expected.

[14] These percentages are lower than those quoted for the Humber Estuary SAC in the HRA (Revision 2), as they reflect further refinement in the assessment that was undertaken when considering the effects of the ROC for the Humber Estuary SSSI. It is likely that such percentages would be achieved at the Humber Estuary SAC too.

Table 17: SSSIs - Predicted PCs for Deposited Nitrogen and % of Critical Load

Designated Site	Qualifying Interest Feature	Background Nitrogen Deposition (kg N /ha /yr)	Critical Load (kg N/ha/yr)		PC (kg N /ha /yr)	PC as % of Critical Load		PEC as % of Critical Load	
			Min	Max		Min	Max	Min	Max
Humber Estuary SSSI									
Multiple Worst Cases (Original Assessment)	Pioneer, low-mid and mid-upper saltmarshes – supporting a wide range of bird species	28.9	20	30	0.5	2.3%	1.52%	146.8%	98%
Reasonable Operating Case		28.9	20	30	0.2	0.63%	0.42%	-	-
Multiple Worst Cases (Original Assessment)	Neutral grassland supporting golden plover, curlew, redshank & ruff	28.9	20	30	0.5	2.3%	1.52%	146.8%	98%
Reasonable Operating Case		28.9	20	30	0.2	0.63%	0.42%	-	-
Multiple Worst Cases (Original Assessment)	Fen, marsh and swamp (*Phragmites australis* swamp and reed-beds) - bittern	28.9	15	30	0.5	3.0%	1.52%	195.8%	98%
Reasonable Operating Case		28.9	15	30	0.2	0.84%	0.42%	-	-

Designated Site	Qualifying Interest Feature	Background Nitrogen Deposition (kg N /ha /yr)	Critical Load (kg N/ha/yr)		PC (kg N /ha /yr)	PC as % of Critical Load		PEC as % of Critical Load	
			Min	Max		Min	Max	Min	Max
Risby Warren SSSI									
Multiple Worst Cases (Original Assessment)	Acid grassland	26.1	8	15	0.1	1.5%	0.8%	327.8%	-
Reasonable Operating Case	Acid grassland	26.1	8	15	0.06	0.77%	0.41%	-	-
Messingham Heath SSSI	Acid grassland	24.5	8		0.04	0.6%	-	-	-
Messingham Sand Quarry SSSI	Broadleaved woodland	38.5	10		0.1	0.6%	-	-	-
Manton and Twigmoor SSSI	Acid grassland	22.8	8		0.04	0.4%	-	-	-
Tuetoes Hills SSSI	Dune and acid grassland	19.7	8		0.03	0.4%	-	-	-

Designated Site	Qualifying Interest Feature	Background Nitrogen Deposition (kg N /ha /yr)	Critical Load (kg N/ha/yr)		PC (kg N /ha /yr)	PC as % of Critical Load		PEC as % of Critical Load	
			Min	Max		Min	Max	Min	Max
Broughton Far Wood SSSI	Broadleaved woodland	41.8	15		0.04	0.3%	-		-
Epworth Turbary SSSI	Bogs	18.9	5		0.01	0.3%	-		-
Scotton and Laughton Forest Ponds SSSI	Fen, marsh and swamp	24.5	10		0.03	0.3%	-		-
Thorne, Crowle and Goole Moors SSSI	Bogs	21.3	5		0.01	0.3%	-		-
Crowle Borrow Pits SSSI	Broadleaved woodland	36.5	10		0.02	0.2%	-		-
Belshaw SSSI	Neutral grassland supporting greater yellow-rattle	21.3	20		0.01	0.1%	-		

Designated Site	Qualifying Interest Feature	Background Nitrogen Deposition (kg N /ha /yr)	Critical Load (kg N/ha/yr)		PC (kg N /ha /yr)	PC as % of Critical Load		PEC as % of Critical Load	
			Min	Max		Min	Max	Min	Max
Eastoft Meadow SSSI	Neutral grassland	21.3	20		0.02	0.1%	-		-

3.3.7 Effects of Acid Deposition on National Sites

3.3.7.1 In the previous assessment, the predicted PCs for acid deposition are listed in Table 18. At Risby Warren SSSI and Messingham Heath SSSI, the 1% PC threshold was exceeded, as was the 70% threshold for PEC. Further assessment was undertaken using the ROC and maximum critical loads.

3.3.7.2 The application of the ROC at the Risby Warren SSSI reduced the PC as it is predicted to be greater than1% against the minimum end of the CL range (1.5%), however less than the 1% Critical Load (0.23%) if assessed against the maximum end of the Critical Load range. Discussions with Natural England confirmed that the site must be assessed against the CL (min) due to the sensitivity of the qualifying features, their extensive loss and its Unfavourable-Declining Status[15] across most of the site. Therefore further consideration was given to deposited acid loads at Risby Warren SSSI.

3.3.7.3 The application of the ROC at the Messingham Heath SSSI reduced the PC as % of Critical Load to 0.64% (based on a minimum critical load) and hence on this basis it could be screened out.

3.3.7.4 The PC did not exceed 1% of the critical load at any other SSSI and therefore acid deposition levels were considered to be insignificant; no likely significant effects on these SSSIs are predicted.

3.3.7.5 No qualifying habitats or species of the Humber Estuary SSSI within 15 km of the Project were found to be sensitive to acid deposition.

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Table 18: SSSIs - Predicted PCs for Acid Deposition and % of Critical Load

SSSI	Qualifying Interest Feature	Critical Load (keq ha^{-1} yr^{-1})			Baseline (keq ha^{-1} yr^{-1})		PC (keq ha^{-1} yr^{-1})		PC as % of Critical Load		PEC as % of Critical Load (min)	
		CL max S	CL min N	CL max N	S	N	Total S	Total N	Min	Max	Min	Max
Risby Warren SSSI												
Multiple Worst Cases (Original Assessment)	Acid grassland	0.4 (Min) 4.1 (Max)	0.2 (Min) 0.4 (Max)	0.6 (Min) 4.3 (Max)	0.5	2.1	0.009	0.009	2.7%	0.4%	403.9%	-
Reasonable Operating Case	Acid grassland	0.42 (Min) 4.1 (Max)	0.223 (Min) 0.4 (Max)	0.643 (Min) 4.3 (Max)	0.5	2.1	0.005	0.004	1.5%	0.23%	403.9%	-
Messingham Heath SSSI												
Multiple Worst Cases (Original Assessment)	Acid grassland	0.2	0.4	0.6	0.2	1.8	0.003	0.003	1.1%	-	355.5%	-
Reasonable Operating Case	Acid grassland	0.2	0.4	0.6	0.2	1.8	0.002	0.002	0.64%	-	-	-
Manton and Twigmoor SSSI	Acid grassland and Fen, Marsh and Swamp	0.2	0.2	0.6	0.3	1.7	0.003	0.003	0.9%	-	-	-
	Broadleaved woodland	0.7	0.1	1.0	0.3	2.8	0.005	0.004	0.9%	-	-	-

SSSI	Qualifying Interest Feature	Critical Load (keq ha^{-1} yr^{-1})			Baseline (keq ha^{-1} yr^{-1})		PC (keq ha^{-1} yr^{-1})		PC as % of Critical Load		PEC as % of Critical Load (min)	
		CL max S	CL min N	CL max N	S	N	Total S	Total N	Min	Max	Min	Max
Scotton and Laughton Forest Ponds SSSI	Fen, marsh and swamp	0.2	0.3	0.5	0.2	1.8	0.002	0.002	0.9%	-	-	-
Tuetoes Hills SSSI	Acid grassland	0.2	0.4	0.6	0.2	1.4	0.002	0.002	0.8%	-	-	-
Messingham Sand Quarry SSSI	Broadleaved woodland	1.0	0.1	1.2	0.3	2.8	0.004	0.004	0.7%	-	-	-
Broughton Far Wood SSSI	Broadleaved woodland	0.7	0.3	1.0	0.2	3.0	0.003	0.003	0.6%	-	-	-
Epworth Turbary SSSI	Bogs	0.2	0.3	0.5	0.2	1.4	0.001	0.001	0.4%	-	-	-
Thorne, Crowle and Goole Moors SSSI	Bogs	0.1	0.3	0.5	0.2	1.5	0.001	0.001	0.4%	-	-	-
Belshaw SSSI	Neutral grassland supporting greater yellow-rattle	1.6	0.4	2.0	0.2	1.5	0.001	0.001	0.1%	-	-	-
Crowle Borrow Pits SSSI	Broadleaved woodland	2.3	0.1	2.7	0.3	2.6	0.002	0.002	0.1%	-	-	-

SSSI	Qualifying Interest Feature	Critical Load (keq ha^{-1} yr^{-1})			Baseline (keq ha^{-1} yr^{-1})		PC (keq ha^{-1} yr^{-1})		PC as % of Critical Load		PEC as % of Critical Load (min)	
		CL max S	CL min N	CL max N	S	N	Total S	Total N	Min	Max	Min	Max
Eastoft Meadow SSSI	Neutral Grassland	1.6	0.4	2.0	0.2	3.3	0.001	0.001	0.1%	-	-	-

3.3.8 Summary of Effects on National Sites

3.3.8.1 Due to exceedance of the 1% PC and 70% PEC targets, further assessment is required for Risby Warren SSSI for deposited acid (for acid grassland habitats).

3.3.8.2 There will be no likely significant effects on any of the remaining SSSIs as a result of emissions to air from the Project as the predicted PCs and PECs for all pollutant types were not significant.

3.3.9 Assessment of Effects on Local Sites

3.3.9.1 This section summarises the predicted effects of the air emissions on local sites (shown in Table 19 – Table 22). Where there are locally designated sites for nature conservation, emissions are considered to be insignificant if the short / long-term PC is less than 100% of the short / long term environmental standard. In all cases, the predicted short and long term PCs are less than 100% of the critical levels. Therefore emissions are considered to be insignificant and no likely significant effects on the local sites (Local Wildlife Sites, Local Nature Reserves and Ancient Woodland) within 2 km of the Project are predicted.

Table 19: Local Sites – Predicted PCs for NO_x and % of Critical Level

Designated Site	Critical Level (µg m^{-3})	PC (µg m^{-3})	PC as % of Critical Level
NO_x Annual Mean			
Burton Wood, Burton upon Stather LWS & AW	30	1.1	3.6%
Burton Wood AW	30	1.1	3.6%
Phoenix LNR	30	0.9	2.9%
Slag Banks LWS	30	0.8	2.6%
Phoenix Parkway LWS, LNR	30	0.5	1.5%
Paupers' Drain LWS	30	0.2	0.8%
NO_x 24hr			
Burton Wood, Burton upon Stather LWS	75	11.3	15.1%
Burton Wood AW	75	11.3	15.1%
Phoenix LNR	75	8.8	11.7%

Designated Site	Critical Level (µg m^{-3})	PC (µg m^{-3})	PC as % of Critical Level
Slag Banks LWS	75	8.2	11.0%
Paupers' Drain LWS	75	5.7	7.6%
Phoenix Parkway LWS, LNR	75	4.5	6.0%

Table 20: Local Sites - Predicted PCs for SO_2 and % of Critical Level

Designated Site	Critical Level (µg m^{-3})	PC (µg m^{-3})	PC as % of Critical Level
Burton Wood, Burton upon Stather LWS	20	0.2	1.0%
Burton Wood AW	20	0.2	1.0%
Phoenix LNR	20	0.2	0.8%
Slag Banks LWS	20	0.1	0.7%
Phoenix Parkway LWS, LNR	20	0.1	0.4%
Paupers' Drain LWS	20	0.03	0.1%

Table 21: Local Sites – Predicted PCs for NH_3 and % of Critical Level

Designated Site	Critical Level (µg m^{-3})	PC (µg m^{-3})	PC as % of Critical Level
Burton Wood, Burton upon Stather LWS	3	0.1	2.2%
Burton Wood AW	3	0.1	2.2%
Phoenix LNR	3	0.1	1.8%
Slag Banks LWS	3	0.05	1.6%
Phoenix Parkway LWS, LNR	3	0.02	0.8%
Paupers' Drain LWS	3	0.01	0.3%

Table 22: Local Sites – Predicted PCs for HF and % of Critical Level

Designated Site	Critical Level (µg m^{-3})	PC (µg m^{-3})	PC as % of Critical Level
HF Weekly			
Burton Wood, Burton upon Stather LWS	0.5	0.03	5.5%
Burton Wood AW	0.5	0.03	5.5%
Phoenix LNR	0.5	0.03	5.0%
Slag Banks LWS	0.5	0.02	4.2%
Phoenix Parkway LWS, LNR	0.5	0.01	1.9%
Paupers' Drain LWS	0.5	0.01	1.6%
HF 24hr			
Burton Wood, Burton upon Stather LWS	5	0.07	1.5%
Burton Wood AW	5	0.07	1.5%
Phoenix LNR	5	0.06	1.1%
Slag Banks LWS	5	0.05	1.0%
Paupers' Drain LWS	5	0.03	0.6%
Phoenix Parkway LWS, LNR	5	0.03	0.5%

4. ASSESSMENT OF POTENTIAL SIGNIFICANT EFFECTS

4.1 Introduction

4.1.1.1 The screening process concluded that further assessment was required to establish if there would be a significant effect on Risby Warren SSSI for deposited acid.

4.1.1.2 This section assesses the impacts of the Project on the relevant qualifying interest features of Risby Warren SSSI. A contour plot was produced to assist with the assessment of the potential effects of emissions to air, which illustrate the dispersion extent and concentrations of the pollutants as a percentage of the PC.

4.1.1.3 The condition of the SSSI is taken into account, based on NE condition assessments of the SSSI units. The aim of the assessment is to identify whether the predicted emission levels are likely to have a significant effect on the habitats or species that form the qualifying interest of the SSSI.

4.2 Risby Warren SSSI - Acid Deposition

4.2.1.1 Acid grassland is sensitive to the effects of acid deposition, which can lead to changes in species composition and have direct effects on lower plants (bryophytes and lichens). Acid deposition also results in additional nitrogen inputs to a system (due to falling sulphur levels, oxidised and reduced nitrogen dominates acid deposition).

4.2.1.2 The application of the ROC at the Risby Warren SSSI reduced the PC from the original assessment however it is still predicted to be greater than 1% against the minimum end of the CL range (1.5%). Whilst the PC is less than the 1% compared with the maximum end of the range, it is not possible to screen it out as discussions with Natural England confirmed that the site must be assessed against the CL Min due to the sensitivity of the qualifying features, their extensive loss and hence the Unfavourable-Declining Status[22] across most of the site. The PEC was also exceeded because of high background levels of sulphur and nitrogen.

4.2.1.3 Figure 3 illustrates the predicted levels of acid deposition across Risby Warren SSSI. Predicted PCs range from 1% of the CL at the southern end of the site, and gradually increase up to a maximum of 1.7% of the CL at the north western corner of the site.

4.2.1.4 This updated assessment is now based on the illustrative ROC and it is unlikely that this can be improved further. For example it has considered possible to increase the stack height (and even if it were, it would require a sizable increase to achieve the further reduction required), or reduce emissions at source any further. Natural England has indicated that management work on the site to help restore the habitat type that has been lost is ongoing and there are no on-site management options available for the Applicant to help mitigate the effects further. Hence significant residual effects from acid deposition are predicted to remain on the Risby Warren SSSI. The Applicant is engaged with Natural England to seek options to

22 [redacted]

compensate for these effects (e.g. through off site habitat improvements / creation).

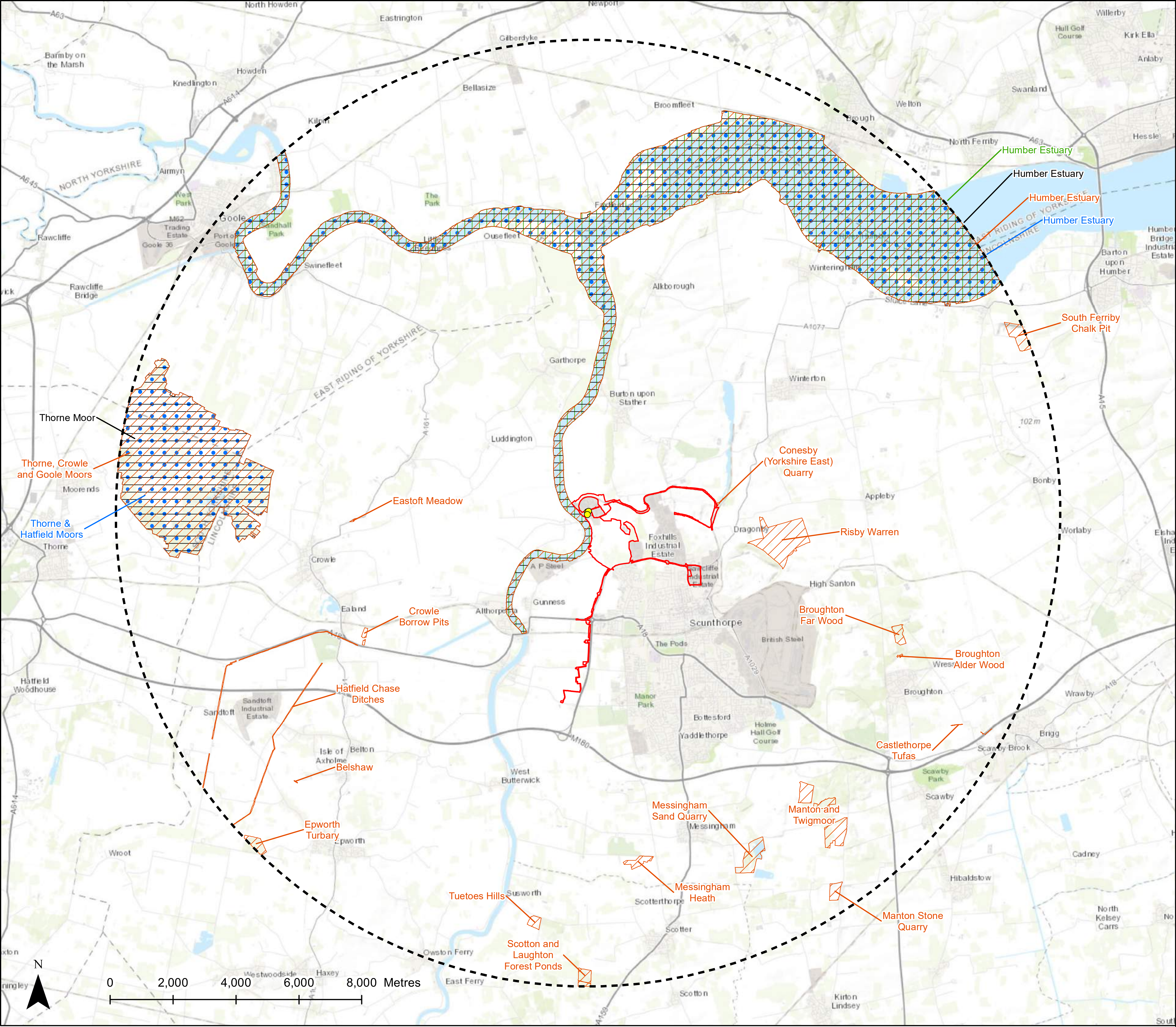
4.3 Summary of Effects

4.3.1.1 Significant residual effects at Risby Warren SSSI are predicted due to acid deposition. NLGEP Ltd are in discussion with Natural England about mitigation / compensation options.

4.3.1.2 There will be no significant effects to European, other national sites or local sites.

FIGURES

Date: April 2023



NORTH LINCOLNSHIRE GREEN ENERGY PARK

ERM

North Lincolnshire Green Energy Park

Title	Figure 1 European Sites and SSSIs within 15 km of the Emissions Source

Client Information

Client	North Lincolnshire Green Energy Park Ltd
PINS Proj No	EN010116
Date	20/05/2022
Drawn by	MTC
Checked by	SD
Version	P0

Map Information

CRS EPSG	27700
CRS Name	British National Grid
Scale	110,000
Drawing No	NLGEP-ERM-XX-XX-DR-Z-0013
ArcMap File	

EC_ES_STAT_NONSTAT_DesignatedSites_15kmBuffer_A01

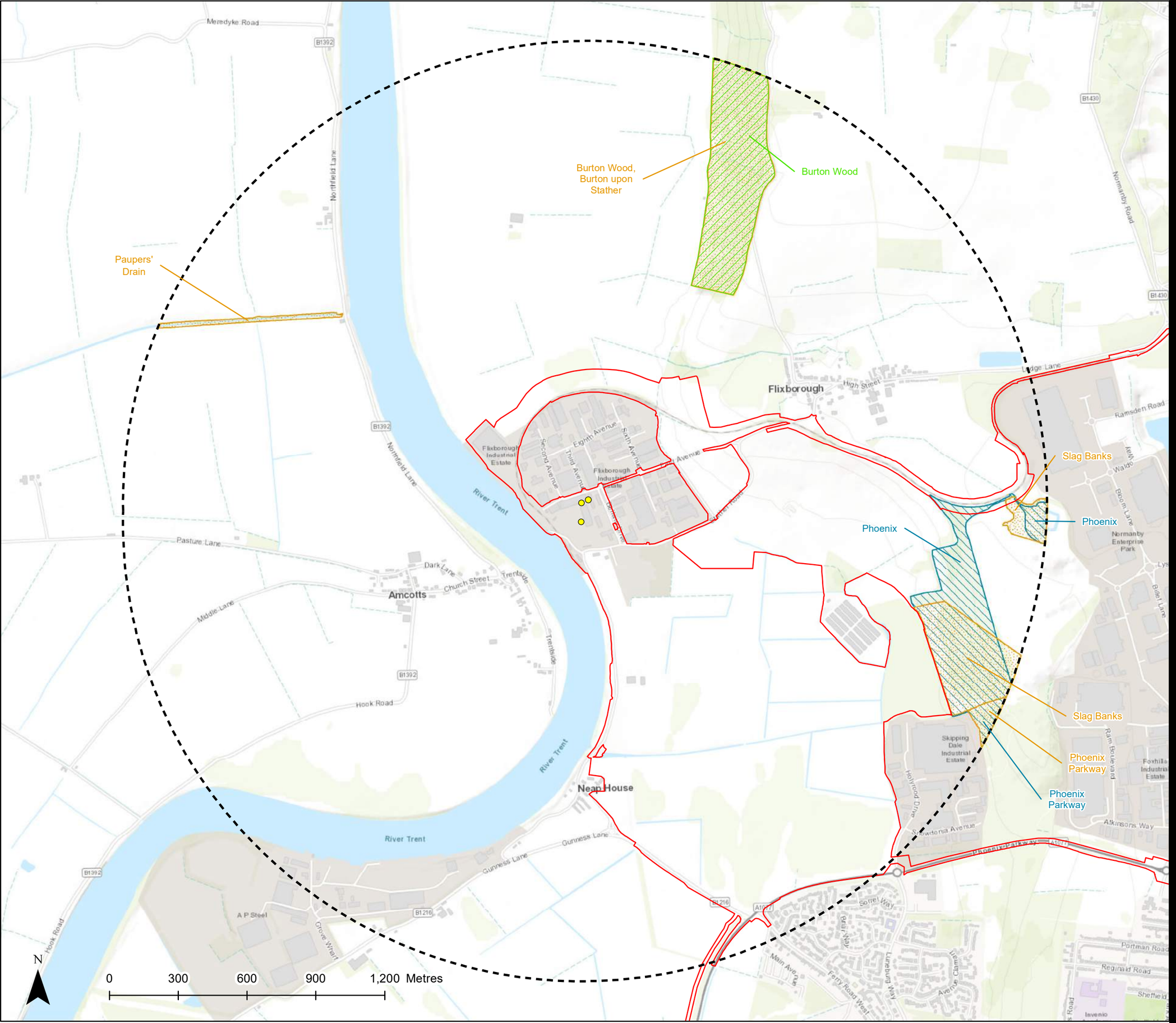
Legend

- Stack Location
- Order Limits
- 15km Buffer from Stack Location
- Special Area of Conservation
- Special Protection Area
- Ramsar Site
- Site of Special Scientific Interest (SSSI)

Layer Source Information

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c)

DO NOT SCALE THIS DRAWING



NORTH LINCOLNSHIRE GREEN ENERGY PARK

ERM

North Lincolnshire Green Energy Park

Title	Figure 2 Locally Important Ecology Designations within 2 km of the Emissions Source

Client Information

Client	North Lincolnshire Green Energy Park Ltd
PINS Proj No	EN010116
Date	20/05/2022
Drawn by	MTC
Checked by	SD
Version	P0

Map Information

CRS EPSG	27700
CRS Name	British National Grid
Scale	15,000
Drawing No	NLGEP-ERM-XX-XX-DR-Z-0016
ArcMap File	EC_ES_STAT_NONSTAT_NonDesignatedSites_2kmBuffer_A01

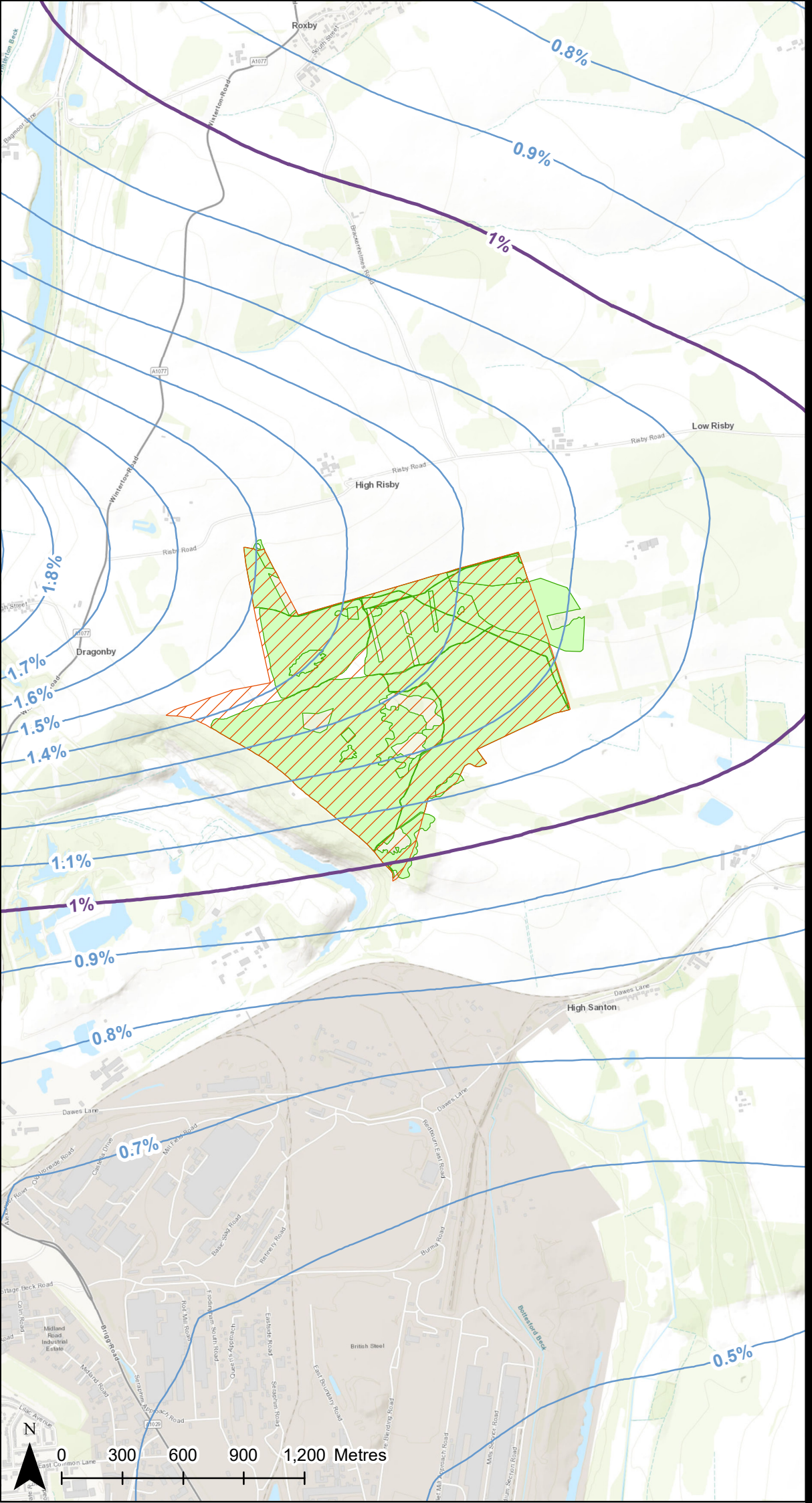
Legend

- Stack Location
- Order Limits
- 2km Buffer from Stack Location
- Ancient Woodland
- Local Wildlife Site (LWS)
- Local Nature Reserve (LNR)

Layer Source Information

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c)

DO NOT SCALE THIS DRAWING



NORTH LINCOLNSHIRE GREEN ENERGY PARK

ERM

North Lincolnshire Green Energy Park

Title Figure
Predicted Acid Deposition (% PC) at Risby Warren SSSI

Client Information

Client	North Lincolnshire Green Energy Park Ltd
PINS Proj No	EN010116
Date	17/04/2023
Drawn by	MTC
Checked by	KOC
Version	P0

Map Information

CRS EPSG	27700
CRS Name	British National Grid
Scale	25,000

ArcMap File

\\uksprdgisfs01\Data\London\Confidential Projects\0483091 - Solar

AQ_ReasonableCaseModel_V7_Risby_Acid_A01

Legend

Reasonable Operating Case (ROC): Acid Dep Contour Plot: PC as % of Critical Load (CL15) (min)

- 0.1% interval
- 1% contour
- Site of Special Scientific Interest (SSSI)
- Lowland Dry Acid

Layer Source Information

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI,

DO NOT SCALE THIS DRAWING

APPENDIX B EXTENDED PHASE 1 SURVEY REPORT

Date: March 2022

Flixborough, Lincolnshire

Technical Appendix B: Desk Study and Extended Phase 1 Habitat Survey

October 2018

Control sheet

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Title:	NLGEP Technical Appendix B: Phase 1 Habitat Survey 2018
Client:	North Lincolnshire Green Energy Park Ltd
Prepared by:	Claire Wilson*, Senior Ecologist*
Checked by:	Jeremy James, *Director & Principal Ecologist*
Date of Issue:	19th October 2018
Version:	1
Revisions:	0
Status:	FINAL

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This report has been prepared by an ecological specialist and does not purport to provide legal advice. You may wish to take separate legal advice.

The information which we have prepared and provided is true, and has been prepared and provided in accordance with the BS42020:2013 and the Chartered Institute of Ecology and Environmental Management's Code of Professional Conduct. We confirm that the opinions expressed are our true and professional bona fide opinions.

Bowland Ecology is accredited to Quality Guild (QG) standards in respect of our Quality, Environmental and Health and Safety procedures. The QG is an independent externally audited and accredited system that has been developed according to the principles of ISO9001, ISO14001 and OHAS18001.

Signed (Author)	Signed (QA)
[redacted]	[redacted]

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1. Introduction

1.1 Bowland Ecology Ltd was commissioned to complete a desk study and extended Phase 1 Habitat survey of land at Flixborough (NGR: SE 85715 14683), regarding the North Lincolnshire Green Energy Park (NLGEP) Project.

1.2 The survey area (see Appendix D) is dominated by hard standing areas, with occasional areas of scattered scrub and trees and areas of grassland. The River Trent is located directly adjacent to the western boundary of the survey area with tall ruderal and marginal vegetation located on the western boundary of the survey area. Habitats which may be affected by works includes broadleaved woodland, bare ground, scattered trees, scrub, buildings, grassland, tall ruderal and marginal vegetation.

1.3 The survey area is located within 7 km of the Humber Estuary Special Protection Area (SPA) therefore the Project has the potential to negatively impact qualifying bird species associated with the SPA. Consideration of the Project, its proximity to the SPA and its potential to be utilised by wintering, passage and breeding birds associated with the SPA will be considered as part of future development plans.

1.4 The survey area is located in North Lincolnshire, approximately one mile from Flixborough village, adjacent to the Flixborough Industrial Estate. The survey area is currently used as a port of entry from which goods are distribution. The survey area boundary is shown on the Phase 1 Habitat Plan in Appendix D.

1.5 The purpose of the survey was to complete an extended Phase 1 Habitat survey and to undertake a detailed desk study with particular reference to birds associated with the Humber Estuary SPA.

1.6 This report includes a description of survey methods and a summary description of habitats and fauna and further survey requirements.

2. Methodology

2.1 The desk study and extended Phase 1 Habitat survey followed the Guidelines for Using and Accessing UK Biodiversity Data (CIEEM, 2016) the Guidelines for Preliminary Ecological Appraisal (GPEA) (CIEEM, 2013) and are in line with the British Standard BS42020:2013 'Biodiversity – Code of practice for planning and development'.

Desk Study

2.2 The aim of the desk study was to identify the presence of statutory and non-statutory wildlife sites within the area and any legally protected species or Habitats and Species of Principal Importance for the conservation of biodiversity (Section 41 NERC Act, 2006).

2.3 The Multi-Agency Geographic Information for the Countryside (MAGIC) websurvey area (www.magic.gov.uk) was reviewed for information on locally, nationally and internationally designated survey areas of nature conservation importance (statutory sites only) on or within 5 km of the survey boundary.

2.4 Local records on and within 5 km of the survey boundary were obtained following a data search with Lincolnshire Environmental Records Network (GLNP)[1].

2.5 Ordnance Survey (OS) maps and aerial photographs [redacted]) were reviewed to help identify any continuous habitat and any other notable habitats within the surrounding area, together with any ponds within 0.25 km of the survey boundary.

2.6 Wetland Bird Survey (WeBS) low tide count data was requested to identify any important sites and legally protected species of non-breeding waterbirds close to, and within the survey boundary. The two low tide sections, CH054 & CH055 of the Humber Estuary were requested due to their proximity to the survey boundary.

2.7 The Lincolnshire Bird Report from 2015 was reviewed to identify any important sites and legally protected species of non-breeding waterbirds close to, and within the survey area boundary.

Phase 1 Habitat Survey

2.8 The extended Phase 1 Habitat survey followed standard methodology (JNCC, 2010 and CIEEM, 2017). All features of ecological significance were target noted.

2.9 This survey methodology records information on the habitats together with any evidence of and potential for legally protected and notable fauna, in particular:

- Potential roosting sites for bats within buildings and trees (identification of suitable cracks and crevices – survey undertaken externally and from ground only). An assessment of suitability was undertaken according to Collins, 2016 (Appendix B);

[1] Records from 2000 onwards are included within the data search from GLNP.

- Assessing the suitability of habitats for other notable and protected species such as nesting birds (including any active or disused nests), reptiles, water vole (*Arvicola amphibius*), otter (*Lutra lutra*), white-clawed crayfish (*Austropotamobius pallipes*), badger (*Meles meles*) and invertebrates;
- Checking for the most common invasive plant species subject to strict legal control including: Japanese knotweed (*Fallopia japonica*), giant knotweed (*F. sachalinensis*), hybrid knotweed (*F. x bohemica*), giant hogweed (*Heracleum mantegazzianum*), rhododendron (*R. ponticum, R. ponticum x R. maximum* and *R. luteum*) and Himalayan balsam (*Impatiens glandulifera*);
- Assessing the suitability of the habitat for amphibians and for the protected great crested newt. Ponds on and within 0.25 km (access permitting) of the survey area, were subject to a Habitat Suitability Index (HSI) (Oldham *et al*. 2000) assessment for great crested newt[2].

2.10 The survey was carried out by Claire Wilson MSc, BSc (Hons), ACIEEM on the 30th July 2018. The weather was warm (approximately 16°C) and dry, with 10% cloud cover and light mid breeze (Beaufort Scale No. 3).

2.11 The timing of the survey was within the optimum period and the majority of the survey area was accessible. Therefore, a valid assessment of the habitats present and their potential to support legally protected species was undertaken.

Limitations

2.12 Ecological surveys are limited by factors which affect the presence of plants and animals such as the time of year, migration patterns and behaviour. Therefore, the survey of the study area has not produced a complete list of plants and animals.

2.13 The list of invasive plant species included on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) is extensive and these plants are found in a range of different habitats, including aquatic habitats. The extended Phase 1 Habitat survey checked, in particular, for the presence of Japanese knotweed, giant knotweed, hybrid knotweed, giant hogweed, rhododendron and Himalayan balsam. There may be other invasive plant species present in the survey area which were not recorded, but it is considered that this survey is sufficient to identify any significant constraints posed by invasive plants.

[2] A HSI is a numerical index, between 0 and 1. Values close to 0 indicate unsuitable habitat, 1 represents optimal habitat. The HSI for the great crested newt incorporates ten suitability indices, all of which are factors known to affect this species. The HSI for great crested newts is a measure of habitat suitability - it is not a substitute for newt surveys.

3. Results

Designated Sites and Habitats of Principal Importance

3.1 Four statutory designations apply to the Humber Estuary, these include; Ramsar, Natura 2000 (Special Protection Area (SPA) and Special Area of Conservation (SAC)) and Sites of Special Scientific Interest (SSSI). The qualifying features and site descriptions for the aforementioned sites and their distance from survey boundary are described in Table 1 below. A plan showing locations of the designated sites in shown in Appendix G.

3.2 The data search with GLNP identified three Local Wildlife Sites (LWS) within 2 km of the survey area. Citations of these survey areas are also described in Table 1 below.

Table 1: Statutory & non-statutory designated wildlife sites within 10 km of the survey area.

Site Name	Site description & qualifying features	Distance from survey boundary (km) and direction
Statutory designated wildlife sites		
The Humber Estuary Ramsar site	The Estuary has five defined criteria detailing why the site qualifies as a wetland of international importance. These criterion are summarised below and detailed descriptions are provided within Appendix E. • Criterion 1 - the site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons; • Criterion 3 - the site supports a breeding colony of grey seals (*Halichoerus grypus*) at Donna Nook. It is the second largest grey seal colony in England and the furthest south regular breeding site on the east coast. The dune slacks at Saltfleetby-Theddlethorpe on the southern extremity of the site are the most north-easterly breeding site in Great Britain (GB) of the natterjack toad (*Bufo calamita*). • Criterion 5 - Internationally important assemblages of waterfowl during the non-breeding season. • Criterion 6 – bird species and/or populations occurring at levels of international importance (species list provided in Appendix E for species). • Criterion 8 - The site is an important migration route for river lamprey (*Lampetra fluviatilis*) and sea lamprey (*Petromyzon marinus*) between coastal waters and spawning areas.	Directly adjacent to the west
The Humber Estuary SAC	Primarily designated due to the presence of estuaries, Atlantic salt meadows, extensive intertidal mudflats and saltflats. Other qualifying features include; subtidal sandbanks, coastal lagoons, glasswort beds, Atlantic salt meadows and a variety of sand dune habitats. No species are selected as a primary reason for the sites designation, however Annex II species with qualifying features comprise of sea lamprey, river lamprey which breed in the River Derwent and grey seal.	Directly adjacent to the west
The Humber	The SPA covers an area of 37,630.24 ha and qualifies under article 4.1 of the Directive (79/409/EEC) as the site is regularly	6.83 km

Site Name	Site description & qualifying features	Distance from survey boundary (km) and direction
Estuary SPA	used by 1% or more of a variety of Annex I wintering and/or breeding birds (see Appendix F) The SPA also qualifies under article 4.2 of the Directive (79/409/EEC) as the site is regularly used by 1% or more of a variety of Annex I migratory species.	
The Humber Estuary SSSI	The SSSI is a site with nationally important habitats including the estuary comprising intertidal mudflats, sandflats and coastal saltmarsh; associated saline lagoons, sand dunes and standing waters. The site also supports breeding colonies of grey seals, river lamprey and sea lamprey. In addition, the site supports nationally important assemblages of breeding birds.	Directly adjacent to the west
Non-statutory designated wildlife sites		
Burton Wood, Burton upon Stather LWS	This site comprises woodland, several springs and small streams. The entire site is identified in the ancient woodland inventory as re-planted ancient woodland.	1.02 km north east
Paupers' Drain LWS	The site comprises a 7 km stretch of a canalised watercourse with an outfall into the Humber Estuary SSSI on the western banks of the River Trent.	1.24 km north west
Slag Banks LWS	This site comprises wetland and grassland on the north-eastern and south-eastern margins of an infilled ironstone quarry, and a botanically-rich sandy area in the south-west within Phoenix Parkway LNR.	1.65 km south east

3.3 The search of the Multi Agency Geographical Information Centre (www.magic.gov.uk) identified the following HPI's within 2 km of the survey area: lowland dry acid grassland, lowland mixed deciduous woodland, lowland heathland, reedbeds, coastal saltmarsh and mudflats. The closest HPI is an area of coastal saltmarsh and mudflat located directly adjacent to the survey areas western boundary. There is one area of ancient woodland also located within 2 km of the survey boundary.

Table 2: HPI and Ancient woodland sites located within 5 km of the survey area

Habitat	No. of areas within 5 km radius	No. of areas within 2 km radius	Distance from survey boundary (km) and direction
Priority Habitats			
Coastal saltmarsh and mudflat	Multiple	Multiple	Adjacent to western survey boundary
Lowland dry acid grassland	6	4	0.9 km south east
Lowland meadows	1	0	3.1 km east
Lowland mixed deciduous woodland	Over 50	10	0.6 km north east
Lowland raised bog	1	0	2.6 km south west
Lowland heathland	7	1	1.8 km south east
Reedbeds	1	1	1.9 km south east
Wet woodland	2	0	2.9 km north east
Wood-pasture and parkland	1	0	2.7 km north east
Ancient Woodland Sites			

Ancient & Semi-Natural Woodland	1	1	1 km south east
Ancient Replanted Woodland	1	0	4 km south east

Habitats

3.4 Target notes summarising key interest features for wildlife recorded during the extended Phase 1 habitat survey are included in Appendix C. The Phase 1 Habitat Plan of the survey presented in Appendix D, includes the locations of the target notes. Plant species nomenclature follows Stace (2010).

Buildings

3.5 14 building are present within the survey area, which are constructed from a variety of materials. The majority of the buildings used for the storage of materials are large, metal corrugated warehouse type buildings with pitched, corrugated roofs (B1 and B5 – B9). To the north side of the survey area, on the banks of the River Trent there is a small red brick building located adjacent to the River Trent, other brick buildings in the survey area are located at B3, B4 and B10, B11, B12, B13 and B15). B14 is a series of portakabins used primarily as office facilities.

Standing water

3.6 Two large (P1 approximately 40 m x 30 m, P2, 40 m x 15 m) very deep lined surface water drainage ponds are located 0.25 km south of the survey area. Both features have no aquatic vegetation present and are surrounded by scattered scrub and fencing on the margins.

3.7 An area of standing water is located at the south-eastern corner of the survey area at TN10. The topography of the survey area indicated that this area is a natural low point and water from hardstanding will run into this area. Construction materials including steel, timbers, and piles of aggregates are scattered throughout the area.

Running water

3.8 The River Trent located at TN1 is located directly adjacent to the western survey boundary and connects to the Humber further downstream. The banks of the river were not closely inspected due to high water levels, however, the banks appear gently sloping and muddy. The river is very wide, spanning approximately 0.16 km and is very turbid and fast flowing due to its tidal nature. It is also likely that water quality within the river is poor due to intensive agriculture in the surrounding area and surrounding industrial estates.

Broadleaved woodland and scattered trees

3.9 A small area of broadleaved woodland is located at the north eastern corner of the survey area at TN7. The woodland is located on a raised mound and comprises a very dense scrub layer with very little ground flora present. Scrub and canopy species include cherry (*Prunus avium*), damson (*Prunus domestica*), elder (*Sambucus nigra*), rose (*Rosa* sp.), field maple (*Acer campestre*), snowberry (*Symphoricarpos albus*), willow (*Salix sp*.), bramble (*Rubus fruticosus agg.)* and ash (*Fraxinus excelsior*).

3.10 A line of semi-mature trees is located at the south eastern corner of the survey area at TN11. Species present include poplar (*Populus* sp.), oak (*Quercus sp*.), pine (*Pinus sp*.), willow and ash.

Dense and scattered scrub

3.11 Scrub is a relatively common feature of the survey area, being more common in the northern section, particularly surrounding B1. The majority of the scrub is scattered and is dominated by willow, bramble and elder. At TN2, on the north western boundary of the survey area is an area of dense scrub dominated by willow and bramble.

Tall ruderal and marginal vegetation

3.12 Marginal vegetation dominated by common reed (*Phragmites australis*) is located along the banks of the River Trent just outside the western survey boundary at TN3. Scattered stands of Himalayan balsam are also present in and amongst the common reed.

3.13 Tall ruderal vegetation is located at the northern section of the survey area surrounding B1. The most frequently occurring species present include common nettle (*Urtica dioica*), rosebay willowherb (*Epilobium hirsutum*) and creeping thistle (*Cirsium arvense*). At TN8 on a mound of raised earth is a dense stand of tall ruderal vegetation comprising common nettle, rosebay willowherb, teasel (*Dipsacus fullonum*), broad-leaved dock (*Rumex obtusifolius*), false oat grass (*Arrhenatherum elatius*), greater willowherb (*Epilobium hirsutum*) and creeping thistle.

Species poor semi-improved grassland

3.14 There are several small areas of species poor semi-improved grassland scattered throughout the survey area, specifically at the north eastern tip, adjacent to the disused railway line on the eastern survey boundary, along the footpath adjacent to the River Trent and surrounding B12, to the south of the survey area. Common grassland species recorded include red fescue (*Festuca rubra*), dandelion (*Taraxacum agg*.) and annual meadow grass (*Poa annua*).

Introduced shrubs

3.15 Butterfly bush (*Buddleia davidii*) is scattered throughout the survey area, primarily at the northern section surrounding B1 and to the south, surrounding B10 and B12.

Other habitats

3.16 The survey area is dominated by hardstanding comprising roads, footpaths and storage areas.

3.17 Small areas of ephemeral vegetation on a shallow substrate is located between the storage buildings located to the south of the survey area.

3.18 A large mound of bare earth is located at TN5, directly north of B1.

Species

3.19 Species potentially present in suitable habitats on survey area and those noted within the data search are described in Table 3 below.

Table 3: Species potentially present in suitable habitats in the survey area and those noted within the data search

Species	Desk study information	Suitability of habitats in the survey area
Amphibians	No amphibian records within the search area.	An area of standing water is located in the survey area at TN10, this provides very limited potential for amphibians as it is likely to dry out frequently. There are two ponds, however, these are located just beyond 0.25 km from the survey area. Habitats in the survey area including broadleaved woodland, scrub, tall ruderal vegetation, rubble piles and other potential refugia including aggregates, piles of timber and steel provide refuge habitat for amphibians, however, due to the absence of suitable aquatic features within 0.25 km of the survey area and the absence of records, the potential for common species of amphibians to be present in the survey area is **low/negligible.**
Mammals		
Badger	The data search revealed six records of badger within the search area the closest of which is located 0.35 km east of the survey area. Information provided with the search indicates that all the records are of badger setts. However, there are pockets of woodland which could be used by species adjacent to survey area but no suitable habitat in the survey area.	There is a small area of woodland in the survey area, however, due to high levels of disturbance and the small nature of the woodland it is considered unlikely that it would be used by badger. Furthermore no evidence of the presence of the species was noted in the survey area during the survey. There is abundant, more suitable habitat in the wider area comprising scattered pockets of woodland, hedgerows and mature trees. Therefore the potential for badger to be present in the survey area is **negligible**.
Water vole	The data search revealed 31 records of water vole within the search area dating from 2000. 29 records were located on the western side of the River Trent. The two records located on the eastern side of the river (same side as the survey area) are from 2000 and are 0.85 km south of the survey area. The records contains no further details on water vole.	There is negligible habitat for water vole in the survey area due to the absence of watercourses and the River Trent is considered unsuitable for the species due to its wide, flashy and tidal nature making it prone to frequent water level changes. Therefore the potential for the species to be present in the survey area is **negligible.**
Otter	The data search revealed nine records of otter from 2000. The closest records for the species are located 0.85 km south of the survey area.	The River Trent may be used as a foraging and commuting route by the species and the marginal vegetation has potential to provide suitable lay-up sites. However, due to the tidal nature of the watercourse it is unlikely that otter would use lay-up sites along the river, they are more likely to use smaller tributaries linked to the feature. There is a small area of woodland in the survey area, however it is considered unsuitable for the species as it is away from the banks of the river and adjacent to buildings in the survey area where there are frequent vehicles and people movements.
Bats	The data search retuned 18 records for bats, nine of which are for common pipistrelle bat, one for pipistrelle species and eight records of bats, no species names were given. There are several records located in the village of	There are 14 buildings in the survey area. Buildings 1, 5, 6, 7, 8 and 9 are all large metal storage facilities that are open, light and draughty and comprise no bat roosting features. As such, they are considered to provide **negligible** potential to support roosting bats.

Species	Desk study information	Suitability of habitats in the survey area
Bats	Flixborough located 1.15 km east of the survey area. The closest record of known bat roost (species name not provided) is located approximately 1.76 km north east of the survey area, dated 2002, no further information was provided with the data.	Building 2, located on the banks of the River Trent (outside the survey area boundary) is a red brick building with a pitched, metal corrugated roof. A structural crack is located on the buildings eastern elevation. Therefore it is considered to have **low** potential to support sorting bats. Building 3 is a single storey red brick building with a pitched roof covered with timber and bitumastic felt both of which are in very poor condition with sections of felt and timber missing. Windows and doors are open and broken and no entry into the building is permitted due to the unsafe nature of the structure. Timber barge boards are present on the gable ends. Whilst the building has features suitable for roosting bats due to the very damp nature of the building and absence of suitable bat foraging and commuting habitat nearby the building is considered to have **negligible** potential to support roosting bats Building 4 is a red brick single storey building with a metal corrugated roof, used for housing electrical generators. The building has no suitable bat roosting features, therefore it is considered to provide **negligible** potential to support roosting bats. Building 10 is a single storey red brick building with a flat concrete roof with well-sealed metal framed windows and doors. No habitat suitable for roosting bats was noted during the survey. Therefore building is considered to have **negligible** bat roost potential. Building 11 is a small single storey red brick building with a flat roof located on the western survey area boundary. There is some missing brickwork on the buildings eastern elevation, however this is very low to the ground and is likely unsuitable for roosting bats. The building is considered to habe **negligible** potential to support roosting bats. Building 12 is a tall, red brick single storey building with a flat roof used as a mechanics garage. Large timber doors are open all day making the interna; space light and draught. The building is considered to have **negligible** potential to support roosting bats. Building 13 is a series of metal, single storey portakabins used as office facilities. The buildings are all well-sealed and have **negligible** potential to support roosting bats. Building 14 is a single storey red brick building with intact PVC framed windows and a flat concrete roof covered with bitumastic felting material. Internally the ceiling comprises suspended plaster board panels. The building has **negligible** bat roost potential due to the absence of suitable roosting features.

Species	Desk study information	Suitability of habitats in the survey area
		There is very limited foraging and commuting habitat in the survey area. The majority of suitable habitat comprising broadleaved woodland and scrub is located at the north eastern corner of the survey area. In addition, the survey area is heavily illuminated reducing the suitability for foraging and commuting bats. Therefore the survey area is considered to have **low** potential for foraging and commuting bats.
Brown Hare (*Lepus europaeus*)	The desk study returned two records of brown hare within the search area. The habitat surrounding the survey area is arable fields favoured by brown hares.	There are negligible habitats suitable for brown hare in the survey area. However the surrounding habitats, dominated by arable fields provide favourable habitat for the species.
Hedgehog (*Erinaceus europaeus*)	The desk study revealed four records of hedgehog within the search area, the closest of which is located in the village of Amcotts on the western side of the River Trent. There is abundant suitable habitat in the surrounding area of survey area.	Habitats in the survey area comprising broadleaved woodland, scrub and tall ruderal vegetation provides refuge habitat for hedgehog therefore there is potential for the species to utilise the aforementioned habitats, if present in the survey area.
Invertebrates	Records of butterflies returned by the desk study comprise grayling (*Hipparchia Semele*), small heath (*Coenonympha pamphilu*), wall (*Lasiommata megera*) and white-letter hairstreak (*Satyrium w-album*). The moth records comprise of garden tiger (*Artica caja*), mottled rustic (*Caradrina morpheus*), small square-spot (*Diarsia rubi*), light brown apple moth (*Epiphyas postvittana*), rosy minor (*Litoligia literosa*), dot moth (*Melanchra persicariae*), shoulder-striped wainscot (*Leucania comma*), cinnabar (*Tyria jacobaeae*), shaded broad-bar (Scotopteryx chenopodiata), knot grass (*Acronicta rumicis*), blood vein (*Timandra comae*), buff ermine (*Spilarctia luteum*), and white ermine (*Spilosoma lubricipeda*).	Tall ruderal vegetation, scrub and introduced shrubs, primarily butterfly-bush provide abundant food sources for a variety of moths and butterflies that may be present in the area. No records for protected or notable invertebrates were recorded in the survey area. However, during the survey a variety of butterflies including cabbage white (*Pieris rapae*), peacock (*Aglais io*), red admiral (*Vanessa atalanta*) and comma (*Polygonia c-album*) were noted at the northern section of the survey area, primarily foraging within scattered buddleia scrub and tall ruderal vegetation.

Birds

3.20 Due to the proximity of the Humber Estuary Ramsar and SPA to the survey area, a variety of sources were reviewed to assess the bird interest on and adjacent to the survey area. Table 4 below lists bird species recorded in the search area, their legal status and the presence of suitable habitat in the survey area. None of the species recorded were listed as being present in the survey area. During the survey blackbird (*Turdus merula*) was noted in the survey area; lesser black backed gulls (*Larus fuscus*) and back headed gulls (*Chroicocephalus ridibundus*) were also noted on the section of the River Trent adjacent to the survey area.

3.21 Birds of Conservation Concern 4 (BoCC4) (Eaton *et al,* 2015) assessment for birds in the UK, places birds on 'Red', 'Amber' or 'Green' lists to indicate the level of conservation concern. During the survey two Amber listed[3] species were encountered.

Table 4: Birds located within 2 km of the survey area, their legal status and habitat suitability

Species recorded on/or within 2 km of the survey area	Species associated with Humber Estuary SPA	Annex I Species (W&CA)	S41 Species of Principal Importance	Red Listed Species	Amber listed species	Suitability of habitat in the survey area
Lesser black-backed gull***					*	Noted to be roosting on the roof of Building 9 during the survey and on the section of the River Trent adjacent to the survey area.
Black-headed gull***					*	Noted to be roosting on the roof of Building 9 during the survey and on the section of the River Trent adjacent to the survey area.
Bullfinch			*		*	No substantial areas of woodland, hedgerows or orchards present on or within close proximity to the survey area.
Common gull					*	Roosting habitat present on the roofs of the large warehouse buildings.
Corn bunting *Emberiza calandra*			*	*		No suitable habitat present in the survey area, but abundant in the wider area.
Cuckoo			*	*		Scrub and woodland in the survey area if potentially suitable for the species. Habitats in the wider area are also considered favourable.
Fieldfare		*		*		No suitable habitat in the survey area but hedgerows and arable fields are abundant in the wider area.
Greater black-backed gull					*	Roosting habitat present on the roofs of the large warehouse buildings.
Green sandpiper		*			*	No suitable habitat present in the survey area but located directly adjacent on the banks of the River Trent.
Grey partridge			*	*		No suitable habitat present in the survey area but located in arable fields directly adjacent.
House sparrow *Passer domesticus*			*	*		Scattered scrub and woodland present in the survey area and in the wider area.

[3] ***Bird species noted in the survey area during the survey

Species recorded on/or within 2 km of the survey area	Species associated with Humber Estuary SPA	Annex I Species (W&CA)	S41 Species of Principal Importance	Red Listed Species	Amber listed species	Suitability of habitat in the survey area
Lapwing *Vanellus vanellus*	*		*	*		No suitable habitat present in the survey area but located in arable fields directly adjacent.
Linnet			*	*		Yes, Linnets use a wide varied habitat including scrub, wasteland and urban areas.
Mallard	*				*	No suitable habitat present in the survey area but located directly adjacent on the banks of the River Trent.
Red-legged partridge *Alectoris rufa*						No suitable habitat present in the survey area but located in arable fields directly adjacent.
Redshank *Tringa tetanus*	*				*	No suitable habitat present in the survey area but located directly adjacent on the banks of the River Trent.
Redwing *Turdus iliacus*		*		*		No suitable habitat present in the survey area but located in arable fields and hedgerows in the wider area.
Reed bunting *Emberiza schoeniclus*			*		*	No suitable habitat present in the survey area but located in arable fields and hedgerows in the wider area.
Skylark *Alauda arvensis*			*	*		No suitable habitat present in the survey area but located in arable fields and hedgerows in the wider area.
Song thrush *Turdus philomelos*			*	*		Potential habitat in the survey area comprises woodland and scrub, however, more favourable habitat is present in the wider area.
Spotted flycatcher *Muscicapa striata*			*	*		No favourable woodland habitat present in the survey area.
Starling *Sturnus vulgaris*			*	*		Located in a variety of habitats so may be presential in the survey area.
Tree sparrow *Passer montanus*			*	*		Limited suitable habitat for the species in the survey area in the form of woodland and scrub. Abundant habitat in the wider area.
Wigeon *Anas Penelope*					*	No suitable habitat present in the survey area but present in the wider area
Yellowhammer *Emberiza citrinella*			*	*		No suitable habitat present in the survey area but present in the wider area
Yellow wagtail *Motacilla flava*			*	*		No suitable habitat present in the survey area but present in the wider area.

3.22 The Lincolnshire Bird Report, 2015 provided no records of bird species associated with the Humber Estuary SPA in the survey area. However, the report did highlight the presence of a variety of waterfowl, waders, and coastal birds within 5 km of the survey area. These birds were mostly recorded within the Humber estuary to the north. The closest site, Bagmoor Floods located 4.5 km east of the survey area has records of wigeon (*Anas Penelope*) and pochard (*Aythya farina*) present in the area, both species are qualifying features of the Humber Estuary SPA.

4. Summary

4.1 The survey area is located adjacent to the Humber Estuary Ramsar, SAC and SSSI all of which lie to the west. The Humber Estuary SPA is located 6.83 km north of the survey area, downstream of the River Trent. Potential key issues surrounding the re-development of the survey area related to the aforementioned statutory designated survey areas is primarily related to the potential impacts on bird species noted as qualifying features of the designated sites.

4.2 Due to the potential to negatively impact the qualifying features of the Natura 2000 sites resulting from the Project, further consideration in respect of the Habitats Regulation Assessment (HRA) process will be required to assess the likely significant effects on the SPA.

4.3 However, the only species associated with the Humber Estuary SPA recorded within 2 km of the survey area are redshank and mallard. During the survey black headed gulls and lesser black-backed gulls were noted on the section of the River Trent directly adjacent to the survey area. The Project has the potential to negatively impact bird species associated with the SPA and other qualifying features via air pollution, emissions and other pollution discharges created during the demolition and construction process and once the development is completed and operational. Furthermore, the increased noise and activity levels during demolition and construction has the potential to impact wintering birds utilising fields adjacent to the survey area for foraging.

4.4 The majority of the survey area comprises hardstanding, and large metal corrugated buildings offering little intrinsic ecological value. Furthermore, the buildings within the survey area have negligible potential to support roosting bats due to the absence of suitable roosting features.

4.5 There is some scattered scrub, woodland and grassland in the survey area, however the areas are very small and due the industrial nature of the survey area it is unlikely that the aforementioned habitat would provide suitable habitat for species noted within the data search.

4.6 Habitats in the wider area comprising arable fields, hedgerows, ditches, mature trees and woodland provide more favourable habitat for bats, birds, small mammals, badger, otter and water vole.

4.7 During the survey lesser black-backed gulls were noted to be roosting on the roof of the large storage warehouses during the survey, specifically Building 9. The habitats in the survey area provide negligible foraging habitat for the species, however due to its proximity to the River Trent it is likely that a variety of gulls utilise the roofs of the buildings for roosting locations. Habitats on the peripheries of the survey area including scrub, woodland, and scattered trees offer some potential for tree and shrub nesting birds, however these habitat types are abundant in the wider area, therefore the loss of these habitats is unlikely to significantly impact any bird species that may utilise them.

4.8 In summary, the main impacts from Project are likely to be in respect of birds associated with the SPA, therefore, it is advised to fully inform the HRA that wintering bird surveys are undertaken between October and March to fully assess the use of the survey area and wider area by qualifying species of the SPA.

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Appendix A – Legal Information

This report provides guidance of potential offences as part of the impact assessment. This report does not provide detailed legal advice and for full details of potential offences against protected species the relevant acts should be consulted in their original forms i.e. The Wildlife and Countryside Act, 1981, as amended, The Countryside and Rights of Way Act 2000, The Natural Environment and Rural Communities Act, 2006 and The Conservation of Habitats and Species Regulations 2017.

Species	Legislation	Offences	Notes on licensing procedures and further advice
Species that are protected by European and national legislation			
Birds	Conservation of Habitats and Species (Amendment) Regulations 2012	N/A	Authorities are required to take steps to ensure the preservation, maintenance and re-establishment of a sufficient diversity and area of habitat for wild birds in the United Kingdom, including by means of the upkeep, management and creation of such habitat. This includes activities in relation to town and country planning functions.
	Wildlife and Countryside Act 1981 (as amended)[4] S.1	Intentionally kill, injure or take any wild bird; Intentionally take, damage or destroy the nest of any wild bird while that nest is in use or being built; Intentionally take or destroy the nest or eggs of any wild bird. **Schedule 1 species** Special penalties are liable for these offences involving birds on Schedule 1 (e.g. most birds of prey, kingfisher, barn owl, black redstart, little ringed plover). Intentionally or recklessly[3] disturb a Schedule 1 species while it is building a nest or is in, on or near a nest containing eggs or young; intentionally or recklessly disturb dependent young of such a species.	No licences are available to disturb any birds in regard to development. Licences are available in certain circumstances to damage or destroy nests, but these only apply to the list of licensable activities in the Act and do not cover development. General licences are available in respect of 'pest species' but only for certain very specific purposes e.g. public health, public safety, air safety. https://www.gov.uk/wild-birds-protection-surveys-and-licences https://www.gov.uk/prevent-wild-birds-damaging-your-land-farm-or-business
Otter *European protected species*	Conservation of Habitats and Species Regulations 2017 Reg 41	Deliberately[1] capture, injure or kill an otter; Deliberate disturbance[2] of otters; Damage or destroy a breeding site or resting place used by an otter.	Licences issued for development by NE. https://www.gov.uk/otters-protection-surveys-and-licences *European Protected Species: Mitigation Licensing- How to get a licence* (NE 2010)
	Wildlife and Countryside Act 1981 (as amended)[4] S.9	Intentionally or recklessly[3] obstruct access to any structure or place used for shelter or protection or disturb an otter in such a place.	No licence is required for survey in England. However, a licence would be required if the survey methodology involved disturbance.

Species	Legislation	Offences	Notes on licensing procedures and further advice
Other species			
Rabbits, foxes and other wild mammals **For BAP species and Species of Principal Importance, see below**	Wild Mammals (Protection) Act 1996	Intentionally inflict unnecessary suffering to any wild mammal.	Natural England provides guidance in relation to rabbits (Technical Information note TIN003, Rabbits- management options for preventing damage, July 2007) and foxes (which are also protected under the Wildlife and Countryside Act 1981 from live baits and decoys, see Species Information notes SIN003 (2011), *Urban foxes* and SIN004 (2011) *The red fox in rural areas* as well as other wild mammals. Lawful and humane pest control of these species is permitted.

[1]Deliberate capture or killing is taken to include "accepting the possibility" of such capture or killing

[2]Deliberate disturbance of animals includes in particular any disturbance which is likely a) to impair their ability (i) to survive, to breed or reproduce, or to rear or nurture their young, or (ii) in the case of animals of hibernating or migratory species, to hibernate or migrate; or b) to affect significantly the local distribution or abundance of the species to which they belong.
Lower levels of disturbance not covered by the Conservation of Habitats and Species Regulations 2017 remain an offence under the Wildlife and Countryside Act 1981 although a defence is available where such actions are the incidental result of a lawful activity that could not reasonably be avoided. Thus deliberate disturbance that does not result in either (a) or (b) above would be classed as a lower level of disturbance.

[3]The term 'reckless' is defined by the case of Regina versus Caldwell 1982. The prosecution has to show that a person deliberately took an unacceptable risk, or failed to notice or consider an obvious risk.

[4] The Wildlife and Countryside Act (1981) has been updated by various amendments, including the Countryside and Rights of Way Act 2000 and the Natural Environment and Rural Communities Act 2006. A full list of amendments can be found at http://jncc.defra.gov.uk/page-1377.

Site Designation	Legislation	Protection	Guidance
Special Area of Conservation (SAC) **Special Protection Area (SPA)** **Wetland of International Importance (Ramsar site)**	Conservation of Habitats and Species Regulations 2017 Conservation of Habitats and Species (Amendment) Regulations 2012 EC Directive on the conservation of natural habitats and of wild fauna and flora (92/42/EEC). EC Directive on the conservation of wild birds (79/409/EEC). Convention on Wetlands of International Importance especially as Waterfowl Habitat 1971 (the Ramsar Convention).	Planning controls are effected through Part 2 of the Conservation of Habitats and Species regulations 2017 (Reg 21) and Part 6 (Regs 61- 67). The legislation for the Site of Special Scientific Interest which will underpin each designation also applies. These sites are given protection through policies in the Local Development Plan.	Formal Appropriate Assessment is required before undertaking, or giving consent, permission or other authorisation for a plan or project which is likely to have a significant effect on such a site. Further guidance can be found in the National Planning Policy Framework and the accompanying joint Circular (ODPM Circular 6/2005 & Defra Circular 01/2005) to PPS9 for England, which is still valid. Consent under S28 is required from NE for actions likely to damage a SSSI. The Conservation of Habitats and Species Regulations (Amendment) 2012 simplifies the Regulations in the case of a European site which is also a SSSI. All applications for carrying out operations on such as site are now made under S28 of the WCA.
Site of Special Scientific Interest (SSSI)	Wildlife and Countryside Act 1981 (as amended)	It is an offence to carry out or permit to be carried out any potentially damaging operation. SSSIs are given protection through policies in the Local Development Plan.	Owners, occupiers, public bodies and statutory undertakers must give notice and obtain the appropriate consent under S.28 before undertaking operations likely to damage a SSSI. S.28G places a duty on all public bodies to further the conservation and enhancement of SSSIs. Further guidance can be found in the National Planning Policy Framework and the accompanying joint Circular (ODPM Circular 6/2005 & Defra Circular 01/2005) to PPS9 for England, which is still valid.

Habitats & Species	Legislation	Guidance
Species and Habitats of Principal Importance for the Conservation of Biodiversity	Natural Environment & Rural Communities Act 2006 S.40 (which superseded S.74 of the Countryside & Rights of Way Act 2000).	S.40 of the NERC Act 2006 sets out the duty for public authorities to conserve biodiversity in England. Habitats and species of principal importance for the conservation of biodiversity are identified by the Secretary of State in consultation with NE, are referred to in S.41 of the NERC Act for England. The list of habitats and species was updated in 2008: http://webarchive.nationalarchives.gov.uk/20140605090108/http:/www.naturalengland.org.uk/ourwork/conservation/biodiversity/protectandmanage/habsandspeciesimportance.aspx The habitats and species listed are not necessarily of higher biodiversity value, but they may be in decline. Habitat Action Plans and Species Action Plans are written for them or are in preparation, to guide their conservation. Ecological impact assessments should include an assessment of the likely impacts to these habitats and species.

Habitats & Species	Legislation	Guidance
Himalayan balsam	Wildlife and Countryside Act 1981 (as amended) S.14	It is illegal to plant these species or otherwise cause them to grow or spread in the wild. Any contaminated soil or plant material containing Japanese knotweed or giant hogweed is classified as controlled waste and should be disposed of in a suitably licensed landfill site, accompanied by appropriate Waste Transfer documentation, and must comply with section 34 of the Environmental Protection Act 1990. *Guidance on Section 14 of the Wildlife and Countryside Act, 1981* (Defra, 2010)

Appendix B – Bat Roost Potential and Habitat Suitability Categories

Guidelines for assessing the potential suitability of proposed development sites for bats, based on the presence of habitat features within the landscape (Collins, 2016).

Suitability	Description of Roosting Habitat	Commuting & Foraging Habitats
Negligible	Negligible habitat features on site likely to be used by roosting bats	Negligible habitat features on site likely to be used by commuting or foraging bats.
Low	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 habitats to be used on a regular basis or by a larger number of bats (i.e. unlikely to be suitable maternity or hibernation). A tree of sufficient size and age to contain potential roosting features but with none seen from the ground, or feature seen with only very limited roosting potential.	Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or unvegetated stream, but isolated i.e. not very well connected to the surrounding landscape by other habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
Moderate	A structure or 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 of high conservation status.	Continuous habitat connected to the wider landscape that could be used by bats for commuting, such as lines of trees and scrub or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging, such as trees, scrub, grassland or water.
High	A structure or 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.	Continuous high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines of trees and woodland edge. High quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats, such as broadleaved woodland, tree-lined watercourses and grazed parkland. Site is close and connected to known roosts.

Appendix C – Target Notes

Target Note	Description	Photograph
TN1	River Trent, a wide, fast flowing, very turbid watercourse. The section of the river adjacent to the survey area has bankside vegetation dominated by common reed (*Phragmites australis*). Numerous gulls were noted on the water during the survey including black-headed gulls (*Chroicocephalus ridibundus*) and lesser black-backed gulls (*Larus fuscus*).	
TN2	A mosaic of scrub and tall ruderal vegetation located on a raised earth bund on the south-western side of Building 1. Species present include; willow (*Salix sp*.), common nettle (*Urtica dioica*), Yorkshire fog (*Holcus lanatus*), rosebay willowherb (*Chamaenerion angustifolium*), creeping thistle (*Cirsium arvense*), common hogweed (*Heracleum sphondylium*), great willowherb (*Epilobium hirsutum*), Himalayan balsam (*Impatiens glandulifera*), bindweed (*Calystegia sepium*), colt's foot (*Tussilago farfara),* elder (*Sambucus nigra),* field maple (*Acer campestre*), bramble (*Rubus fruticosus*) and Snowberry (*Symphoricarpos albus*). The scrub is denser towards the south.	
TN3	Marginal vegetation on the banks of River Trent. Dominated by common reed (*Phragmites australis*) with occasional common nettle (*Urtica dioica*), bindweed (*Convolvulus* sp.), common hogweed (*Heracleum sphondylium*), Himalayan balsam (*Impatiens glandulifera*), Yorkshire fog (*Holcus lanatus*), cock's-foot (*Dactylis glomerata*), common couch (*Elymus repens*), broad-leaved dock (*Rumex obtusifolius*), great willowherb (*Epilobium hirsutum*), and cleavers (*Galium aparine*). Scattered willow (*Salix sp.*) and elder (*Sambucus nigra*) scrub is also occasional within the area	
TN4	Dense stand of Himalayan balsam (*Impatiens glandulifera*) on banks of river.	No photograph

Target Note	Description	Photograph
TN5	Hardstanding in working industrial estate, predominantly tarmac roads, storage areas and walkways. Construction materials are scattered throughout. The areas of hardstanding, materials include including steel rails, rubble piles, bricks, timber, concrete, pallets. The majority of the items are raised from the ground; however, some are scattered along grassy verges.	
TN6	The boundary of B1 is surrounded by steel girders, timbers and piles of waste. Amongst this is scattered tall ruderal vegetation, dominated by willowherb species, introduced shrubs, primarily butterfly bush (*Buddleja davidii*) and short grasses including red fescue (*Festuca rubra)* and Yorkshire fog (*Holcus lanatus*).	
TN7	Mound of earth adjacent to the disused railway line. Densely vegetated with semi-mature trees and scrub species, including cherry (*Prunus avium*), damson (*Prunus domestica*), elder (*Sambucus nigra*), rose, field maple (*Acer campestre*), snowberry (Symphoricarpos albus), willow (*Salix sp*.), bramble (*Rubus fruticosus)* and ash (*Fraxinus excelsior*).	
TN8	The section of mound closest to B1 is dominated by tall ruderal vegetation comprising common nettle (Urtica dioica), rosebay willowherb (*Chamaenerion angustifolium*), teasel (*Dipsacus fullonum*), broad-leaved dock (*Rumex obtusifolius*), false oat grass (*Arrhenatherum elatius*), great willowherb (*Epilobium hirsutum*) and creeping thistle (*Cirsium arvense*).	

Target Note	Description	Photograph
TN9	An old mineral railway line with stone substrate beneath steel rails and timber railway sleepers. Vegetation with a mixture of grass species, herbs and scrub. Red fescue (*Festuca rubra*) dominates the area. Bramble (*Rubus fruticosus*) is located along the boundary of survey area. Other species present includes rosebay willowherb (*Chamaenerion angustifolium*), butterfly bush (*Buddleja davidii*), false oat grass (*Arrhenatherum elatius*), dandelion (*Taraxacum*), hawkweed *(Hieracium*), common ragwort, teasel, willow, weld and Yorkshire fog. A Mound of earth covered with grasses is located directly adjacent to railway line, species present includes cock's-foot (*Dactylis glomerata*), red fescue (*Festuca rubra*), and ribwort plantain (*Plantago lanceolata*).	
TN10	Large area of standing water at the south eastern corner of the survey area. Construction materials are scattered throughout the area. These include steel, timbers, and piles of aggregates.	
TN11	Linear semi-mature trees present on the south western boundary of the survey area. Species present are poplar (*Populus*), oak (*Quercus sp*.), pine (*Pinus sp*.), willow (*Salix sp.)* and ash (*Fraxinus excelsior*) trees.	

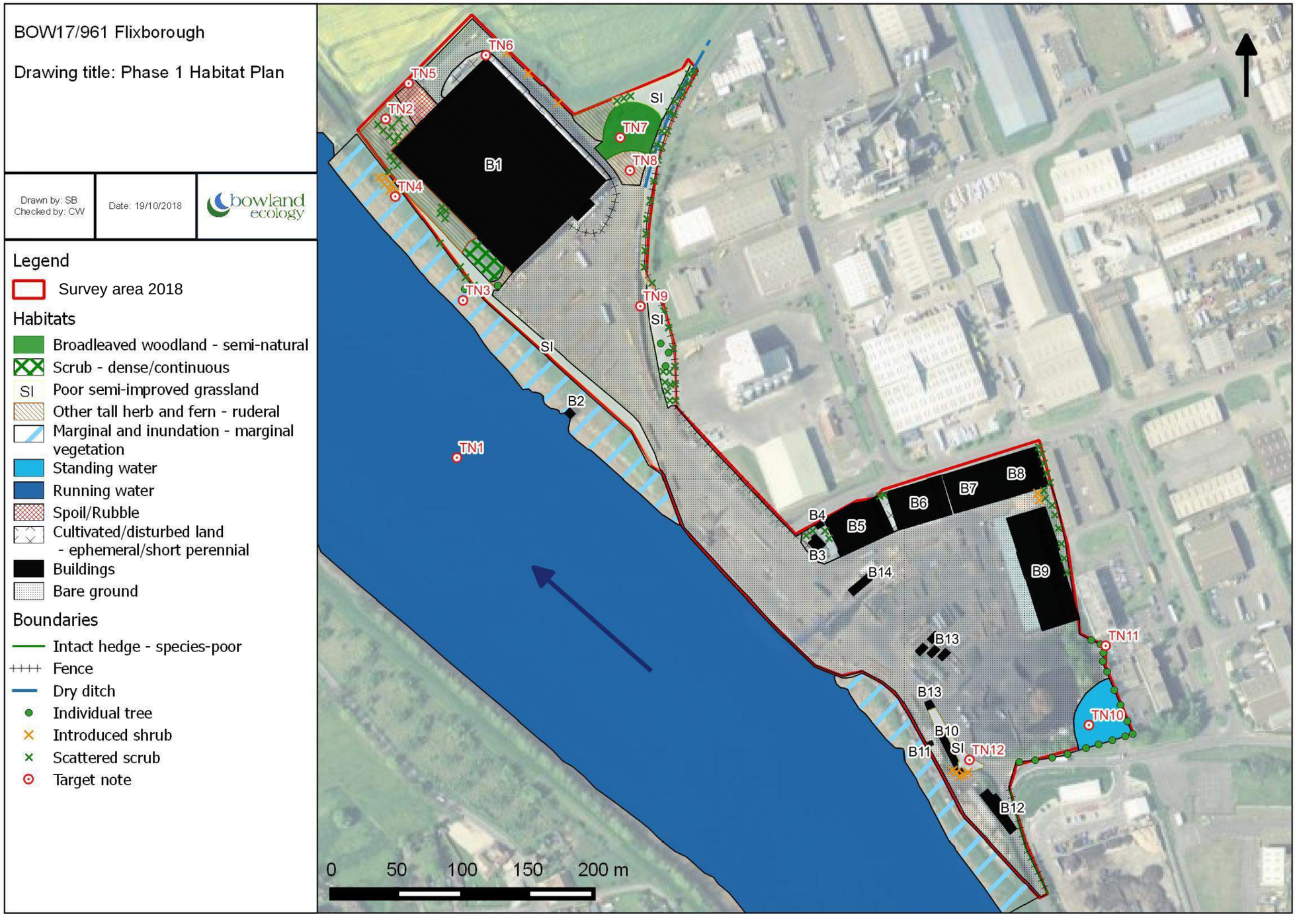
Target Note	Description	Photograph
TN12	An area dominated by scrub including, young willow (*Salix sp*.), common nettle (*Urtica dioica*), broad-leaved dock (*Rumex obtusifolius*) and butterfly bush (*Buddleja davidii*).	
TN13	Mosaic of ephemeral, tall ruderal vegetation and introduced shrubs. Species present includes butterfly bush, nettle, dandelion, cock's-foot, daisy, red clover, great willowherb and common ragwort.	No photograph
B1	A large corrugated, metal storage building located at northern tip of the survey area. The roof is pitched with skylights along all sections making the internal space very light. The building is used for the storage of materials and internally is well lit and relatively noisy due to vehicle movements. No habitat suitable for roosting bats was noted during the survey. As such the building is considered to have negligible potential to support roosting bats. Evidence of roosting pigeons was recorded inside the building as numerous droppings were noted on the floor.	
B2	A single storey red brick building with a pitched corrugated roof located on the banks of the River Trent outside of the survey area boundary. Structural cracks are located on the north eastern facing elevation.	

Target Note	Description	Photograph
B3	Single storey red brick building with a pitched roof comprising of timber covered with bitumastic felt which is in very poor condition with sections of felt and timber missing. The windows and doors are open and broken and no entry into the building is permitted due to the unsafe nature of the structure. Timber barge boards are also present on the on gable ends. A view if the internal space from the windows identified as separate loft space, however, ceiling panels were missing due to the very damp nature of the building. There are also numerous gaps in the brick. The building is considered to have negligible potential to support roosting bats due to its very damp nature.	
B4	Single storey red brick building with a mono pitch corrugated roof. The building is used to house electrical generators and has negligible potential to support roosting bats.	No photograph
B5-9	Series of five large metal corrugated storage sheds with pitched corrugated roofs. All the buildings have large doors which are open throughout the day. Large skylights across the roof. The building has negligible potential to support roosting bats. The surrounding area is also very noisy and heavily lit.	
B10	Single storey red brick building with a flat concrete roof. Well sealed metal framed windows and doors are also present. No habitat suitable for roosting bats was noted. The building considered has negligible bat roost potential.	

Target Note	Description	Photograph
B11	Single storey, red brick building with a flat roof. Some areas have missing bricks and mortars, some gaps in brickwork, however, these are all low to ground. The building has negligible potential to support roosting bats.	
B12	Red brick building with a flat roof used as a mechanics garage. Large doors are open all day. The building has negligible potential to support roosting bats.	
B13	A series of portacabins with metal frames and flat roofs used as office facilities. Negligible bat roost potential.	
B14	Single storey red brick building with PVC framed windows and a flat bitumen felted roof with concrete slabs on the edges. Well-sealed timber barge boards are present on the northern. Internally the ceiling comprises suspended plaster board. The building has negligible bat roost potential.	

Target Note	Description	Photograph
P1 & P2	Two surface water drainage ponds, both very deep and lined. No aquatic vegetation is present and scattered scrub on is present on the banks.	

Appendix D – Phase 1 Habitat Plan



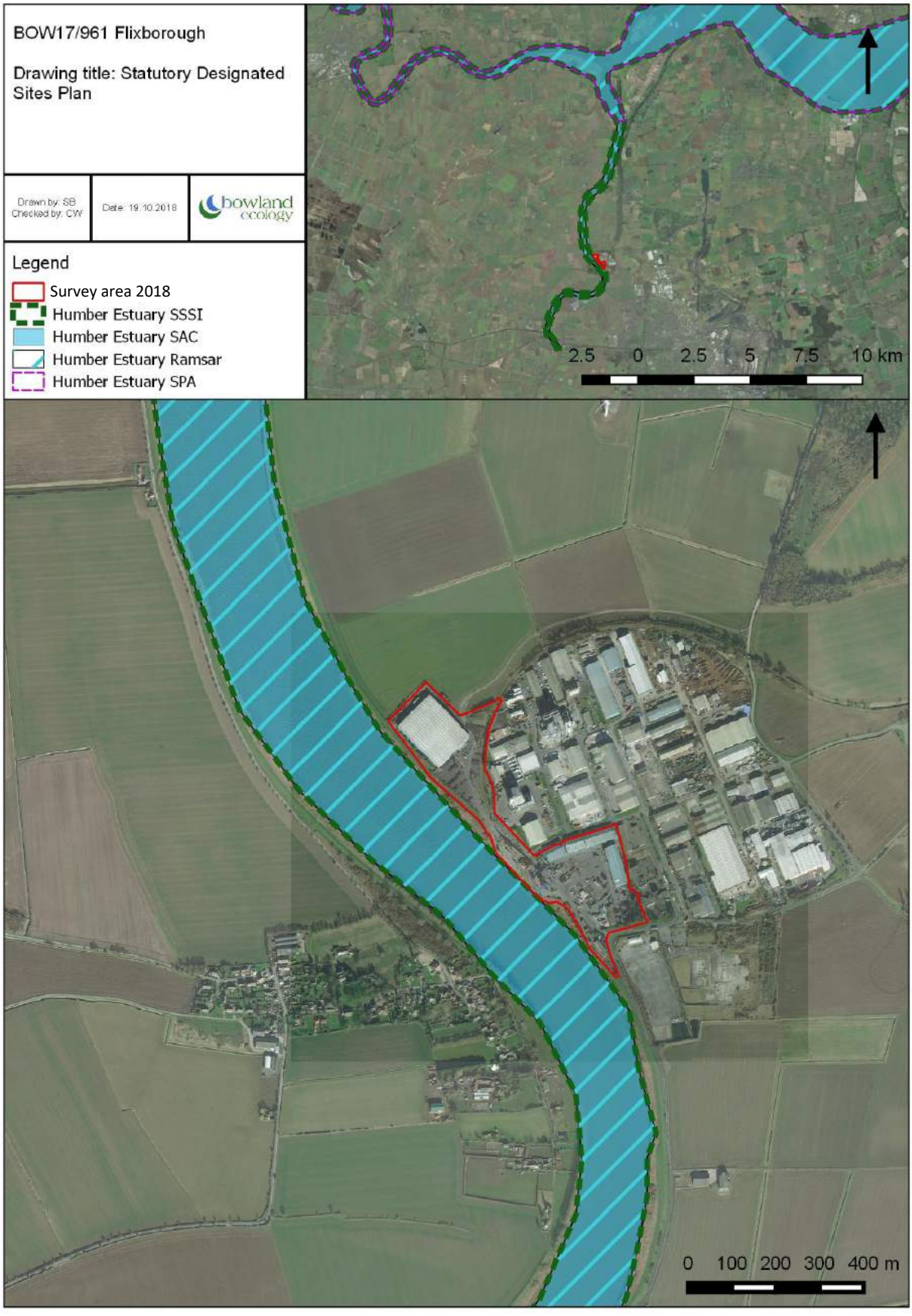
Appendix E – Humber Estuary (Ramsar Site) qualifying peak species counts

Common Name	Latin Name	Key Population Facts
Species with peak counts in spring/autumn:		
European golden plover	*Pluvialis apricaria apricaria*	17996 individuals, representing an average of 2.2% of the population (1996-2000).
Red knot	*Calidris canutus islandica*	18500 individuals, representing an average of 4.1% of the population (1996-2000)
Dunlin	*Calidris alpina alpina*	20269 individuals, representing an average of 1.5% of the population (1996-2000)
Black-tailed godwit	*Limosa limosa islandica*	915 individuals, representing an average of 2.6% of the population (1996-2000)
Common redshank	*Tringa totanus totanus*	7462 individuals, representing an average of 5.7% of the population (1996-2000)
Species with peak counts in spring/autumn:		
Common shelduck	*Tadorna tadorna*	4464 individuals, representing an average of 1.5% of the population (1996/7 to 2000/1)
European golden plover	*Pluvialis apricaria apricaria*	30709 individuals, representing an average of 3.8% of the population (1996/7 to 2000/1)
Red knot	*Calidris canutus islandica*	28165 individuals, representing an average of 6.3% of the population (1996/7 to 2000/1)
Dunlin	*Calidris alpina alpina*	22222 individuals, representing an average of 1.7% of the population (1996/7 to 2000/1)
Wintering		
Dunlin	*Calidris alpina alpina*	22222 individuals, representing an average of 1.7% of the population (1996/7 to 2000/1)
Black-tailed godwit	*Limosa limosa islandica*	1113 individuals, representing an average of 3.2% of the population (1996/7 to 2000/1)
Bar-tailed godwit	*Limosa lapponica lapponica*	2752 individuals, representing an average of 2.3% of the population (1996/7 to 2000/1)

Appendix F – Humber Estuary (SPA) qualifying species

Breeding:		
Common Name	**Latin Name**	**Key Population Facts**
Little Tern	*Sterna albifrons*	63 pairs representing at least 2.6% of the breeding population in Great Britain
Marsh Harrier	*Circus aeruginosus*	11 pairs representing at least 6.9% of the breeding population in Great Britain (Count as at 1995)
Passage Migrants:		
Redshank	*Tringa totanus*	5,212 individuals representing at least 2.9% of the Eastern Atlantic - wintering population (5-year peak mean 1991/2 - 1995/6)
Sanderling	*Calidris alba*	1,767 individuals representing at least 1.8% of the Eastern Atlantic/Western & Southern Africa - wintering population (2 year mean May 1993 - 1994
Over Winter:		
Bar-tailed Godwit	*Limosa lapponica*	1,593 individuals representing at least 3.0% of the wintering population in Great Britain (5-year peak mean 1991/2 - 1995/6)
Bittern	*Botaurus stellaris*	2 individuals representing at least 2.0% of the wintering population in Great Britain (5 year mean 91/2-95/6)
Golden Plover	*Pluvialis apricaria*	29,235 individuals representing at least 11.7% of the wintering population in Great Britain (5-year peak mean 1991/2 - 1995/6)
Hen Harrier	*Circus cyaneus*	20 individuals representing at least 2.7% of the wintering population in Great Britain (5-year peak mean 1984/5-1988/9)
Dunlin	*Calidris alpina alpina*	23,605 individuals representing at least 1.7% of the wintering Northern Siberia/Europe/Western Africa population (5-year peak mean 1991/2 - 1995/6)
Knot	*Calidris canutus*	33,848 individuals representing at least 9.7% of the wintering Northeastern Canada/Greenland/Iceland/Northwestern Europe population (5-year peak mean 1991/2 - 1995/6)
Redshank	*Tringa totanus*	4,452 individuals representing at least 3.0% of the wintering Eastern Atlantic - wintering population (5-year peak mean 1991/2 - 1995/6)
Shelduck	*Tadorna tadorna*	4,083 individuals representing at least 1.4% of the wintering Northwestern Europe population (5-year peak mean 1991/2 - 1995/6)
Assemblages qualification:		
Over winter, the area regularly supports 187,617 individual waterfowl (5 year peak mean 1991/2 - 1995/6) including: mallard (*Anas platyrhynchos)*, golden plover (*Pluvialis apricaria)*, bar-tailed godwit (*Limosa lapponica)*, shelduck (*Tadorna tadorna)*, knot (*Calidris canutus)*, dunlin (*Calidris alpina)*, redshank (*Tringa tetanus)*, cormorant (*Phalacrocorax carbo)*, dark-bellied brent goose (*Branta bernicla bernicla)*, bittern (*Botaurus stellaris)*, teal (*Anas crecca)*, curlew (*Numenius arquata)*, pochard (*Aythya farina)*, poldeneye (*Bucephala clangula)*, oystercatcher (*Haematopus ostralegus)*, ringed plover (*Charadrius hiaticula)*,grey plover (*Pluvialis squatarola)*, lapwing (*Vanellus vanellus)*, sanderling (*Calidris alba)*, black-tailed godwit (*Limosa limosa islandica)*, wigeon (*Anas Penelope)*, whimbrel (*Numenius phaeopus)*.		

Appendix G – Plan of Statutory Designated Sites



North Lincolnshire Green Energy Park

Technical Appendix B: Extended Phase 1 Habitat Survey

July 2019

Control sheet

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Job number:	BOW17/961	
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1. Introduction

1.1 Bowland Ecology Ltd was commissioned to complete an extended Phase 1 Habitat survey of land at Flixborough, located to the north of Scunthorpe, North Lincolnshire (NGR: SE 85715 14683). The survey area is proposed for re-development into an Energy Recovery Facility with associated business park, new road development, installation of a heat network and biodiversity and landscaping areas.

1.2 For the purposes of this report the survey area is spilt into five Zones (illustrated in Appendix E). Zone A is currently used by the RMS Ports and occupies land within the Flixborough Industrial Estate; Zone B is greenfield land, approximately 5 m from the River Trent corridor on its western boundary; Zone C is a brownfield mixed-use site that abuts the River Trent corridor; Zone D is a disused railway spur of approximately 9 km that runs from Zone A, to a National Rail connection east of Scunthorpe; and Zone E is an active quay that is the port of entry from which goods are distributed.

1.3 Zone A is dominated by hard standing areas and buildings, with occasional areas of scattered scrub and trees and areas of grassland. Zone B comprises arable fields and boundary features including wet ditches and unmanaged arable field margins; Zone E comprising the River Trent is located directly adjacent to the western boundary of Zone A with tall ruderal and marginal vegetation present on the banks of the river. Zone D comprises a disused mineral railway line; a variety of habitats are present along the line including broadleaved woodland, semi-improved grassland, scrub and bare ground. Zone C is predominantly bare ground with scattered scrub, hedgerows, tall ruderal vegetation, two ponds and surface water drainage channels.

1.4 The purpose of the survey was to complete an extended Phase 1 Habitat survey. This report includes a description of survey methods and a summary description of habitats and fauna.

2. Methodology

2.1 The extended Phase 1 Habitat survey and the report followed the Guidelines for Preliminary Ecological Appraisal and the Guidelines for Ecological Report Writing (CIEEM, 2017 a, b), and are in line with the British Standard BS42020:2013 'Biodiversity – Code of practice for planning and development'

Phase 1 Habitat Survey

2.2 The extended Phase 1 Habitat survey followed standard methodology (JNCC, 2010 and CIEEM, 2017). All features of ecological significance were target noted.

2.3 This survey methodology records information on the habitats together with any evidence of and potential for legally protected and notable fauna, in particular:

- Potential roosting sites for bats within buildings and trees (identification of suitable cracks and crevices – survey undertaken externally and from ground only). An assessment of suitability was undertaken according to Collins, 2016 (Appendix B);
- Assessing the suitability of habitats for other notable and protected species such as nesting birds (including any active or disused nests), reptiles, water vole (*Arvicola amphibius*), otter (*Lutra lutra*), white-clawed crayfish (*Austropotamobius pallipes*), badger (*Meles meles*) and invertebrates;
- Checking for the most common invasive plant species subject to strict legal control including: Japanese knotweed (*Fallopia japonica*), giant knotweed (*F. sachalinensis*), hybrid knotweed (*F. x bohemica*), giant hogweed (*Heracleum mantegazzianum*), rhododendron (*R. ponticum, R. ponticum x R. maximum* and *R. luteum*) and Himalayan balsam (*Impatiens glandulifera*);
- Assessing the suitability of the habitat for amphibians and for the protected great crested newt. Ponds within the survey area and within 0.25 km (access permitting) were subject to a Habitat Suitability Index (HSI) (Oldham *et al*. 2000) assessment for great crested newt[1].

2.4 The survey of Zone A was carried out by Claire Wilson MSc, BSc (Hons), MCIEEM on the 30th July 2018. The weather was warm (approximately 16°C) and dry, with 10% cloud cover and a gentle breeze (Beaufort Scale No. 3). The survey of Zones B, C, D and part of E was undertaken on the 20th June 2019 by Claire Wilson. The weather was warm (approximately 22°C) and dry, with no breeze.

2.5 The timing of the surveys was within the optimum period for Phase 1 Habitat survey and the majority of the survey area was accessible. Therefore, a valid assessment of the habitats present and their potential to support legally protected species was undertaken.

[1] A HSI is a numerical index, between 0 and 1. Values close to 0 indicate unsuitable habitat, 1 represents optimal habitat. The HSI for the great crested newt incorporates ten suitability indices, all of which are factors known to affect this species. The HSI for great crested newts is a measure of habitat suitability - it is not a substitute for newt surveys.

Limitations

2.6 Ecological surveys are limited by factors which affect the presence of plants and animals such as the time of year, migration patterns and behaviour. Therefore, the survey of the study area has not produced a complete list of plants and animals.

2.7 The list of invasive plant species included on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) is extensive and these plants are found in a range of different habitats, including aquatic habitats. The extended Phase 1 Habitat survey checked, in particular, for the presence of Japanese knotweed, giant knotweed, hybrid knotweed, giant hogweed, rhododendron and Himalayan balsam. There may be other invasive plant species present within the survey area which were not recorded, but it is considered that this survey is sufficient to identify any significant constraints posed by invasive plants.

3. Results

Habitats

3.1 Target notes summarising key interest features for wildlife recorded during the extended Phase 1 Habitat survey are included in Appendix C. The Phase 1 Habitat Plan of the survey area is presented in Appendix D, includes the locations of the target notes. Plant species nomenclature follows Stace (2010).

Buildings

3.2 14 buildings are present within Zone A, which are constructed from a variety of materials. The majority of the buildings are used for the storage of materials and comprise large, metal corrugated warehouse type structures, with pitched, corrugated roofs (B1 and B5 – B9). To the north side of survey area, on the banks of the River Trent there is a small red brick building (B2). Other brick buildings within the survey area are located at B3, B4 and B10, B11, B12, B13 and B15. B14 is a series of porta cabins used primarily as office facilities.

3.3 Two buildings are located within Zone C, B15 and B16. B15 is a porta cabin type building with a pitched, metal corrugated roof. Building 16 is a large storage building with breeze block walls from the ground to the mid-point on the building. The remainder is clad with timber to the wall tops. The roof comprises single skinned, corrugated metal sheeting.

Standing water

3.4 There are 16 ponds and two ditches on/within 0.25 km of the boundaries of Zones A - E. An area of standing water is located at the south eastern corner of Zone A, at TN10. The topography in this area is a natural low point and water from hardstanding runs into the area. Construction materials including steel, timbers, and piles of aggregates are scattered throughout the area.

3.5 Two large, very deep, surface water drainage ponds are located to the south of Zone C.

- Pond 1 is large (35 m x 30 m), lined with a geotextile type material with steep banks and no aquatic vegetation. The pond is surrounded by scattered scrub and fencing on the margins.
- Pond 2 is approximately 35 m x 10 m. It receives water from the adjacent yard, and has a large outlet that is likely pumped into Pond 1. The pond has a dense cover of common reed (*Phragmites australis*), is relatively turbid with some open water and steep banks of compacted mud and gravel.

3.6 The remainder of the ponds/ditches (described below) are all located within 0.25 km of Zone D.

- Pond 3 is narrow, approximately 50 m x 10 m and surrounded by dense young alder (*Alnus glutinosa*) and bramble (*Rubus fruticosus agg.*) scrub. The pond is mostly open, but with a small area of reedmace (*Typha latifolia*) swamp at the western side.
- Pond 4 is a moat-like pond with a central island; the water body in total is approximately 250 m x 10 m in extent. The pond supports large areas of reedmace and common reed along the margins. Open areas have abundant submerged aquatic vegetation. The pond is situated in an area of mixed scrub and unmanaged grassland. Newt exclusion fencing

is located approximately 30 m to the south of the pond on the edge of an adjacent development site.

- Pond 5 is a shallow flash near the corner of an access road, on flat ground. It is a maximum of 10 cm in depth. It supports an abundance of common spike rush (*Eleocharis palustris*) and occasional reedmace.
- Pond 6 is a series of very shallow, clear pools on generally flat, but slightly undulating surface of rutted clay and limestone fragments. The pools are generally a maximum of about 10 cm deep and 2-5 m x 1-2 m in size. Patches of reedmace and common reed are present, alongside common spike rush and sprawling bryophytes.
- Pond 7 is a small pool in an area of dense reed swamp, approximately 7 m x 7 m in extent. Reedmace is dominant and the pond is surrounded by young willow (*Salix* sp.) scrub. The water is slightly turbid, but with filamentous algae gradually growing across the surface.
- Pond P8 is a large fishing pond used for private fishing, with numerous jetties present along the margins. The pond is surrounded by mature trees and scrub with no aquatic vegetation present. The banks vary from shallow to steep.
- Pond 9 is approximately 15 m x 15 m in extent, situated on the south-western corner of a small poplar (*Populus* sp.) plantation, and situated within an arable farm; the surrounding fields are managed to grow grass turves. The pond appears quite recently enlarged, with bare earth banks and sandy rocky margins, and low but dense charophyte growth across the central two thirds of the pond, together with occasional reedmace.
- Pond 10 is part of a dense reed bed approximately 40 m x 50 m. It is very shallow, approximately 5-10 cm in depth with a few deeper patches reaching to about 30 cm.
- Pond 11 is similar to Pond 6, with several interconnecting areas of open shallow swamp supporting patches of reedmace, rushes and common spike rush, with no other aquatic vegetation present. The pools are a maximum of 10 cm deep and 5/6 m wide (maximum area 70 m x 20 m).
- Pond 12 is a slurry pit for an industrial chicken farm that is regularly pumped out.
- Pond 13 is a fish pond that is heavily stocked with carp, rudd, tench and perch.
- Pond 14 is a reedbed, approximately 25 m x 10 m in extent and is densely covered with common reed.
- Pond 15 is approximately 25 m x 10 m in extent, and slightly less densely covered with reeds than Pond 14. No aquatic plants other than emergent reeds are present and the banks are covered with dense willow and bramble scrub.
- Pond 16 is a very large water body that stretches to the north (1000 m x 70 m). It is a disused ironstone quarry that has filled with water. Much of it has sheer stone cliffs, the majority is inaccessible because of steep slopes covered with dense gorse (*Ulex* sp.), bramble and hawthorn (*Crataegus monogyna*).
- Ditch 1 is largely dry and filled with dense stands of common reed, and approximately 1 m in width. The northern section of the ditch has water flowing from a manhole cover. A short section (10 m) at the far north-western end has ponded where the gradient is very slight. Water clarity is good, however no aquatic vegetation is present.

- Ditch 2 is approximately 2 m - 4 m wide, supporting dense reedmace and common reed along its margins, alongside grassy herbaceous banks.

Running water

3.7 The River Trent (TN1) is located directly adjacent to the western boundary of Zones A and E. The banks of the river were not closely inspected due to high water levels, however, the banks appear gently sloping and muddy. The river is very wide, spanning approximately 0.16 km, and is very turbid and fast flowing due to its tidal nature.

3.8 Wet ditches are located on the boundaries of the arable fields located to the north of Zone B. The ditches are large agricultural drains (Burthon and Flixborough Drain). The ditches are typically steep sided with a bank gradient of approximately 45° or more. The banks are covered with a dense growth of grasses and tall herbaceous plants such as oilseed rape (*Brassica napus*), common nettle (*Urtica dioica*), cow parsley (*Anthriscus sylvestris*) and scattered common reed. Water depth varies from 0 cm to 30 cm, with deeper water (and mud) in the main drain.

Broadleaved woodland and scattered trees

3.9 A small area of broadleaved woodland is located at the north eastern corner of Zone A, at TN7. The woodland is located on a raised mound and comprises a very dense scrub layer with very little ground flora present. Scrub and canopy species include cherry (*Prunus avium*), damson (*Prunus domestica*), elder (*Sambucus nigra*), rose (*Rosa* sp.), field maple (*Acer campestre*), snowberry (*Symphoricarpos albus*), willow, bramble and ash (*Fraxinus excelsior*).

3.10 A line of semi-mature trees is located at the south eastern corner of Zone A, at TN11. Species present include poplar (*Populus* sp.), oak (*Quercus sp*.), pine (*Pinus sp*.), willow and ash.

3.11 Along sections of the mineral railway line are areas of broadleaved woodland; the majority are not particularly dense and form a linear feature along the length of the line (TNs 13, 17 and 19). The trees are located on the steep embankments of the railway line and the canopy overhangs the line. The trees are semi-mature in nature and largely comprise sycamore (*Acer pseudoplatanus*) and ash with an understory of hawthorn, bramble and rose. The ground beneath the areas of woodland and along the railway line is largely bare due to the presence of a pebble/stone substrate, limiting vegetation growth. Species present includes false oat grass (*Arrhenatherum elatius*), cock's-foot (*Dactylis glomerata*), cleavers (*Galium aparine*), ivy (*Hedera helix*) and red fescue (*Festuca rubra*).

Dense and scattered scrub

3.12 Scrub is a relatively common feature of the Zone A, being more common in the northern section, particularly surrounding B1. The majority of the scrub is scattered, and is dominated by willow, bramble and elder. At TN2, on the north-western boundary of the Zone A is an area of dense scrub dominated by willow and bramble.

3.13 Dense and scattered scrub is a common feature of the railway line within Zone D. The majority of species present include willow, hawthorn, bramble, blackthorn and rose. However, towards the eastern section, close to the quarry gorse is dominant (TN20).

3.14 Some scattered scrub comprising hawthorn, willow and bramble is located within the drainage channel in Zone C.

Hedgerow

3.15 A species poor, unmanaged roadside hedgerow is located on the western boundary of Zone C. Hawthorn dominates the feature alongside occasional bramble and rose.

Tall ruderal and marginal vegetation

3.16 Marginal vegetation dominated by common reed is located along the banks of the River Trent within Zone E. Scattered stands of Himalayan balsam are also present in and amongst the common reed (TN3).

3.17 A dense stand of Himalayan balsam is located at TN4 along the banks of the River Trent, in Zone E.

3.18 Tall ruderal vegetation is located at the northern section of Zone A surrounding B1 and to the south of the arable fields in Zone B. The most frequently occurring species present include common nettle, rosebay willowherb (*Epilobium hirsutum*) and creeping thistle (*Cirsium arvense*). At TN8 on a mound of raised earth is a dense stand of tall ruderal vegetation comprising common nettle, rosebay willowherb, teasel (*Dipsacus fullonum*), broad-leaved dock (*Rumex obtusifolius*), false oat grass, great willowherb (*Epilobium hirsutum*) and creeping thistle.

Species poor semi-improved grassland

3.19 There are several small areas of species poor semi-improved grassland scattered throughout Zone A, specifically at the north eastern tip (TN9), adjacent to the disused railway line on the eastern boundary, along the footpath adjacent to the River Trent and surrounding B10 (TN12), to the south of Zone A. Common grassland species recorded include red fescue, dandelion (*Taraxacum agg*.) and annual meadow grass (*Poa annua*).

3.20 The margins of the arable fields within Zone B are species poor in nature. They are coarse and unmanaged and dominated by grasses including false oat grass, cock's-foot, cow parsley and the remnants of arable crops including oilseed rape.

Semi-improved neutral grassland

3.21 Small areas of semi-improved neutral grassland are located along the banks of the railway line within Zone D, at TNs 14, 15, 16. Some areas have slightly fewer herbs within the sward and are becoming outcompeted by tall ruderal vegetation including cow parsley and common hogweed. However, common species noted include bush vetch (*Vicia sepium*), primrose (*Primula vulgaris*), annual meadow grass (*Poa annua*), false oat grass, cock's-foot, forget-me-not (*Myotis* sp.), shining cranesbill (*Geranium lucidum*), meadow vetchling (*Lathyrus pratensis*), Russian comfrey (*Symphytum x uplandicum*), field horsetail (*Equisetum arvense*), barren brome (*Bromus sterilis*), white campion (*Silene latifolia*) and common knapweed (*Centaurea nigra*).

Semi-improved calcareous grassland

3.22 Two distinct areas of semi-improved calcareous grassland are located along the mineral railway line in Zone D. Both areas are unmanaged and located on

freely draining, base rich, pebble/stone substrate. The first area is located to the north of Normanby industrial estate, at TN18. Along this section of the line the habitat is open with only scattered willow scrub along the margins. As such, the area is open and receives much sunlight. The sward varies in height, from very low ephemeral type vegetation to swards with a height of approximately 50 cm. There is no one common or dominant species throughout, however viper's bugloss (*Echium vulgare*) is locally dominant. Other species noted includes barren brome, false oat grass, soft brome (*Bromus hordeaceus*), Yorkshire fog (*Holcus lanatus*), red fescue, blue fleabane (*Erigeron acris*), sulphur clover (*Trifolium ochroleucon*), common stork's bill (*Erodium cicutarium*), shining cranesbill, smooth cat's ear (*Hypochaeris glabra*), smooth tare (*Vicia tetrasperma*), common vetch (*V. sativa*), perforate St. John's wort (*Hypericum perforatum*), biting stonecrop (*Sedum acre*) and great mullein (*Verbascum thapsus*). A single northern marsh orchid (*Dactylorhiza purpurella*) was also noted within the sward.

3.23 The second, notable area of semi-improved calcareous grassland is located further east along the mineral railway line, close to the quarry at TN21. The second area has all the species noted in paragraph 3.37 above, alongside additional red campion (*Silene dioica*), common centaury (*Centaurium erythraea*), white dead nettle (*Lamium album*), yarrow (*Achillea millefolium*), hairy tare (*Vicia hirsuta*), wood sage (*Teucrium scorodonia*), wild mignonette (*Reseda lutea*) and common vetch. Hare's foot clover (*Trifolium arvense*) is locally common throughout the sward and a single bee orchid (*Ophrys apifera*) and southern marsh orchid (*Dactylorhiza praetermissa*) were also noted.

Arable

3.24 Large arable fields are the dominant habitat within Zone B.

Amenity grassland

3.25 A small area of amenity grassland is located in the north western corner of Zone C. The sward is well maintained and short. Species present include daisy (*Bellis perennis*), selfheal (*Prunella vulgaris*), annual meadow grass, perennial rye grass, cock's-foot and dandelion.

Introduced shrubs

3.26 Butterfly bush (*Buddleia davidii*) is scattered throughout Zone A, primarily at the northern section surrounding B1 and to the south, surrounding B10 and B12.

Other habitats

3.27 Zone A and Zone C is dominated by hardstanding comprising roads, footpaths and storage areas. A large mound of bare earth is located at TN5, directly north of B1 in Zone A, and along the edge of B1 (TN6) in Zone A are areas where still has been laid down. Scattered throughout this area are small sections of ephemeral vegetation and introduced shrubs dominated by butterfly bush.

3.28 Sections of the track along the mineral railway line in Zone D are dominated by bare ground.

3.29 Small areas of ephemeral vegetation on a shallow substrate are located between the storage buildings located to the south of Zone A.

Species

Bats

3.30 Potential foraging habitats within Zones A-E include hedgerows, grassland, dense and scattered scrub, broadleaved woodland and scattered trees. These habitats are connected to other areas of continuous, good quality bat foraging and commuting habitat; specifically mature hedgerows and woodland located along arable field boundaries. Therefore the survey area is considered to provide **moderate** value foraging and commuting habitat for bats.

3.31 The aforementioned habitats provide suitable foraging and commuting habitat for bat species which show a preference for utilising 'edge' habitats. Such species include common pipistrelle (*Pipistrellus pipistrellus*) and myotid species (*Myotis* spp.), which are flexible in their foraging habitat. The arable fields and areas of semi-improved grassland may potentially provide favourable foraging habitat for noctule (*Nyctalus noctula*) bats which show a preference for feeding in 'open' habitats. However, the abundance of insects would influence the value of the foraging habitat for noctule bats.

3.32 There are 14 buildings in Zone A and 2 buildings in Zone C. None of the buildings have any Potential Roosting Features (PRFs) suitable for bats, as such the building are considered to have **negligible** potential to support roosting bats (see Appendix C). However, there are a number of trees with PRFs located along the embankments of the railway line (Zone D). Table 2 below provides a description of each tree and its potential to support roosting bats.

Table 2: Trees with bat roost potential

Tree No.	Description	Bat Roost Potential
1	Semi-mature ash with light ivy cladding.	Low
2	Semi-mature ash with moderate ivy cladding. Dense foliage in the canopy limited a full view of the tree.	Low/moderate
3	Semi-mature trees with bat boxes attached.	High

Birds

3.33 The hedgerows, marginal vegetation, scattered trees, dense and scattered scrub, broadleaved woodland and tall ruderal vegetation in Zones A-E provides suitable nesting and foraging habitat for tree and shrub nesting birds. The arable field boundaries potentially provide foraging habitat for raptors and owls and habitat for ground nesting farmland birds including skylark (*Alauda arvensis*). The arable fields may also provide favourable habitat for a variety of ground nesting birds including lapwing (*Vanellus Vanellus*).The marginal vegetation in Zone E provides suitable nesting habitat for riparian species.

Otter & water vole

3.34 The River Trent (TN1) may be used as a foraging and commuting route by otter and the marginal vegetation along the banks of the river has potential to provide suitable lay-up sites. However, due to the tidal nature of the watercourse it is unlikely that otter would use lay-up sites along the river, they are more likely to use smaller tributaries/wet ditches linked to the river. There is

a small area of woodland within Zone A, however it is considered unsuitable for the species as it is located away from the banks of the river, and adjacent to other buildings where there are frequent vehicle and people movements.

3.35 The wet ditches along the arable field boundaries are connected throughout the landscape to additional ditches/field drains. In addition, the banks of the ditches are covered with a variety of short and long grasses suitable for foraging water vole and the bank profile is steep and deep providing abundant burrowing habitat. Some scattered aquatic vegetation also suitable for foraging water vole is also present within the ditches.

Other mammals

3.36 The hedgerows, broadleaved woodland, dense scrub, tall ruderal vegetation and coarse semi-improved grasslands located in Zones A-E provides potential refuge habitat for European hedgehog (*Erinaceus europaeus*) and other small mammals. It is likely that European hedgehog is common in the area due to the presence of scattered villages and abundant hedgerows providing wildlife corridors, foraging and refuge habitat for the species.

3.37 A hedgehog was noted along the railway line (Zone D), close to the village of Flixborough during the evening bat activity survey on the 20th June 2019.

3.38 The arable crops within Zone B and the wider area provide abundant foraging habitat for brown hare (*Lepus europaeus*). Brown hare have been recorded in the area on dusk activity surveys that have been undertaken during spring/summer 2019.

3.39 A large badger sett (approximately 10 entrances) is located at TN19, 10 m outside of the railway line fencing within Zone D. Badger latrines were also recorded adjacent to the calcareous grassland at TN21.

3.40 No evidence of, or habitat for any other protected or notable species was recorded in Zones A-E during the surveys.

Invertebrates

3.41 Tall ruderal vegetation, scrub and introduced shrubs, primarily butterfly bush within Zone A provide abundant food sources for a variety of moths and butterflies that may be present in the area.

3.42 During the survey of Zone A variety of butterflies including cabbage white (*Pieris rapae*), peacock (*Aglais io*), red admiral (*Vanessa atalanta*) and comma (*Polygonia c-album*) were noted at the northern section of Zone, primarily foraging within scattered buddleia scrub and tall ruderal vegetation.

3.43 The semi-improved grasslands along the railway line (Zone D) also provide habitat for a variety invertebrates.

Amphibians & reptiles

3.44 There are two ponds within Zone C and 14 ponds and two ditches within 0.25 km of Zone D. Descriptions of each pond/ditch are located in paragraph 3.5–3.6 above. The ponds/ditches provide potential breeding habitat for great crested newt and other common amphibians including common toad (*Bufo bufo*) a Species of Principal Importance (SPI).

3.45 The HSI calculations for the ponds/ditches are shown in Table 3 below. Ponds 2, 8 and 12 provide 'poor' suitability for GCN. Pond 1 and ditch 1 provide 'below average' suitability for GCN. Ponds 5, 6, 11, 14 and 15 provide 'average' suitability for GCN. Ponds 3, 7, 9 and 13 provide 'good' suitability for GCN, and ponds 4, 10, 16 and ditch 2 provide 'excellent' suitability for GCN.

Table 3: Pond/ditch HSI Scores

No.	SI1 - Location	SI2 - Pond area	SI3 - Pond drying	SI4 - Water quality	SI5 - Shade	SI6 - Fowl	SI7 - Fish	SI8 - Ponds	SI9 – Terr'l habitat	SI10 - Macrophytes	HSI
1	1	0.95	0.9	0.33	1	0.67	0.67	0.4	0.33	0.3	0.59
2	1	1	0.5	0.01	1	1	1	0.4	0.33	0.9	0.48
3	1	1	0.9	0.67	0.2	1	1	1	1	0.6	0.77
4	1	0.9	0.9	1	1	0.67	1	1	1	1	0.94
5	1	0.2	0.1	0.67	1	1	1	1	0.67	0.7	0.60
6	1	0.6	0.1	0.67	1	1	1	0.95	0.67	0.8	0.68
7	1	0.1	1	0.67	1	0.67	1	0.95	1	0.7	0.70
8	1	-	0.9	0.33	0.2	0.67	0.01	0.63	0.67	0.3	0.33
9	1	0.4	1	1	1	0.67	1	0.98	0.67	0.3	0.75
10	1	0.4	0.5	0.67	1	1	1	0.95	1	0.8	0.80
11	1	0.85	0.1	0.67	1	1	1	0.95	1	0.4	0.68
12	1	0.8	0.1	0.01	1	1	1	0.8	0.33	0.3	0.38
13	1	0.9	0.9	0.67	1	0.67	1.01	0.8	0.33	0.8	0.77
14	1	0.2	1	0.33	1	1	1	0.9	1	0.3	0.67
15	1	0.2	1	0.33	1	1	1	0.9	1	0.3	0.67
16	1	0.8	0.9	1	0.4	0.67	1	0.85	1	0.8	0.82
D1	1	0.1	0.9	0.67	0.2	1	1	0.95	1	0.3	0.57
D2	1	1	0.9	0.67	1	0.67	1	1	0.95	0.8	0.89
Pond suitability: <0.5 'poor', 0.5 – 0.59 'below average', 0.6 – 0.69 'average', 0.7 – 0.79 'good', >0.8 'excellent'											

3.46 The large quarry lagoon and large, deeper ponds, specifically P1, P2, P8 and P16 potentially provide more favourable breeding habitat for common toad, as this species shows a preference for breeding in deeper waterbodies, as opposed to small, shallow ponds, preferred by other common amphibians.

3.47 Habitats within Zones A-E including hedgerows, tall ruderal vegetation, dense and scattered scrub, broadleaved woodland, and areas of coarse, unmanaged semi-improved grassland provide suitable refuge habitat for great crested newt and other common amphibians.

3.48 Habitats along the railway line (Zone D), specifically the open areas of semi-improved grassland provide suitable basking habitat for reptiles. The areas of scrub and woodland potentially provide suitable refuge habitat for reptiles.

References

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Appendix A – Legal Information

This report provides guidance of potential offences as part of the impact assessment. This report does not provide detailed legal advice and for full details of potential offences against protected species the relevant acts should be consulted in their original forms i.e. The Wildlife and Countryside Act, 1981, as amended, The Countryside and Rights of Way Act 2000, The Natural Environment and Rural Communities Act, 2006 and The Conservation of Habitats and Species Regulations 2017.

Species	Legislation	Offences	Notes on licensing procedures and further advice
Species that are protected by European and national legislation			
Badger	Protection of Badgers Act 1992	Wilfully kill, injure or take a badger; Intentionally or recklessly damage, destroy or obstruct access to a badger sett; Disturb a badger in its sett. It is not illegal to carry out disturbance activities in the vicinity of setts that are not occupied.	Where required, licences for development activities involving sett loss, damage or disturbance are issued by Natural England (NE). Licences for activities involving watercourse maintenance, drainage works or flood defences are issued under a separate process. Licences are normally not granted from December to June inclusive because cubs may be present within setts. https://www.gov.uk/badgers-protection-surveys-and-licences
Bats *European protected species*	Conservation of Habitats and Species Regulations 2017 Reg 41	Deliberately[1] capture, injure or kill a bat; Deliberate disturbance[2] of bats; Damage or destroy a breeding site or resting place used by a bat. The protection of bat roosts is considered to apply regardless of whether bats are present.	An NE licence in respect of development is required in England. https://www.gov.uk/bats-protection-surveys-and-licences *European Protected Species: Mitigation Licensing- How to get a licence* (NE 2010) *Bat Mitigation Guidelines* (English Nature 2004) *Bat Workers Manual* (JNCC 2004) *BS8596:2015 Surveying for bats in trees and woodland* (BSI, 2015)
	Wildlife and Countryside Act 1981 (as amended)[4] S.9	Intentionally or recklessly[3] obstruct access to any structure or place used for shelter or protection or disturb a bat in such a place.	Licence from NE is required for surveys (scientific purposes) that would involve disturbance of bats or entering a known or suspected roost site.

Species	Legislation	Offences	Notes on licensing procedures and further advice
Birds	Wildlife and Countryside Act 1981 (as amended)[4] S.1	Intentionally kill, injure or take any wild bird; Intentionally take, damage or destroy the nest of any wild bird while that nest is in use or being built; Intentionally take or destroy the nest or eggs of any wild bird. **Schedule 1 species** Special penalties are liable for these offences involving birds on Schedule 1 (e.g. most birds of prey, kingfisher, barn owl, black redstart, little ringed plover). Intentionally or recklessly[3] disturb a Schedule 1 species while it is building a nest or is in, on or near a nest containing eggs or young; intentionally or recklessly disturb dependent young of such a species.	No licences are available to disturb any birds in regard to development. Licences are available in certain circumstances to damage or destroy nests, but these only apply to the list of licensable activities in the Act and do not cover development. General licences are available in respect of 'pest species' but only for certain very specific purposes e.g. public health, public safety, air safety. https://www.gov.uk/wild-birds-protection-surveys-and-licences https://www.gov.uk/prevent-wild-birds-damaging-your-land-farm-or-business
Great crested newt *European protected species*	Conservation of Habitats and Species Regulations 2017 Reg 41	Deliberately[1] capture, injure or kill a great crested newt; Deliberate disturbance[2] of a great crested newt; Deliberately take or destroy its eggs; Damage or destroy a breeding site or resting place used by a great crested newt.	Licences issued for development by NE. https://www.gov.uk/great-crested-newts-protection-surveys-and-licences *European Protected Species: Mitigation Licensing - How to get a licence* (NE 2010) *Great Crested Newt Mitigation Guidelines* (English Nature 2001)
	Wildlife and Countryside Act 1981 (as amended)[4] S.9	Intentionally or recklessly[3] obstruct access to any structure or place used for shelter or protection or disturb a great crested newt in such a place.	Licences issued for science (survey), education and conservation by NE.
Otter *European protected species*	Conservation of Habitats and Species Regulations 2017 Reg 41	Deliberately[1] capture, injure or kill an otter; Deliberate disturbance[2] of otters; Damage or destroy a breeding site or resting place used by an otter.	Licences issued for development by NE. https://www.gov.uk/otters-protection-surveys-and-licences *European Protected Species: Mitigation Licensing- How to get a licence* (NE 2010)
	Wildlife and Countryside Act 1981 (as amended)[4] S.9	Intentionally or recklessly[3] obstruct access to any structure or place used for shelter or protection or disturb an otter in such a place.	No licence is required for survey in England. However, a licence would be required if the survey methodology involved disturbance.

Species	Legislation	Offences	Notes on licensing procedures and further advice
Reptiles (species that are not European protected): **Common lizard** **Grass snake** **Slow worm**	Wildlife and Countryside Act 1981 (as amended)[4] S.9(1) (part); S.9(5)	Intentionally kill or injure any common reptile species.	No licence is required in England. However an assessment for the potential of a site to support reptiles should be undertaken prior to any development works which have potential to affect these animals. https://www.gov.uk/reptiles-protection-surveys-and-licences
Water vole	Wildlife and Countryside Act 1981 (as amended)[4] S.9	Intentionally kill, injure or take water voles; Intentionally or recklessly[3] damage, destroy or obstruct access to any structure or place used for shelter or protection; Disturb a water vole in such a place.	No licence is required for survey in England, unless you are likely to commit an action that is otherwise illegal. There are currently no licensing purposes that explicitly cover development activities or activities associated with the improvement or maintenance of waterways. However when a proposed lawful activity has no opportunity to retain water voles within a development site and their translocation would result in a conservation benefit then a licence from NE may be obtained. *The Water Vole Conservation Handbook* (R. Strachan, T. Moorhouse & M. Gelling, Wildlife Conservation Research Unit (WildCRU), 3rd Edition 2011). https://www.gov.uk/water-voles-protection-surveys-and-licences Water voles and development licensing policy -NE Technical Information Note TIN042 2008
Other species			
Rabbits, foxes and other wild mammals **For BAP species and Species of Principal Importance, see below**	Wild Mammals (Protection) Act 1996	Intentionally inflict unnecessary suffering to any wild mammal.	Natural England provides guidance in relation to rabbits (Technical Information note TIN003, Rabbits- management options for preventing damage, July 2007) and foxes (which are also protected under the Wildlife and Countryside Act 1981 from live baits and decoys, see Species Information notes SIN003 (2011), *Urban foxes* and SIN004 (2011) *The red fox in rural areas* as well as other wild mammals. Lawful and humane pest control of these species is permitted.

[1]Deliberate capture or killing is taken to include "accepting the possibility" of such capture or killing

[2]Deliberate disturbance of animals includes in particular any disturbance which is likely a) to impair their ability (i) to survive, to breed or reproduce, or to rear or nurture their young, or (ii) in the case of animals of hibernating or migratory species, to hibernate or migrate; or b) to affect significantly the local distribution or abundance of the species to which they belong.
Lower levels of disturbance not covered by the Conservation of Habitats and Species Regulations 2017 remain an offence under the Wildlife and Countryside Act 1981 although a defence is available where such actions are the incidental result of a lawful activity that could not reasonably be avoided. Thus deliberate disturbance that does not result in either (a) or (b) above would be classed as a lower level of disturbance.

[3]The term 'reckless' is defined by the case of Regina versus Caldwell 1982. The prosecution has to show that a person deliberately took an unacceptable risk, or failed to notice or consider an obvious risk.

[4] The Wildlife and Countryside Act (1981) has been updated by various amendments, including the Countryside and Rights of Way Act 2000 and the Natural Environment and Rural Communities Act 2006. A full list of amendments can be found at http://jncc.defra.gov.uk/page-1377.

Habitats & Species	Legislation	Guidance
Species and Habitats of Principal Importance for the Conservation of Biodiversity	Natural Environment & Rural Communities Act 2006 S.40 (which superseded S.74 of the Countryside & Rights of Way Act 2000).	S.40 of the NERC Act 2006 sets out the duty for public authorities to conserve biodiversity in England. Habitats and species of principal importance for the conservation of biodiversity are identified by the Secretary of State in consultation with NE, are referred to in S.41 of the NERC Act for England. The list of habitats and species was updated in 2008:http://webarchive.nationalarchives.gov.uk/20140605090108/http:/www.naturalengland.org.uk/ourwork/conservation/biodiversity/protectandmanage/habsandspeciesimportance.aspx The habitats and species listed are not necessarily of higher biodiversity value, but they may be in decline. Habitat Action Plans and Species Action Plans are written for them or are in preparation, to guide their conservation. Ecological impact assessments should include an assessment of the likely impacts to these habitats and species.
Biodiversity Action Plan (BAP) Habitats & Species	No specific legislation, unless it is also a species or habitat of principal importance as described above.	The UK Post 2010 Biodiversity Framework published in July 2012 succeeds the UK BAP. Following devolution in 1998, each of the four countries of the UK have developed their own Biodiversity Strategies. In England the current strategy is *Biodiversity 2020: A strategy for England's wildlife and ecosystem services* (2011), which also reflects a change in strategic thinking following the Convention for Biological Diversity's (CBD) Strategic Plan for Biodiversity 2011-2020 and the launch of the new EU Biodiversity Strategy. The UK Post 2010 Biodiversity Framework demonstrates how the work of the four countries and the UK contributes to the Aichi Biodiversity Targets in the CBD's Strategic Plan for Biodiversity 2011-2020. The original UK BAP list of species and habitats, prepared over 10 years ago, was used to compile the lists of species and habitats of principal importance under section 41 of the NERC Act 2006 which now forms the focus of England's Biodiversity Strategy. In addition to the England Biodiversity Strategy, there are also many BAPs at the regional and local level which feed into the delivery at the country level and also identify biodiversity priorities at the more local level.
Hedgerows	The Hedgerow Regulations 1997	Under the regulations, it is against the law to remove or destroy hedgerows that are classified as "important" under the regulations without permission from the local planning authority. The regulations apply if a hedgerow is in or runs alongside agricultural land, common land including town or village greens, land used for forestry or for the breeding or keeping of horses etc, a local nature reserve or Site of Special Scientific Interest. A hedgerow can be classified as 'Important' due to its wildlife

Habitats & Species	Legislation	Guidance
		and landscape value or due to its heritage value. In general, permission will be required before removing hedges that are at least 20 metres in length, over 30 years old and contain certain species/diversity of plant. The local planning authority will assess the importance of the hedgerow using criteria set out in the regulations. See Defra and Natural England websites for further guidance and information.
Himalayan balsam	Wildlife and Countryside Act 1981 (as amended) S.14	It is illegal to plant these species or otherwise cause them to grow or spread in the wild. *Guidance on Section 14 of the Wildlife and Countryside Act, 1981* (Defra, 2010)

Appendix B – Bat Roost Potential and Habitat Suitability Categories

Guidelines for assessing the potential suitability of proposed development sites for bats, based on the presence of habitat features within the landscape (Collins, 2016).

Suitability	Description of Roosting Habitat	Commuting & Foraging Habitats
Negligible	Negligible habitat features on site likely to be used by roosting bats	Negligible habitat features on site likely to be used by commuting or foraging bats.
Low	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 habitats to be used on a regular basis or by a larger number of bats (i.e. unlikely to be suitable maternity or hibernation). A tree of sufficient size and age to contain potential roosting features but with none seen from the ground, or feature seen with only very limited roosting potential.	Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or unvegetated stream, but isolated i.e. not very well connected to the surrounding landscape by other habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
Moderate	A structure or 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 of high conservation status.	Continuous habitat connected to the wider landscape that could be used by bats for commuting, such as lines of trees and scrub or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging, such as trees, scrub, grassland or water.
High	A structure or 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.	Continuous high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines of trees and woodland edge. High quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats, such as broadleaved woodland, tree-lined watercourses and grazed parkland. Site is close and connected to known roosts.

Appendix C – Target Notes

Target Note	Description	Photograph
TN1	River Trent, a wide, fast flowing, very turbid watercourse. The section of the river adjacent to the survey area has bankside vegetation dominated by common reed. Numerous gulls were noted on the water during the survey including black-headed gulls and lesser black-backed gulls. The river provides potential for foraging and commuting otter and a variety of fish species.	
TN2	A mosaic of scrub and tall ruderal vegetation located on a raised earth bund on the south-western side of Building 1. Species present include; willow, common nettle, Yorkshire fog, rosebay willowherb, creeping thistle, common hogweed, great willowherb, Himalayan balsam, bindweed, colt's foot, elder, field maple, bramble and Snowberry. The scrub is denser towards the south. The area provides nesting bird habitat, bat foraging and commuting habitat, small mammal and amphibian refuge habitat and invertebrate foraging habitat.	
TN3	Marginal vegetation on the banks of River Trent. Dominated by common reed with occasional common nettle, bindweed, common hogweed, Himalayan balsam, Yorkshire fog, cock's-foot, common couch, broad-leaved dock, great willowherb and cleavers. Scattered willow and elder scrub is also occasional within the area. The vegetation provides potential refuge habitat for otter and nesting bird habitat.	
TN4	Dense stand of Himalayan balsam on banks of river.	No photograph

Target Note	Description	Photograph
TN5	Hardstanding comprises predominantly tarmac roads, storage areas and walkways. Construction materials are scattered throughout, including steel rails, rubble piles, bricks, timber, concrete and pallets. The majority of the items are raised from the ground; however, some are scattered along grassy verges. Where materials have not been stored above ground suitable refuge habitat for amphibians is present.	
TN6	The boundary of B1 is surrounded by steel girders, timbers and piles of waste. Amongst this is scattered tall ruderal vegetation, dominated by willowherb species, introduced shrubs, primarily butterfly bush and short grasses including red fescue and Yorkshire fog. Where materials have not been stored above ground suitable refuge habitat for amphibians is present. The vegetation provides foraging habitat for invertebrates.	
TN7	Mound of earth adjacent to the disused railway line. Densely vegetated with semi-mature trees and scrub species, including elder, rose, field maple, snowberry, willow, bramble and ash. The area provides nesting bird habitat, bat foraging and commuting habitat, small mammal and amphibian refuge habitat and invertebrate foraging habitat.	
TN8	The section of mound closest to B1 is dominated by tall ruderal vegetation comprising common nettle, rosebay willowherb, teasel, broad-leaved dock, false oat-grass, great willowherb and creeping thistle. The area provides nesting bird habitat, bat foraging and commuting habitat, small mammal and amphibian refuge habitat and invertebrate foraging habitat.	

Target Note	Description	Photograph
TN9	An old mineral railway line with stone substrate beneath steel rails and timber railway sleepers. Vegetation with a mixture of grass species, herbs and scrub. Bramble is located along the boundary of the survey area. Other species present includes rosebay willowherb, butterfly bush, false oat grass, dandelion, common ragwort, teasel, willow, weld and Yorkshire fog. A Mound of earth covered with grasses is located directly adjacent to railway line, species present includes cock's-foot, red fescue and ribwort plantain. The habitat provides foraging habitat for invertebrates.	
TN10	Large area of standing water at the south eastern corner of the survey area. Construction materials are scattered throughout the area. These include steel, timbers, and piles of aggregates.	
TN11	Linear semi-mature trees present on the south western boundary of the survey area. Species present are poplar, oak, pine, willow and ash trees. The trees provide nesting bird habitat, bat foraging and commuting habitat, small mammal and amphibian refuge habitat and invertebrate foraging habitat.	
TN12	Area of species poor semi-improved grassland with red fescue, false oat grass and cock's-foot.	No photograph

Target Note	Description	Photograph
TN13	Line of broadleaved woodland along steep embankments of mineral railway line. Canopy species comprise ash and sycamore, the understory is dominated by hawthorn, bramble and rose. The ground flora beneath the woodland is relatively sparse due to the dense canopy. The substrate comprises stone and rocks with very little earth present. The majority of the railway line along this point is predominantly bare ground with some scattered false oat grass, cock's-foot, bramble and herb Robert. The woodland provides nesting bird habitat, bat foraging and commuting habitat, small mammal and amphibian refuge habitat and invertebrate foraging habitat.	
TN14	Area of semi-improved neutral grassland along the steep sided north and south facing embankments of the railway line. Common knapweed is locally dominant alongside forget-me-not, false oat grass, Yorkshire fog, common vetch, herb Robert and red fescue. Tall ruderal vegetation dominated by common hogweed and cow parsley is encroaching into the edges of the sward. The grassland provides nesting bird habitat, bat foraging and commuting habitat, small mammal and amphibian refuge habitat and invertebrate foraging habitat.	
TN15	Small area of semi-improved neutral grassland along the steep sided north and south facing embankments of the railway line. Common knapweed is locally dominant alongside forget-me-not, false oat-grass, Yorkshire fog, common vetch, herb Robert and red fescue. Tall ruderal vegetation and dominated by common hogweed and cow parsley is encroaching into the edges of the sward, alongside bramble scrub. The area provides nesting bird habitat, bat foraging and commuting habitat, small mammal and amphibian refuge habitat and invertebrate foraging habitat.	

Target Note	Description	Photograph
TN16	Small areas of semi-improved neutral grassland along the steep sided north and south facing embankments of the railway line that has a greater diversity of herbs within the sward than other areas. The sward is approximately 0.5 m in height and unmanaged. Species present includes bush vetch, primrose, annual meadow-grass, false oat-grass, cock's-foot, forget-me-not, shining cranesbill, meadow vetchling, Russian comfrey, field horsetail, barren brome, white campion and common knapweed. The area provides nesting bird habitat, bat foraging and commuting habitat, small mammal and amphibian refuge habitat and invertebrate foraging habitat.	
TN17	Broadleaved woodland on steep north and south facing embankments of the railway line. The canopy is relatively dense and dominated by ash and sycamore. The understory comprises predominantly hawthorn and bramble with occasional rose and elder Frequent ash saplings are also present within the understory. Ground flora is relatively sparse, likely due to the dense shading from the canopy and the stoney substrate beneath. False oat-grass and ivy is locally common alongside occasional herb Robert and cock's-foot. The railway line within this section is predominantly bare stone. The area provides nesting bird habitat, bat foraging and commuting habitat, small mammal and amphibian refuge habitat and invertebrate foraging habitat.	

Target Note	Description	Photograph
TN18	Area of semi-improved calcareous grassland on shallow stoney substrate. The habitat has opened up slightly with only light cover provided by the adjacent scrub on the margins of the railway line. Viper's bugloss is locally dominant. Other species noted includes barren brome, false oat grass, soft brome Yorkshire fog, red fescue, blue fleabane, sulphur clover, common stork's bill, shining cranesbill, smooth cat's ear, smooth tare, common vetch, perforate St. John's wort, biting stonecrop and great mullein. A single northern marsh orchid was also noted within the sward. The area provides nesting bird habitat, bat foraging and commuting habitat, small mammal and amphibian refuge habitat and invertebrate foraging habitat.	
TN19	Area of dense broadleaved woodland with a dense canopy cover. The railway embankment sat this location are slightly less steep. The canopy is dominated by ash, sycamore and sliver birch with hawthorn and bramble dominating the understory. There is very little ground flora and the majority of the railway line at this location is covered with bramble scrub. A large, active badger sett is located within the woodland, approximately 10 m from the boundary fencing of the railway line.	
TN20	Dense scrub on north and south facing, steep sided embankments of the railway line. Willow and gorse is locally common alongside hawthorn, blackthorn and elder.	No photograph
TN21	Large are of semi-improved calcareous grassland along the entire eastern section of the railway line. At this point the line is not densely shaded by woodland, as such it is very open and has a greater diversity of herbs present that the area at TN18. Additional species at this location include red campion, common centaury, white dead nettle, yarrow, hairy tare, wood sage, wild mignonette and common vetch. Hare's foot clover is locally common throughout the sward and a single bee orchid and southern marsh orchid were also noted. The area provides nesting bird habitat, bat foraging and commuting habitat, small mammal and amphibian refuge	No photograph

Target Note	Description	Photograph
	habitat reptile basking habitat and invertebrate foraging habitat.	
B1	A large corrugated, metal storage building located at northern tip of the the survey area. The roof is pitched with skylights along all sections making the internal space very light. The building is used for the storage of materials and internally is well lit and relatively noisy due to vehicle movements. No habitat suitable for roosting bats was noted during the survey. As such the building is considered to have negligible potential to support roosting bats. Evidence of roosting pigeons was recorded inside the building as numerous droppings were noted on the floor.	
B2	A single storey red brick building with a pitched corrugated roof located on the banks of the River Trent outside of the survey area boundary. Structural cracks are located on the north eastern facing elevation, these are open and exposed and section of the roof are missing. The building provides negligible bat roost potential.	
B3	Single storey red brick building with a pitched roof comprising of timber covered with bitumastic felt which is in very poor condition with sections of felt and timber missing. The windows and doors are open and broken and no entry into the building is permitted due to the unsafe nature of the structure. Timber barge boards are also present on the on gable ends. A view if the internal space from the windows identified as separate loft space, however, ceiling panels were missing due to the very damp nature of the building. There are also numerous gaps in the brickwork. The building is considered to have negligible potential to support roosting bats due to its very damp nature.	
B4	Single storey red brick building with a mono pitch corrugated roof. The building is used to house electrical generators and has negligible potential to support roosting bats.	No photograph

Target Note	Description	Photograph
B5-9	Series of five large metal corrugated storage sheds with pitched corrugated roofs. All the buildings have large doors which are open throughout the day. Large skylights are located across the roof. The building has negligible potential to support roosting bats. The surrounding area is also very noisy and heavily lit.	
B10	Single storey red brick building with a flat concrete roof. Well sealed metal framed windows and doors are also present. No features suitable for roosting bats was noted. The building considered has negligible bat roost potential.	
B11	Single storey, red brick building with a flat roof. Some areas have missing bricks and mortars, some gaps in brickwork, however, these are all low to ground. The building has negligible potential to support roosting bats.	
B12	Red brick building with a flat roof used as a mechanics garage. Large doors are open all day. The building has negligible potential to support roosting bats.	

Target Note	Description	Photograph
B13	A series of porta cabins with metal frames and flat roofs used as office facilities. Negligible bat roost potential.	
B14	Single storey red brick building with PVC framed windows and a flat bitumen felted roof with concrete slabs on the edges. Well-sealed timber barge boards are present on the northern elevation. Internally the ceiling comprises suspended plaster board. The building has negligible bat roost potential.	
B15	Large porta cabin building used as an office facility. The building is well sealed and provides negligible bat roost potential.	
B16	A large storage building with breeze block walls from the ground to the mid-point on the building. The remainder is clad with timber to the wall tops. The roof comprises single skinned corrugated metal sheeting. The building provides negligible bat roost potential.	

Appendix D – Phase 1 Habitat Plan

Legend

- Site boundary Feb 19
- Target note
- Individual tree
- Introduced shrub
- Scattered scrub

Boundaries

- Species poor hedgerow
- Fence
- Dry ditch

Habitats

- Scrub - dense/continuous
- SI Poor semi-improved grassland
- Tall ruderal vegetation
- Marginal/ inundation vegetation
- Standing water
- Running water
- A Arable
- A Amenity grassland
- Ephemeral vegetation
- Buildings
- Bare ground

0 25 50 75 100

Metres

N

BOW17/961 Flixborough
Figure 5.6.2: Phase 1 Plan 1 of 6

Scale: See Scale Bar
Size A3
Version: 1
Drawn: LB
Checked: CW
Approved:
Date: 04.007.2019

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NORTH LINCOLNSHIRE GREEN ENERGY PARK

Legend

- Site boundary Feb 19
- Target note
- Individual tree
- Introduced shrub
- Scattered scrub
- Fence
- Dry ditch

Habitats

- Broadleaved woodland - semi-natural
- Scrub - dense/continuous
- SI Poor semi-improved grassland
- Tall ruderal vegetation
- Marginal/ inundation vegetation
- Running water
- Spoil/Rubble
- A Arable
- Ephemeral vegetation
- Buildings
- Bare ground

Boundaries

0 25 50 75 100

Metres

N

BOW17/961 Flixborough
Figure 5.6.3: Phase 1 Plan 2 of 6

Scale: See Scale Bar
Size A3
Version: 1
Drawn: LB
Checked: CW
Approved:
Date: 04.007.2019

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NORTH LINCOLNSHIRE GREEN ENERGY PARK

Legend

- Site boundary
- Target notes
- Broadleaved trees
- Scattered scrub
- Watercourse
- Broadleaved woodland
- A Arable
- SI Semi improved grassland
- Dense scrub
- Bare ground
- Tall ruderal vegetation

0 50 100

Metres

N

BOW17/961 Flixborough
Figure 5.6.4: Phase 1 Plan (3 of 6)

Scale: See Scale Bar
Size A3
Version: 1
Drawn: LB
Checked: CW
Approved:
Date: 03.07.2019

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NORTH LINCOLNSHIRE GREEN ENERGY PARK

Legend

- Site boundary
- Target notes
- Broadleaved trees
- Scattered scrub
- Watercourse
- SI Semi-improved calcareous grassland
- Broadleaved woodland
- A Arable
- Plantation woodland
- Dense scrub
- Bare ground

0 50 100

Metres

N

BOW17/961 Flixborough
Figure 5.6.5: Phase 1 Plan (4 of 6)

Scale: See Scale Bar
Size A3
Version: 1
Drawn: LB
Checked:CW
Approved:
Date: 03.07.2019

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NORTH LINCOLNSHIRE GREEN ENERGY PARK

Legend

- Site boundary
- Target notes
- Watercourse
- SI Semi-improved calcareous grassland
- Broadleaved woodland
- Plantation woodland
- Dense scrub

0 50 100

Metres

N

BOW17/961 Flixborough
Figure 5.6.6: Phase 1 Plan (5 of 6)

Scale: See Scale Bar
Size A3
Version: 1
Drawn: LB
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Approved:
Date: 03.07.2019

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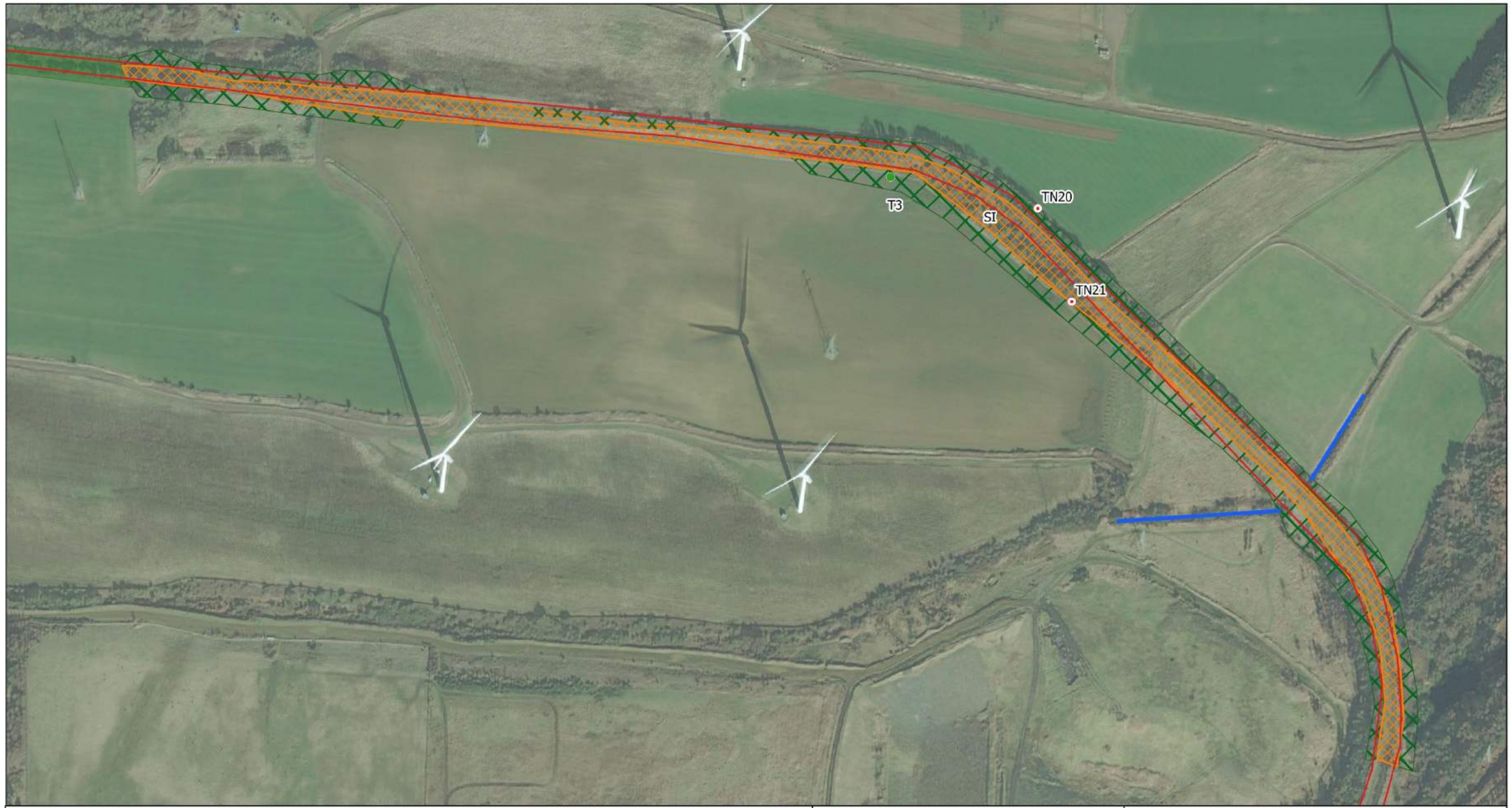
NORTH LINCOLNSHIRE GREEN ENERGY PARK



Legend

- Site boundary
- Watercourse
- Target notes
- Semi-improved calcareous grassland
- Broadleaved trees
- Broadleaved woodland
- Scattered scrub
- Dense scrub

0 50 100 150

Metres

N

BOW17/961 Flixborough
Figure 5.6.7: Phase 1 Plan (6 of 6)

Scale: See Scale Bar
Size A3
Version: 1
Drawn: LB
Checked: CW
Approved:
Date: 03.07.2019

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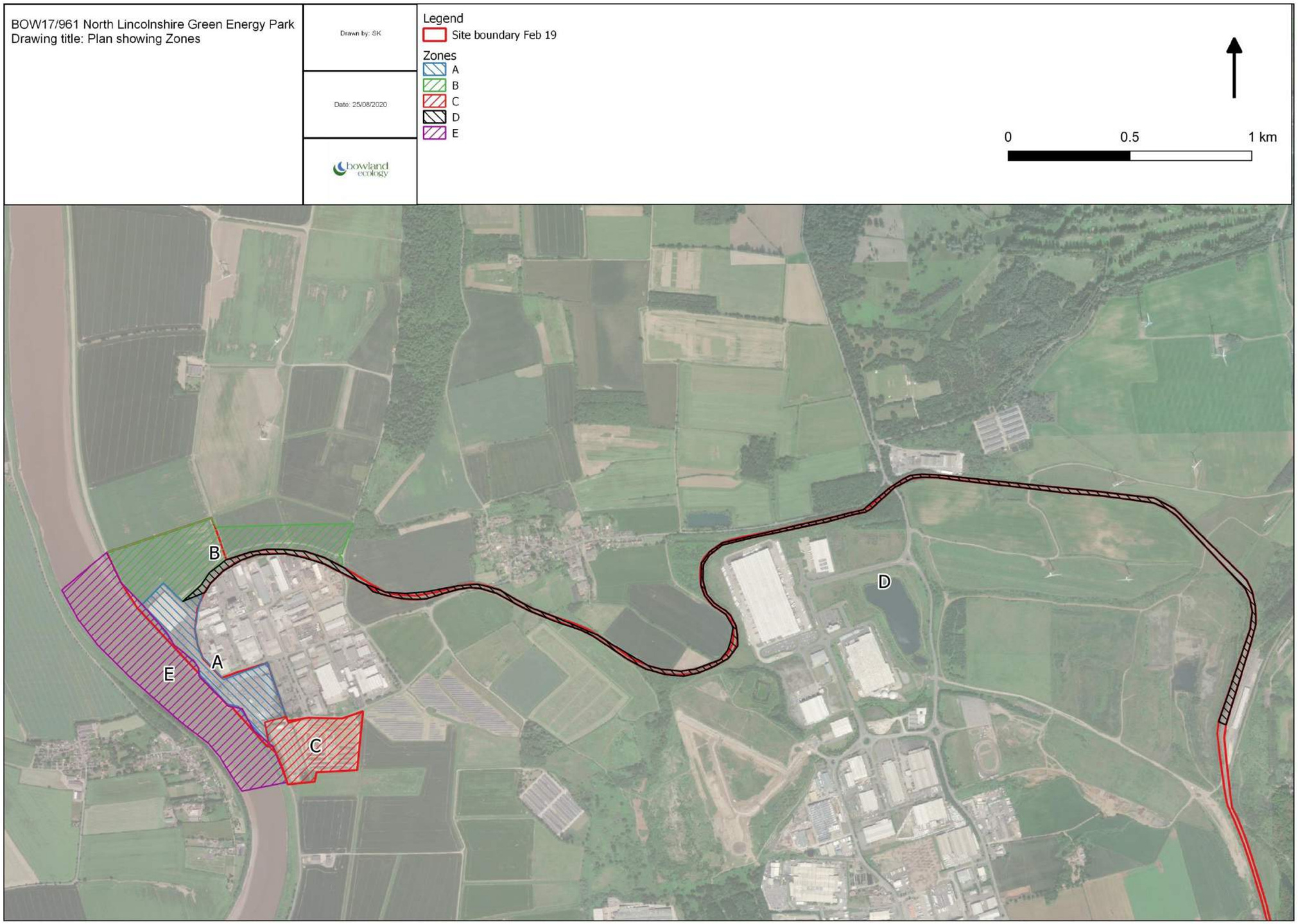
NORTH LINCOLNSHIRE GREEN ENERGY PARK

Appendix E – Plan showing Zones as defined in the Introduction



North Lincolnshire Green Energy Park
Technical Appendix B: Preliminary Ecological Appraisal (Energy Park Land and Southern DHPWN Land)

August 2020

Control sheet

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Client:	North Lincolnshire Green Energy Park Ltd
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1. Introduction

1.1 Bowland Ecology Ltd was commissioned to complete a Preliminary Ecological Appraisal of land at Flixborough (NGR: SE 85715 14683) to inform the North Lincolnshire Green Energy Park (NLGEP) ('Project').

1.2 The Project is located in North Lincolnshire, approximately one mile from Flixborough village, adjacent to the Flixborough Industrial Estate. The Order Limits are shown on the Phase 1 Habitat Plan (Appendix A) and the indicative landscaping plans (dated 2020) are shown in Appendix E. This report looks specifically at the areas identified for the Energy Park, which will be referred to as the Energy Park Land, and the Southern District Heat and Private Wire Network (DHPWN).

1.3 The majority of the area comprises intensively managed arable fields and poor semi-improved grassland. However, there are some habitats within the area that are of greater interest, including ditches, open water, broadleaved and plantation woodland, occasional scattered trees and areas of dense and scattered scrub. The River Trent is located directly adjacent to the western boundary of the Energy Park Land.

1.4 The purpose of the appraisal was to 1) identify and map all habitats occurring within the survey area, 2) identify the presence of (or potential for) wildlife interests with particular reference to the need for further surveys and legal requirements, and 3) provide an ecological assessment, identify potential impacts, and provide recommendations pertaining to the Project.

1.5 This report includes a description of survey methods and a summary description of habitats and fauna and further survey requirements. It supplements:

- a previous desk study and Phase 1 Habitat report based on a preliminary boundary which was produced in October 2018 (Bowland Ecology, 2018); and
- a Phase 1 Habitat report of a secondary boundary which was produced in July 2019 (Bowland Ecology, 2019).

2. Methodology

2.1 This Preliminary Ecological Appraisal is based on a desk study, an extended Phase 1 Habitat survey and an ecological appraisal. It follows the CIEEM Guidelines for Preliminary Ecological Appraisal and the CIEEM Guidelines for Ecological Report Writing (CIEEM, 2017 a, b), and is in line with the British Standard BS42020:2013 'Biodiversity – Code of practice for planning and development' (British Standards Institution 2013).

Desk Study

2.2 The area had previously been subject to a desk study (Bowland Ecology, 2018) based on a smaller survey area. This highlighted the potential of the Project to impact on qualifying bird species associated with the Humber Estuary Special Protection Area (SPA), as well as the suitability of habitat in the vicinity for protected mammals/birds and bird species of conservation concern recorded within 5 km of the survey area.

2.3 For the purpose of this report a targeted desk study was undertaken, which aimed to identify the presence of statutory and non-statutory wildlife sites and any Habitats of Principal Importance (HPI) for the conservation of biodiversity (Section 41 NERC Act 2006) within close proximity to the updated survey area.

2.4 This involved reviewing the local records of protected sites and species on and within 5 km from the data search with Lincolnshire Environmental Records Network (GLNP) reported in Bowland Ecology (2018) and carrying out a further search of non-statutory Local Wildlife Sites (LWS) within 2 km based on the updated Order Limits covered by this report. The Multi-Agency Geographic Information for the Countryside (MAGIC) website was reviewed for information on locally, nationally and internationally designated sites of nature conservation importance (statutory sites only) on or within 2 km of the Order Limits. A search area of 5 km is normally recommended, however as the Project has previously been subject to a search of this size (Bowland Ecology, 2018), a 2 km search area was deemed sufficient for the purposes of this report.

2.5 In addition, a review of aerial photos and OS maps was conducted to identify ponds within 0.25 km of the Order Limits. This followed the advice given in Natural England's great crested newt licensing method statement template (Form WML-A14-2, version November 2017[1]), which advises that, for developments resulting in permanent or temporary habitat loss at distances over 0.25 km from the nearest pond, careful consideration should be given as to whether a survey of relevant habitats is appropriate.

Field Survey

2.6 The extended Phase 1 Habitat survey followed standard methodology (JNCC, 2010 and CIEEM, 2017b). A colour coded map of the habitats on within the Order Limits has been produced (Appendix A)' along with target notes for all features of ecological significance (see Appendix B). The survey covered all areas within the indicative Order Limits, as well as all areas within 0.1 km of the Southern DHPWN Land (see Appendix E).

[1] https://www.gov.uk/government/publications/great-crested-newts-apply-for-a-mitigation-licence

2.7 This survey methodology records information on habitats together with any evidence of and potential for legally protected and notable fauna, in particular:

- potential roosting sites for bats within buildings and trees (identification of suitable cracks and crevices – survey undertaken externally and from ground level only). An assessment of the suitability of bat roosting, foraging and commuting habitat was undertaken according to the Bat Conservation Trust's Good Practice Guidelines 3rd Edition (Collins, 2016) (Appendix C);
- assessing the suitability of habitats for other notable and protected species such as nesting birds (including any active or disused nests), reptiles, water vole (*Arvicola amphibius*), otter (*Lutra lutra*), white-clawed crayfish (*Austropotamobius pallipes*), badger (*Meles meles*) and invertebrates;
- checking for the most common invasive plant species subject to strict legal control including: Japanese knotweed (*Fallopia japonica*), giant knotweed (*F. sachalinensis*), hybrid knotweed (*F. x bohemica*), giant hogweed (*Heracleum mantegazzianum*), rhododendron (*Rhododendrom. ponticum, R. ponticum x R. maximum* and *R. luteum*) and Himalayan balsam (*Impatiens glandulifera*); and
- assessing suitability of habitats for amphibians and the protected great crested newt (*Triturus cristatus*). Ponds on and within 0.25 km (access permitting) of the Order Limits were subject to a Habitat Suitability Index (HSI) (Oldham *et al*. 2000) assessment for great crested newt[2].

2.8 The survey was carried out by Claire Wilson MSc, BSc (Hons), ACIEEM, and Sophie King MSc, BSc on the 18th,19th and 20th November 2019 and the 20th and 21st July 2020. The weather conditions during the survey are presented in table 1 below.

Table 1: Survey dates and weather conditions

Date	***Weather***
18.11.2019	Cool (approximately 8°C), occasional scattered showers, with 50% cloud cover and a gentle breeze (Beaufort Scale No. 3).
19.11.2019	Cool (approximately 6°C) and dry, with 10% cloud cover and a gentle breeze (Beaufort Scale No. 2).
20.11.2019	Cool (approximately 8°C) and dry, with 20% cloud cover and a gentle breeze (Beaufort Scale No. 3).
20.07.2020	Cool (approximately 16°C) and dry, with 30% cloud cover and a gentle breeze (Beaufort Scale No. 3).
21.07.2020	Warm (approximately 17°C) and dry, with 20% cloud cover and a gentle breeze (Beaufort Scale No. 2).

Limitations

2.9 Ecological surveys are limited by factors that affect the presence of plants and animals such as the time of year, migration patterns and behaviour. Therefore, the survey has not produced a complete list of plants and animals.

[2] A HSI is a numerical index, between 0 and 1. Values close to 0 indicate unsuitable habitat, 1 represents optimal habitat. The HSI for the great crested newt incorporates ten suitability indices, all of which are factors known to affect this species. The HSI for great crested newt is a measure of habitat suitability - it is not a substitute for newt surveys.

2.10 Desk study data should not be treated as a comprehensive list of species present within a search area. Many species are under-recorded and low numbers of records can indicate a lack of survey effort in some areas, rather than confirm the absence of a species.

2.11 The timing of the first part of the Phase 1 Habitat survey was outside the optimum period for completing such a survey. However, this was not considered a major limitation as the majority of the survey area was accessible and the habitats encountered were commonly occurring and relatively species-poor. As a result, a valid assessment of the habitats present and their potential to support legally protected species was undertaken.

2.12 The list of invasive plant species included on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) is extensive and these plants are found in a range of different habitats, including aquatic habitats. The extended Phase 1 Habitat survey checked, in particular, for the presence of Japanese knotweed, giant knotweed, hybrid knotweed, giant hogweed, rhododendron and Himalayan balsam. There may be other invasive plant species present within the Order Limits which were not recorded, but it is considered that the survey was sufficient to identify any significant constraints posed by invasive plants.

2.13 A desk study including species information was included in Bowland Ecology (2018). Although this is deemed adequate at this stage of the ecological appraisal, it is recommended that an updated data search is conducted and assessed before the ecological recommendations are finalised.

3. Results

Designated Sites and Habitats of Principal Importance

3.1 The desk study included in Bowland Ecology (2018) identified four statutory designations applying to the Humber Estuary: Ramsar, Natura 2000 (Special Protection Area (SPA) and Special Area of Conservation (SAC)) and Site of Special Scientific Interest (SSSI). The qualifying features, site descriptions and their distance from the Order Limits are described in Bowland Ecology (2018). A plan showing the locations of the designated sites is shown in Appendix F.

3.2 A search of MAGIC identified the following statutory designated wildlife sites within 2 km of the Order Limits (see Appendix F):

- Phoenix Local Nature Reserve (LNR) is located along the eastern boundary of the Order Limits. No citation is included with the site details available on MAGIC, however the LRN connects with Atkinson's Warren LRN and Phoenix Parkway LNR. Review of aerial imagery suggests that the site includes areas of acid grassland/heath, bracken, scrub and Deciduous Woodland HPI with some areas of previously disturbed land;

- Phoenix Parkway LNR, located along the eastern boundary of the Order Limits, formerly park of Atkinson's Warren. The site is woodland on acid grassland. Ground flora typical of acid grassland. An important habitat linking Atkinson's Warren to Flixborough, known to provide habitat to deer, bats, numerous species of birds and invertebrates;

- Atkinson's Warren LNR is located less 90 m east of the Order Limits at its closest point. Atkinson's Warren sits on a Coversands Heathland site,

with around 36 ha of acidic grassland and mixed woodland. The UK has about 20 per cent of the world's total area of lowland heath. We now have only about 20 per cent of the heathland we had 200 years ago. In North Lincolnshire, heathland is concentrated around Scunthorpe on land known as the 'coversands' (an area of wind-blown sand deposits). Most of these areas around the town have been lost to development and what remains is largely fragmented and found on the edge of the town, often within areas of acid grassland; and

- Conesby Quarry LNR; a working quarry site and lagoon located 1 km east of the Order Limits. The site has a variety of flora and fauna, including orchids, acid loving flowers and plants, butterflies, dragonflies, amphibians and a variety of birds and mammals.

3.3 Bowland Ecology (2018) includes a search of Habitats of Principal Importance (HPI) and Ancient woodland within 5 km of the original survey area. For the purposes of this report, a search radius of 2 km from the current Order Limits was conducted for HPI and Ancient Woodland. The following HPI and Ancient Woodland were returned by the desk study:

- more than 30 counts of Saltmarsh and Mudflats HPI were returned within 2 km of the Order Limits. These habitats are located along the River Trent and are present along most of the western Order Limits;

- nine records of Costal and Floodplain Grazing Marsh HPI, the closest of which is located 0.7 km to the west of the Southern DHPWN Land;

- over 50 counts of Deciduous Woodland HPI, including one area within the Order Limits in the northern section of the Project, as well as large areas of woodland close to the Order Limits;

- 15 records of Lowland Dry Acid Grassland HPI, including a large block which spans part of east section of the Energy Park Land;

- 22 areas of Lowland Heathland HPI, the closest of which is located within Atkinson's Warren LNR, approximately 90 m to the east of the Order Limits;

- four records of Semi-Natural Ancient Woodland, comprising Brumby Wood, located 1.4 km to the east of the Southern DHPWN Land; and

- one record of Ancient Replanted Woodland, comprising Burton Wood, which is also classified as a Deciduous Woodland HPI, located immediately north-west of the Order Limits.

3.4 In addition, the search of MAGIC identified that areas fall within the National Habitat Network (Natural England, 2020) for the following habitat categories; costal saltmarsh, traditional orchard, SSSI and lowland dry acid grassland, alongside the following classifications; Fragmentation Action Zone, Network Enhancement Zone 1 and Network Enhancement Zone.

3.5 The data search with GLNP identified 15 Local Wildlife Sites (LWS) and two Local Geological Sites (LGS) within 2 km of the Order Limits. Locations of LWS and LGS are illustrated in a plan in Appendix F. Citations of these sites are described in Table 1 below.

Table 1. Non-statutory sites ordered according to their distance from the Order Limits

Ref No.	Name	Description
103	Burton Wood LWS	This is a 2 km long and 250 m wide native and non-native plantation on ancient woodland site. Located along the northern Order Limits.
83	Slag Banks LWS	This site comprises wetland and grassland on the north-eastern and south-eastern margins of an infilled ironstone quarry, plus a botanically-rich sandy area in the south-west within Phoenix Parkway Local Nature Reserve (LNR). Located along the eastern Order Limits.
72	Phoenix Parkway LWS	This is a complex of dry habitats on sand, plus a short stretch of shaded stream. Woodland predominates, but there is also scrub, coarse grassland and rabbit-grazed short turf, all contributing to a structurally-diverse and species-rich site. Located along the eastern Order Limits.
102	Brumby Common LWS	An area of plantation woodland located within 0.1 km east of the DHN, PWN.
26	Atkinson's Warren LNR, LWS	This is a large, botanically-rich, sandy site, the boundary of which is very similar to Atkinson's Warren LNR. Major habitats are four blocks of dry acidic grassland and three blocks of woodland. Located 0.2 km east of the Order Limits.
56	Land Adjacent to Jonhnson's Transport LWS	The site features a moderately-sized patch of good acid grassland, surrounded by larger areas of coarse grassland, scrub and woodland. Some wetland habitat is also present. Located 0.2 km east of the Southern DHPWN Land.
22	Ashby Decoy Golf Course LWS	The site support remnants of heathland and acid grassland, plus woodland around a pond. Located 0.5 km east of the Southern DHPWN Land.
94	Westcliffe Lagoon LWS	A complex lake system surrounded by oak-birch woodland and a little remnant heathland. Located 0.8 km east of the Southern DHPWN Land.
35	Gunness Common LWS	This is a substantial flat area of acidic peaty pasture on damp floodplain about 2m above sea level. Located 0.8 km west of the Southern DHPWN Land.
59	Kingsway Gold Course LWS	This woodland and grassland site occupies land that ranges from wet to dry and from acidic to neutral, supporting a diverse flora Located 1 km east of the Southern DHPWN Land.
19	Brumby Wood LWS	This site comprises the great majority of Brumby Wood LNR and supports a substantial amount of semi-natural woodland, most of which is included in the Ancient Woodland Inventory. Neutral grassland and a little acidic grassland are also present, plus small amounts of scrub. Located 1.4 km east of the Southern DHPWN Land.
3	Conesby Quarry LGS	A working quarry, the main habitats comprise scrub, semi-improved neutral grassland, ruderal vegetation and unimproved acid grassland. Located 1.5 km east of the Order Limits.
82	Silica Park LNR, LWS	This LNR comprises a rich mixture of open sandy grassland, denser and longer grassland, open water, marshy ground, scattered/dense scrub, and trees. Located 1.6 km east of the Southern DHPWN Land.
25	Conesby Quarry Rock Store LGS	A working quarry, the main habitats comprise scrub, semi-improved neutral grassland, ruderal vegetation and

		unimproved acid grassland. Located 1.7 east of the Order Limits
73	Ridge Walk LWS	A long north-south strip of mature hawthorn scrub. Located 1.8 km east of the Southern DHPWN Land.
66	Normanby Park LWS	A variety of habitats within five distinct areas, which are a large enclosed deer park in the east, a strip of woodland and amenity grassland in the west, two fenced grassland areas in the centre and a mixture of woodland and grassland in the south. Located 1.8 km east of the Order Limits.
67	Normanby Park Community Woodland LWS	Non-native plantation, semi-natural woodland, scrub and acid-grassland site. Located 2 km east of the Order Limits.

Habitats

3.6 The map of Phase 1 habitats recorded during the surveys is presented in Appendix A. This also shows the location of the Target Notes (TN), which summarise the key interest features for wildlife (as detailed in Appendix B). Each Phase 1 habitat is described more fully below (plant species nomenclature follows Stace 2010).

Arable

3.7 The majority of the land within the Order Limits comprises intensively managed arable farmland on flat ground. Crops recorded during the survey include rapeseed (*Brassica* sp.) and barley (*Hordeum vulgare*). The arable fields are extensive and there are abundant field drains and wide field margins present.

Buildings

3.8 Six buildings are present within or close to the survey area. These include two farm buildings at Park Ings Store (B1, B2) that are of red brick and corrugated metal construction, located in the arable fields in the southern section of the Energy Park Land. A farm building and house at Flixborough Grange (B3, B4), which are of red brick construction, are located to the north of the Order Limits. Two buildings are located within 0.1 km of the Southern DHPWN Land, comprising a Tesco Extra supermarket (B5), which is located to the east of the A1077 road in the Gallagher Retail Park, and a red brick hotel (B6), also located east of the A1077. Residential properties are also located within the Nuddock Wood Lakes fishery; however, they were not accessible at the time of survey.

Standing water

3.9 Five ponds are located within the Order Limits, all of which are located in the eastern section of the Energy Park Land (see Appendix A):

- Pond 1 (P1; TN15) is approximately 6 m x 6 m. The pond is located in an area of dense willow (*Salix* sp.) scrub and is fully shaded by a semi-mature willow tree. No aquatic vegetation was recorded, however grasses are submerged indicating that the pond regularly dries out;
- Pond 2 (P2; TN21) is a small area of wet ground, approximately 3 m x 3 m which is dominated by sedge growth. The water level at the time of survey was under 10 cm;
- Pond 3 (P3; TN22), which is approximately 10 m x 10 m, is located in an area surrounded by dense bracken (*Pteridium aquilinum*) growth. The water depth is up to 20 cm. The water is clear and the substrate is earth. Aquatic vegetation comprises reedmace (*Typha* sp.), however stands of

rush (*Juncus* sp.) grow in raised tussocks across the pond. The banking is shallow;

- Pond 4 (P4; TN23) is a small area of open water located adjacent to an area of dense scrub. The pond is dominated by yellow iris (*Iris pseudacorus*), and is dry at the edge with a water depth of under 10 cm in the centre; and
- Pond 5 (P5; TN24) is located partially within the Order Limits, in an area of dense scrub. The pond is large, approximately 75 m x 10 m, and over 0.5 m deep. Completely shaded by trees, the pond is turbid, with no emergent vegetation recorded. A ditch is present at the south and north of the pond.

3.10 A review of aerial photos and OS maps identified an additional nine ponds beyond the Order Limits and within 0.25 km of the Order Limits, four of which were not accessible for survey (see the Phase 1 Habitat in Appendix A for pond locations):

- Pond 6 (P6; TN1) is rectangular, approximately 550 m^2, and deep and turbid. It is situated on a chicken farm and is fenced off from the adjacent arable land. Reedmace was noted on the north and east margins, however no aquatic vegetation was present;
- Pond 7 (P7) is approximately 160 m^2, rectangular and turbid. P7 is also situated in the chicken farm and fenced off from the adjacent arable land. The banks are largely exposed earth with no aquatic vegetation present. The pond is 20% shaded;
- Pond 8 (P8) is also located within the chicken farm. OS maps and aerial imagery indicate that the pond is approximately 125 m^2, however it was not accessible for survey;
- Pond 9 (P9, TN1) is located immediately north of the Order Limits in the farm yard of Flixborough Grange;
- Pond 10 (P10) is circular, approximately 120 m^2 and situated between a small area of woodland. The banks are shallow and largely earth. Common reed (*Phragmites australis*) grows around the margins of the pond, with two small common reed islands in the centre. The pond is entirely covered by common duckweed (*Lemna minor*), with no other aquatic vegetation present. The pond margins are 80% shaded by hawthorn (*Crataegus monogyna*) and willow scrub;
- Pond 11 (P11) is a long, narrow waterbody, approximately 1700 m^2 and situated to the north of a railway embankment. The area immediately surrounding the pond is dense willow woodland with dense bramble (*Rubus fruticosus* agg.) growth throughout. The banks are exposed earth with no aquatic vegetation present; however the western section of the pond is filled with common reed. The water is shallow and clear, with an earth substrate. The pond margins are 100% shaded by willow;
- Pond 12 (P12) was not accessible for survey, located at NGR: SE 86427 10175;
- Pond 13 (P13) is a commercial fishing lake which was not accessible for survey, located at NGR: SE 85980 09294; and
- Pond 14 (P14) is a commercial fishing lake which was not accessible for survey, located at NGR: SE 85955 09104.

Running water

3.11 The River Trent is located along the western boundary of the Order Limits. This is a wide, fast flowing and turbid watercourse. The section of the river adjacent

to the Order Limits has bankside, marginal vegetation dominated by common reed.

3.12 A short section of a narrow stream (TN19) is present along the northern Order Limits. The stream is present along an arable field boundary and flows through the woodland at TN26. The stream connected with Ditch 1 (see Appendix B) and is culverted beneath the road.

3.13 38 ditches are present within the survey area. Full descriptions of these are included in Appendix B. The majority border arable fields and have with steep banks (30° to 90° angle) up to 4 m in height. Typical marginal vegetation includes short and long grasses such as false oat-grass (*Arrhenatherum elatius*), cocksfoot (*Dactylis glomerata*) and perennial ryegrass *(Lolium perenne*), together with common hogweed (*Heracleum sphondylium*), cow parsley (*Anthriscus sylvestris*), nettle (*Urtica dioica*), and creeping thistle (*Cirsium arvense*). Water depth and flow is variable across the ditches; five were recorded as dry, two were dry in places and the remainder had a recorded water depth of under 10 cm to over 0.5 m. Emergent vegetation comprised common reed, reedmace, fools-water-cress (*Apium nodiflorum*), brooklime (*Veronica beccabunga*), water-starwort (*Callitriche* agg.), water-crowfoot (*Ranunculus aquatilis*) and water mint (*Mentha aquatica*). Emergent vegetation was limited in some ditches due to recent dredging. It is likely that water quality within the ditch system is impacted by the surrounding intensive agriculture land use.

Broadleaved woodland and scattered trees

3.14 A small area of broadleaved woodland is located in the north eastern section of the Energy Park Land at TN26. The woodland qualifies as a Habitat of Principal Importance (HPI) and comprises occasional canopy species with a very dense scrub layer and limited ground flora. Mature oak (*Quercus* sp.) and beech (*Fagus sylcatica*) trees are present in the canopy and the understory is dominated by hawthorn, with elder (*Sambucus nigra*), rose (*Rosa* sp) and willow (*Salix sp*.) also recorded.

3.15 Occasional areas of semi-natural broadleaved woodland were recorded within 0.1 km of the Southern DHPWN Land; TN40 comprises an area of mature beech, sessile oak, and willow. The canopy is not closed and the understory is sparse, comprising young sessile oak, young silver birch, hazel, young Scot's pine (*Pinus sylvestris*), bramble and rose. The ground flora is dense bracken, with cocksfoot, false oatgrass, nettle, creeping thistle, herb-Robert, and lords-and-ladies (*Arum maculatum*) recorded; TN43 comprises occasional linear areas of broadleaved woodland located immediately east of the Southern DHPWN Land. The canopy is closed and includes mature sessile oak and sycamore. The understory is dense, with rowan, rose, hawthorn, bramble and elder recorded.

3.16 Scattered mature and young trees are present along the arable field boundaries and throughout the area of bracken and dense scrub to the east of the Energy Park Land (see TN18, TN20 and T1-T12). Species recorded include oak, ash (*Fraxinus excelsior*), field maple (*Acer campestre*) and sycamore (*Acer pseudoplatanus*).

Mixed Plantation woodland

3.17 Plantation woodland is frequent within 0.1 km of the Southern DHPWN Land, including an area of young mixed plantation along the western boundary of the A1077 (TN33). Frequently recorded species include oak, ash, silver birch (*Betula pendula*), rowan (*Sorbus aucuparia*) and hazel (*Corylus avellana*). An additional

area of mixed plantation woodland was recorded at TN41. This has an open canopy, with Scot's pine and silver birch recorded. The understory and ground flora are limited, with rose, rowan, hawthorn, cocksfoot, bramble and common reed recorded.

Coniferous plantation

3.18 An area of dense, coniferous plantation (TN42) was recorded to the east of the Southern DHPWN Land. The canopy is close and dominated by Scot's pine with occasional larch (*Larix* sp.) also recorded. The area is classified as Brumby Common LWS.

Dense, continuous and scattered scrub

3.19 Small areas of scrub are present along some field boundaries and are present in the marginal vegetation of the ditches. Dense mature willow, mature hawthorn and bramble scrub, as well as scattered scrub are abundant in the eastern section of the Energy Park Land (see TN16. TN17, TN18 and TN20). In addition, dense, continuous, and scattered scrub is abundant within 0.1 km of the Southern DHPWN Land.

Introduced shrubs

3.20 Occasional areas of ornamental planting are present around the Gallagher Retail Park to the east of the A1077.

Tall ruderal and marginal vegetation

3.21 Marginal vegetation dominated by common reed is located along the eastern banks of the River Trent as well as along the banks of numerous ditches within the Order Limits.

3.22 Tall ruderal vegetation is located along some of the arable field boundaries and is abundant within 0.1 km of the Southern DHPWN Land. The most frequent species recorded comprise common nettle, great willowherb (*Epilobium hirsutum*), rosebay willowherb (*Epilobium hirsutum*), common hogweed and creeping thistle.

Bracken and swamp

3.23 The eastern section of the Energy Park Land (TN14) features a mosaic of bracken dominated habitat located on dry ground and common reed on wetter ground. At the time of survey, this vegetation was dense and over 1.5 m in height. Scattered scrub including sapling oak trees, young hawthorn and young willow are present throughout.

Semi-improved acid grassland

3.24 Small areas of semi-improved acid grassland (TN14) are present in the clearings of bracken in the eastern section of the Energy Park Land. Species recorded include fescue grass (*Festuca* sp.), heath bedstraw (*Galium saxatile*), daisy (*Bellis perennis*), dandelion (*Taraxacum* agg.), springy turf moss (*Rhytidiadelphus squarrosus*), lichens and occasional heather (*Calluna vulgaris*). It is considered likely that this is an area of valuable relic heathland habitat, including dry acid grassland, on coversands. The habitat extends to the east, connecting to Phoenix Parkway LNR/LWS, Atkinson's Warren LNR/LWS and Slag Banks LWS, which also include areas of acid grassland with heathland, scrub, and mixed woodland habitats, and have numerous breeding bird species present, including green woodpecker, blackcap and linnet, and excellent habitats for invertebrates and mammals.

Species-poor semi-improved grassland

3.25 There are several areas of set-aside land with the arable fields which are characterised as species-poor semi-improved grassland. Flora recorded frequently in these areas include false-oat grass, cocksfoot, white clover (*Trifolium repens*), red clover (*Triofolium pratense*), common knapweed (*Centaurea nigra*), greater bird's-foot trefoil (*Lotus pedunculatus*) and creeping thistle. In addition the majority of arable fields have wide field boundaries which were recorded as poor semi-improved grassland during the survey. Common grassland species recorded within the field boundaries include Yorkshire fog, false-oat grass, cow parsley (*Anthriscus sylvestris*) and common hogweed.

3.26 An extensive area of species-poor semi-improved grassland was recorded to the east of the Energy Park Land at TN20. The grassland appears unmanaged, with a sward of approximately 0.5 m in height. See Appendix B for details of the vegetation composition.

Hedgerows

3.27 Ten hedgerows were recorded within the Order Limits, the majority of which are present along arable field boundaries and the eastern boundary. All of the hedgerows qualify as Habitats of Principal Importance (HPI). No hedgerows were recorded within 0.1 km of the Southern DHPWN Land. Woody species which were frequently recorded include hawthorn, elder, rose, bramble, field maple and blackthorn (*Prunus spinosa*). Full descriptions of hedgerows are included in Appendix B, the hedgerows within the Order Limits were assessed as follows:

- Intact native species-rich hedgerow (H1, H4);
- Intact species-poor hedgerow (H2, H6, H7, H8, H9);
- Defunct species-poor hedgerow (H5); and
- Native species-poor hedge and trees (H3, H10).

Other habitats

3.28 Hardstanding occurs along roads, farm tracks and footpaths. The Southern DHPWN Land is located adjacent to the A1077 and M181 roads. Foot and road bridges cross the M181 road along the Southern DHPWN Land.

3.29 Metal and wooden fencing is present throughout the survey area.

3.30 Amenity grassland planting is present in the area surrounding the Gallagher Retail Park, as well the pathways and central island of the Frodingham Grange Roundabout. The grassland is managed to a short sward of less than 15 cm. Species recorded include yarrow (*Achillea millefolium*), ribwort plantain (*Plantago lanceolata*), daisy, black medic (*Medicago lupulina*) and common ragwort (*Senecio Jacobaea*).

Species

Plants (incl. invasive species)

3.31 Cotoneaster (*Cotoneaster* sp.) was recorded to the east of the Southern DHPWN Land (TN37), in the carpark of a hotel within the Gallagher Retail Park. Certain species of cotoneaster are listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended). Identifying cotoneaster to species level is difficult;

therefore as a precaution, it is advised that the species within the Order Limits are treated as being listed on Schedule 9.

3.32 A small stand of rhododendron (*Rhododendron* sp.) was recorded in the dense scrub, immediately west of the Order Limits (TN12). Rhododendron is listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended).

Bats

3.33 The 2018 desk study returned 18 records of bats, nine of which are for common pipistrelle bat, one for pipistrelle species and eight records of bats, no species names were given.

3.34 Suitable foraging and commuting habitat for bats within the Order Limits includes arable fields, hedgerows, woodland, grassland, dense and scattered scrub, and scattered trees. These habitats are connected to other areas of good quality bat foraging and commuting habitat; specifically the River Trent, mature hedgerows and woodland located along arable field boundaries. Overall the land within the Order Limits was assessed as offering **moderate** suitability for foraging and commuting bats in accordance with Collins (2016).

3.35 Bat species for which the land within the Order Limits provides suitable foraging and commuting habitat include species which show a preference for utilising 'edge' habitats. Such species include common pipistrelle (*Pipistrellus pipistrellus*) and myotid species (*Myotis* spp.), which are flexible in their foraging habitat. The arable fields and areas of semi-improved grassland may provide favourable foraging habitat for noctule bats (*Nyctalus noctula*) which show a preference for feeding in 'open' habitats. However, the abundance of insects would influence the value of the foraging habitat for this species.

3.36 There are two buildings within the Order Limits. B1 and B2 are located at Park Ings Store, neither of which have Potential Roosting Features (PRFs) suitable for roosting bats. As such the buildings are considered to offer **negligible potential to support roosting bats** (see Appendix C). An additional two buildings (B5 and B6) are located within 0.1 km of the Southern DHPWN Land, and were assessed as providing **negligible to low potential to support roosting bats.**

3.37 Two buildings were recorded adjacent to the northern Order Limits (B3, B4). As these buildings were not included with the Order Limits, a preliminary roost assessment was not conducted. However it is considered likely that B3 and B4 provide suitable PRF for bats.

3.38 Twelve trees with PRFs were recorded within the survey area. The trees were assessed as providing **low to moderate potential to support roosting bats**. Seven of which are located within a line of mature and young trees, located to the north of the Order Limits (T1-T7). One tree is located within the area of scrub and bracken in the eastern section of the Energy Park Land; another is in the edge of an arable field. The remaining three are located within 0.1 km of the Southern DHPWN Land. Full descriptions of PRF and assessments of bat roost potential are included in Appendix B.

Badgers

3.39 The data search revealed six records of badger setts within the 5 km search area (Bowland Ecology, 2018). During the extended Phase 1 Habitat survey five badger setts (TN6, TN7, TN8, TN9, TN10) were recorded along the banks of

ditches in the southern section of the Energy Park Land. Four were recorded as outlying setts and one as a main sett. The main sett is located on the eastern bank of a ditch and comprises seven, active entrance holes with latrines and bedding recorded at the hole entrances, as well as a further three collapsed entrances. Mammal trails which appeared to be regularly used are present around the main sett.

3.40 The feeding remains of badger were observed in the northern section of the Energy Park Land.

3.41 Habitats which are considered suitable for foraging, commuting or sett building badger include the arable field boundaries, marginal vegetation, ditches, hedgerows, tall ruderal vegetation, bracken, dense and scattered scrub, broadleaved woodland and plantation woodland.

Other mammals

3.42 The 2018 desk study retuned two records of brown hare (*Lepus europaeus*) and four records of European hedgehog (*Erinaceus europaeus)* within the 5 km search area (Bowland Ecology, 2018). The arable field boundaries, hedgerows, dense and scattered scrub, broadleaved and plantation woodland provide suitable foraging, commuting and refuge habitat for European hedgehog, a Species of Principal Importance (SPI).

3.43 Brown hare (a SPI) were recorded in the arable fields of the Energy Park Land during the survey. The arable crops within the Order Limits provide suitable foraging habitat for brown hare.

3.44 Additional mammal species (non-SPI) recorded within the Order Limits comprises roe deer (*Capreolus capreolus*). Species considered likely to be present include wood mouse (*Apodemus sylvaticus*), common shrew (*Sorex araneus*) and field vole (*Microtus agrestis*).

Otter and water vole

3.45 The desk study revealed 31 records of water vole and nine records of otter within 5 km of the original Order Limits (Bowland Ecology, 2018.)The River Trent provides a foraging and commuting route for otter and the marginal vegetation along the banks of the river has potential to provide suitable lay-up sites. The wet ditches within the arable fields, in particular the larger ditches (D4, D5, D11 and D16) provide potential foraging and commuting habitat for otter. Potential lay-up sites include the marginal vegetation of the ditches, scattered scrub located along the ditches and areas of long, set-aside grassland adjacent to ditches (TN13).

3.46 The wet ditches are considered to provide suitable habitat for water vole. The long vegetation along the banks and aquatic vegetation within the channels provide favourable foraging and refuge habitat for water vole. The profile of the banks is steep and suitable for the creation of burrows. In addition, the ditches are interconnected over a large area, allowing for commuting. Previous surveys have confirmed the presence of water vole to the north of the Flixborough Industrial Estate, therefore it is highly likely that are present within the Order Limits of the Energy Park Land and Southern DHPWN Land.

3.47 The ditches within the Energy Park Land are subject to dredging, which will disturb the ditch substrate, aquatic vegetation, marginal vegetation and banks, reducing the suitability for otter and water vole.

3.48 The ditches which run parallel to the Southern DHPWN Land (D28, D34) were dry at the time of survey, suggesting that they are suboptimal for otter and water vole. However, there are several wet ditches along the Southern DHPWN Land, which are culverted beneath the road and connected to D28 and D34, which provide more suitable otter and water vole habitat.

Birds

3.49 The arable fields, field boundaries and associated areas of poor semi-improved grassland provide favourable nesting habitat for a variety of ground nesting birds including skylark (*Alauda arvensis*) and lapwing (*Vanellus Vanellus*). In addition, the marginal vegetation, tall ruderal vegetation and hedgerows adjacent to the arable fields are suitable for farmland birds such as yellowhammer (*Emberiza citrinella*) and reed bunting (*Emberiza schoeniclus*). The arable fields and associated habitats also provide foraging habitat for raptors, including marsh harrier (*Circus aeruginosus*) which are a qualifying feature of the Humber Estuary SPA. The farm buildings located within the Energy Park Land (B1 and B2) provide potential roosting and nesting habitat for barn owl (*Tyto alba*), as does the farm building to the north of the Order Limits (B4).

3.50 Suitable nesting habitat for shrub nesting birds recorded within the Order Limits comprise; hedgerows, marginal vegetation, scattered trees, dense and scattered scrub, broadleaved woodland, plantation woodland, bracken, swamp and tall ruderal vegetation.

3.51 Ditches, ponds and areas of wet ground identified within the Order Limits provide suitable habitat for waterfowl and wading birds such as teal (*Anas crecca*), mallard (*Anas platyrhynchos*), moorhen (*Gallinula chloropus*), snipe (*Gallinago gallinago*) and green sandpiper (*Tringa ochropus*), as well as foraging habitat for kingfisher (*Alcedo atthis*).

Reptiles

3.52 Suitable basking, foraging and refuge habitat for reptiles within the Order Limits comprises semi-improved acid grassland, species-poor semi-improved acid grassland, marginal vegetation, tall ruderal vegetation, bracken, dense and scattered scrub, and woodland. In particular the mosaic of semi-natural habitats in the eastern section of the Energy Park Land (TN14) was considered suitable for grass snake (*Natrix natrix*).

Amphibians

3.53 There are five ponds within the Order Limits and an additional nine ponds within 0.25 km of the Order Limits, four of which were not accessible for survey. Full descriptions of each pond are located under *Habitats* above. The ponds provide potential breeding habitat for great crested newt (GCN) and other amphibians including common toad (*Bufo bufo*) a SPI. Previous surveys have confirmed that GCN populations are present within the area.

3.54 A Habitat Suitability Index (HSI) was calculated for all accessible ponds (P1-P10), and these were categorised according to their suitability for GCN:

- Good: P10;
- Average: P5 and P6;
- Below Average: P2, P3, P4 and P7; and
- Poor: P1, P9.

3.55 Terrestrial habitats within the eastern section of the Energy Park Land are of the greatest suitability for amphibians. This includes areas of grassland, bracken, swamp, dense/scattered scrub and scattered trees (TN14, TN16, TN17).

Invertebrates

3.56 Records of butterflies returned by the desk study 2018 comprise grayling (*Hipparchia Semele*), small heath (*Coenonympha pamphilu*), wall (*Lasiommata megera*) and white-letter hairstreak (*Satyrium w-album*). The moth records comprise of garden tiger (*Artica caja*), mottled rustic (*Caradrina morpheus*), small square-spot (*Diarsia rubi*), light brown apple moth (*Epiphyas postvittana*), rosy minor (*Litoligia literosa*), dot moth (*Melanchra persicariae*), shoulder-striped wainscot (*Leucania comma*), cinnabar (*Tyria jacobaeae*), shaded broad-bar (Scotopteryx chenopodiata), knot grass (*Acronicta rumicis*), blood vein (*Timandra comae*), buff ermine (*Spilarctia luteum*), and white ermine (*Spilosoma lubricipeda*) (Bowland Ecology, 2018).

3.57 The range of habitats across the land within the Order Limits support a diversity of invertebrate species. The areas of tall ruderal and swamp vegetation, poor semi-improved grassland, acid semi-improved grassland, scattered and dense scrub, hedgerows, scattered trees and woodland are considered to be of greater value to invertebrates. The intensively managed arable fields are less suitable for invertebrates.

4. Evaluation and Assessment of Potential Impacts

4.1 An assessment of effects on ecological features has been made using the available design and survey information and the professional judgement of the ecologist. This includes a consideration of the relevant legislation (see Appendix D) and planning guidance. If there are changes to the Project, such as a change to the design or to the construction method and programme, the assessment would need to be reviewed.

Scheme Proposal

4.2 The Project (see Appendix E) includes the construction of an Energy Park, comprising an Energy Recovery Facility and associated developments, a new access road, and areas for biodiversity and landscaping. The Southern DHPWN comprises buried utilities infrastructure to supply electrical power. At the time of writing, detailed plans had not been produced.

Designated Sites

4.3 The Energy Park Land lies at the boundary of international and national wildlife sites (River Trent Ramsar SAC, and SSSI), which include extensive areas of Costal Saltmarsh and Mudflat HPI, and within 7 km of the Humber Estuary SPA. Additional statutory and non-statutory wildlife sites which border the Order Limits include: Burton Woods LWS and Ancient Woodland; Slag Banks LWS; Phoenix Parkway LNR, LWS and Lowland Dry Acid Grassland HPI; Brumby Common LWS; and Atkinson's Warren LRN, LWS and Lowland Heathland HPI.

4.4 Potential indirect impacts to these sites relating to the construction phase of the scheme include noise, vibration, dust, and disturbance from additional human presence, run-off of pollutants including silt, contaminated water, concrete, cement, oils, and chemicals. Impacts during the operational phase of the application scheme, which are likely to be smaller, include additional lighting, intermittent low-level noise/disturbance, and potential chemical runoff from accidental spillages. While the construction phase is anticipated to have a larger impact on ecological features than the operational phase, the impacts will be short term.

4.5 Unmitigated, impacts may also include a reduction in available habitat and habitat connectivity. Resulting in adverse impacts to Local Nature Reserves, Local Wildlife Sites and Habitats or Principal Importance.

Habitats

4.6 The majority of the land within the Order Limits is covered by intensively managed arable farmland, which comprises arable crops, species-poor semi-improved grassland along the field boundaries, and areas of set-aside. The arable farmland is of limited botanical interest and occurs commonly in the surrounding area; however the areas of set-aside provide sheltering, foraging and nesting opportunities for wildlife, particularly lowland farmland birds. Note that whilst part of the arable farmland in the east of Energy Park Land (TN13) has previously been classified as Lowland Dry Acid Grassland HPI, it currently supports set-aside grassland which does not meet with the qualifying criteria for this HPI (given that this was previously used for arable cropping, it seems that its previous classification as Lowland Dry Acid Grassland HPI was an error).The Project will result in the loss of a sizeable area of arable farmland and associated

habitats. In the absence of mitigation, this will result in an adverse ecological impact.

4.7 The eastern section of the Energy Park Land includes an area with a mosaic of species-poor semi-improved grassland, acid semi-improved grassland, tall ruderal vegetation, scattered trees, bracken, swamp, standing water, dense and scattered scrub (see TN14-18, TN20-21, P1-5). This is highlighted as an area of valuable relic 'heathland' habitat, including dry acid grassland on coversands. The search of MAGIC maps revealed that is had previously been classified as Lowland Dry Acid Grassland HPI, and it extends to the east to form part of a major block of semi-natural habitat, including Phoenix Parkway LNR/LWS, Atkinson's Warren LNR/LWS, and Slag Banks LWS. This section is of substantial ecological value and its loss would result in a significant ecological impact at site level which could not be easily mitigated.

4.8 Ten hedgerows within the Order Limits and an area of Deciduous Woodland (TN26) located along the northern Order Limits qualify as Habitats of Principal Importance (HPI). Mature scattered trees (T1-T12) are also considered of ecological value. The loss of these would be considered a significant negative ecological impact.

4.9 Habitats which are likely to be directly impacted along the Southern DHPWN Land include dense and scattered scrub, plantation woodland, scattered trees, tall ruderal vegetation, and ditches. In the absence of mitigation, the loss of these habitats would result in an adverse ecological impact at site level.

4.10 Where the habitats described above are retained, indirect impacts resulting from the construction and operation phase, including pollution (fuel spillages incidents, runoff and dust) and vibration disturbance during ground/vegetation clearance and construction, may occur in the absence of suitable control measures. Dust pollution in particular, has the potential to negatively impact on habitats through an increase in dust deposition. For example, the smothering effects from the grounding of dust reduces the amount of light available for photosynthesis which can affect the long-term success of trees.

4.11 The numerous interconnecting ditches and areas of standing water within the Order Limits provide aquatic habitat within the landscape. This is supported by any marginal vegetation, which acts as a buffer, and provides variety and structural diversity and complimentary habitat for a variety of species (further described below). In the absence of mitigation, the loss of ditches, standing water and any associated marginal vegetation would be considered a negative ecological impact. In addition, where these habitats are retained, works taking place within close proximity risk impacting through chemical pollution, siltation and physical damage to the banks. The ditches are currently subject to occasional dredging and are likely impacted by pollution from agricultural run-off, limiting the existing water quality.

4.12 It is not anticipated that the Project will result in direct impacts to the River Trent or the small section of watercourse (TN19) which is present along the northern Order Limits. Indirect impacts to the watercourses and marginal vegetation could include chemical pollution, siltation and physical damage to the banks.

4.13 Other habitats within the Order Limits include occasional introduced shrubs within 0.1 km of the Southern DHPWN Land, hardstanding, metal fencing and amenity grassland. These habitats are assessed as having limited ecological

value. As such, any loss would not have a significant negative ecological impact. Buildings are discussed under species below.

Species

Plants (inc. invasive species)

4.14 Rhododendron was recorded along the Order Limits (TN12), and cotoneaster was recorded within 0.1 km of the Southern DHPWN Land. The Project has the potential to cause the spread of these plants in the wild, which would constitute an offence under the Wildlife and Countryside Act (1981, as amended).

Bats

4.15 Overall the land within the Order Limits was assessed as offering **moderate suitability for foraging and commuting bats**. Species considered likely to use the land within the Order Limits include common pipistrelle, myotid species and noctule. Anticipated impacts to foraging and commuting bats resulting from the Project include; disturbance during works caused by increased noise, lighting and human presence; and the loss and modification of suitable foraging habitats. This is not considered to represent a significant long-term impact to local bat populations as these habitats are commonly occurring within the surrounding landscape.

4.16 Of the trees assessed as having potential to support roosting bats, direct impacts in the absence of mitigation are anticipated for the following two trees:

- T8, a semi-mature oak tree situated in the dense bracken growth in the eastern section of the Energy Park Land. A compression fork in the trunk of the tree provides a Potential Roosting Feature (PRF) for bats. Assessed as providing **low potential** for roosting bats; and

- T9, a dead oak tree located in an arable field which appears to have been struck by lightning. A split in the trunk may lead to a large internal cavity.

4.17 Direct impacts to these trees have the potential to lead to harm/mortality of roosting bats and a loss of roosting opportunities. This may result in an adverse impact on roosting bats, which would likely constitute an offence (see Appendix D for legislation and guidance). If the trees are to be retained, indirect impacts include increased disturbance (including light, noise, vibration, human presence and dust) during the construction and operational phase.

4.18 It is considered unlikely that the remaining trees with PRF for roosting bats will be directly impacted by the Project; T1-T7 are located to the north of the Order Limits and T10-T12 are located within 0.1 km of the DHN, PWN, outside of the anticipated working footprint. However, if bats are roosting in these trees then they may be affected by the indirect impacts described above, which may constitute an offence under the Wildlife and Countryside Act, 1981 (as amended).

4.19 Within the Order Limits, two buildings (B1 and B2) were assessed as offering negligible potential to support roosting bats. Therefore no impacts to roosting bats are anticipated. B5 and B6 are located within 0.1 km of the DHN, PWN. B5 was assessed as having negligible potential to support roosting bats. B6 was assessed as having low potential to support roosting bats. Due to the distance from the working footprint of the DHN, PWN, no direct impacts to bats which may be roosting in B6 are anticipated. Two buildings (B3 and B4) are located to the

north of the Order Limits at Flixborough Grange. While these buildings were not surveyed, it is considered likely that they provide PRF for bats. As such, if bats are roosting in B3 and/or B4, impacts may result from increased light, noise and human disturbance associated with the construction and operational phases of the Project.

Badgers

4.20 A main badger sett with a minimum of seven holes and three collapsed holes is present within the Order Limits of the Energy Park Land. An additional four outlying badger setts were recorded in the surrounding area. As badger are a highly mobile species and there is abundant suitable sett building habitat within the site (broadleaved woodland, dense scrub and sloping ground), there is a risk of badgers excavating additional setts across the site, within or close to working areas. As such, the Project has a high potential to result in the mortality and/or injury of badger; damage, obstruction or destruction of badger sett; and the disturbance of a badger in its sett; all of which would likely constitute offences under the Protection of Badgers Act 1992.

4.21 Badger field signs were recorded in the northern section of the Energy Park Land, suggesting badgers forage and commute throughout the land within the Order Limits. Unmitigated, earthworks pose a risk of disturbance to foraging and commuting badger through an increase in human presence, external lighting and entrapment in excavations. Impacts to foraging and commuting badger are considered to be of a moderate scale at site level.

Other mammals

4.22 Brown hare (a SPI) are confirmed as present within the Order Limits; other SPI considered likely to utilise the land within the Order Limits include European hedgehog. The land within the Order Limits is also likely to support populations of other (non-SPI) mammals including roe deer, field vole, wood mouse and common shrew. Impacts to these species include the disturbance/harm of individuals and the loss of foraging, breeding, refuge and hibernation habitats. Impacts to SPI are considered to be of a moderate scale at site level.

Otter and water vole

4.23 There is potential for otter to use laying-up site/holts within the land within the Order Limits, as well as using the interconnecting ditches for foraging and commuting. It is considered likely that the poor water quality of ditches within site has the potential to discourage the presence of otter, which are likely to favour better quality aquatic habitats. If the Project results in direct impacts to these ditches, this could result in the loss of suitable otter habitat and disturbance and/or harm of otter, which would constitute and offence under the Wildlife and Countryside Act 1981 (as amended).

4.24 The network of ditches within the Order Limits provide suitable habitat for water vole. In addition, previous surveys have confirmed the presence of water vole to the north of the Flixborough Industrial Estate, and a desk study (Bowland Ecology, 2018) returned numerous records of water vole within the area. In the absence of mitigation, impacts to water vole include; loss of suitable foraging, commuting and burrowing habitat; and harm or mortality to water vole, which would likely constitute and offence under the Wildlife and Countryside Act 1981 (as amended). Impacts to water vole have the potential to be significant at a local level due to the size of the land within the Order Limits and the potential to disrupt commuting corridors to the north and south of the Flixborough Industrial Estate.

Birds

4.25 The arable farmland, associated field margins, set-aside land, ditches and marginal vegetation, and other grassland areas provide suitable breeding habitat for ground nesting and farmland bird species including skylark, yellowhammer and reed bunting. The hedgerows, woodland, scattered trees, tall ruderal vegetation, bracken, swamp, dense and scattered scrub provide habitat for shrub nesting species. The ditches, open water and marginal vegetation provide suitable habitat for nesting birds with a preference for aquatic habitats. In the absence of mitigation, the scheme has the potential to result in the loss of nesting bird habitat. Furthermore, impacts to nesting birds, in the form of disturbance or killing/injuring, may occur if removal of the habitats is carried out during the nesting bird season (March – August inclusive), which would likely constitute an offence under the Wildlife and Countryside Act, 1981 (as amended).

4.26 The Energy Park Land is located within 0.7 km of the Humber Estuary SPA (Bowland Ecology, 2018). The River Trent provides a commuting route for bird species associated with the SPA. An assessment of the habitats within the Order Limits found that it provided potential overwintering habitat for wildfowl which are qualifying features of the SPA. A loss of these habitats has the potential to impact upon the SPA if these species are confirmed as present within the Order Limits.

Reptiles

4.27 The areas of semi-improved grassland present along the field boundaries and in the eastern section of the Energy Park Land, as well as the tall ruderal vegetation, dense and scattered scrub, marginal vegetation and bracken provide suitable reptile habitat. These areas provide shelter and basking proximity in close proximity to foraging areas including waterbodies. Unmitigated, the Project poses direct impacts to reptiles through the disturbance, injury/mortality to individuals and the loss of potential breeding and/or resting sites, which would likely constitute and offence under the Wildlife and Countryside Act, 1981 (as amended).

Amphibians

4.28 There are five ponds within the Order Limits. The Project has the potential to directly impact upon these waterbodies and the immediate surrounding terrestrial habitat. A further nine ponds are located within 0.25 km of the Order Limits: the surrounding terrestrial habitat of these ponds might be impacted by the Project.

4.29 Previous surveys have confirmed the presence of GCN in the surrounding area and records of GCN were returned by a desk study (Bowland Ecology, 2018). In addition, three of the ponds were assessed as having good to average habitat suitability for GCN. It is therefore considered highly likely that GCN are present in some of the ponds. The waterbodies also provide suitable breeding habitat for other amphibians including common toad (a SPI).

4.30 Unmitigated, potential impacts comprise the killing/injury of individuals which would constitute and offence under the Wildlife and Countryside Act, 1981 (as amended), loss of breeding habitat and loss of terrestrial habitat. The scale of impacts to GCN is dependent on the population size present. However, the loss of suitable breeding and terrestrial habitats for GCN and common amphibians is considered likely to represent a negative ecological impact at a site and local level.

Invertebrates

4.31 The majority of the land within the Order Limits comprises intensively managed arable farmland which is of limited suitability for most invertebrate species. Loss of this habitat would represent a minor negative ecological impact for invertebrates at site level. Habitats of greater value for invertebrates include the HPI hedgerows and the small area of Deciduous Woodland HPI to the north of the Flixborough Industrial Estate (TN26), as well as the mosaic of habitats in the eastern section of the site (TN14-TN18) and areas of dense and scattered scrub, bracken, marginal vegetation, semi-improved grassland, tall ruderal vegetation, scattered tree and woodland. The partial or complete loss of these habitats will represent a moderate negative ecological impact with respect to invertebrates at a site level.

5. Recommendations

5.1 This section provides the required measures to mitigate the impacts of the Project. A key element of the National Planning Policy Framework is to minimise impacts to biodiversity and provide enhancements. Paragraph 170 states that "*Planning policies and decisions should contribute to and enhance the natural and local environment by … minimising impacts on and providing net gains for biodiversity…"*. Paragraph 175 also states that "*when determining planning applications, local planning authorities should* …" encourage "*opportunities to incorporate biodiversity improvements in and around developments*". (National Planning Policy Framework, 2019) This section therefore also includes suggested enhancement measures. The following recommendations are designed to comply with legal requirements and national and local planning policy.

Designated Sites

5.2 Due to the presence of the Humber Estuary SAC and SPA, it will be necessary to apply the Habitats Regulations to the Project. This is a staged process with initial screening followed by an Assessment of Likely Significant Effects (ALSE). If significant effects are identified the competent authority will need to undertake an Appropriate Assessment in consultation with Natural England.

5.3 In order to minimise impacts on nearby designated sites (SSSI, Ramsar, SAC, SPA, LWS, LGS) and HPI, and the wildlife that use these sites, a detailed Construction Environmental Method Plan (CEMP) will be produced. The requirements of the CEMP will be embedded within the design of the project and it will be a requirement that a CEMP is produced and approved before tenders are validated. This will be agreed with the Local Planning Authority and/or Natural England and adhered to as a condition of the works during all works. The CEMP will include the Pollution Prevention Measures to be undertaken in accordance with Environment Agency Pollution Prevention Guidelines 5 – Works and maintenance in or near water. The CEMP will cover the following issues:

- pollution, including control of dust;
- surface water management;
- noise emissions;
- vibration disturbance;
- light pollution;
- biosecurity; and
- buffer strips around semi-natural habitats and Root Protection Areas for trees (as defined in British Standard: BS: 5837:2012).

Habitats

5.4 The Project area includes a range of habitats of ecological value which provide sheltering, foraging and nesting opportunities for a variety of wildlife species. The Project will result in the reduction of certain habitats, as well as increasing disturbance to habitats. There are, however, opportunities for habitat improvement in the areas marked for 'biodiversity and landscaping' shown in grey in Appendix E.

5.5 Measures to secure appropriate mitigation and compensation for these impacts are set out below. These are based on the following principles: minimising the loss of ecologically important and designated habitats; avoiding harming such habitats; and designing appropriate compensation for unavoidable habitat loss.

5.6 It is expected that the Project will result in the loss of a sizeable area of arable farmland. Whilst the arable cropland is of limited ecological value, there are areas of set-aside/marginal grassland which provide shelter, forage and nesting opportunities for wildlife, particularly lowland farmland birds. Loss of arable farmland and associated set-aside/field margins could be mitigated for by replicating the 'weedy grassland' vegetation associated with set-aside and field margins. An area at least equal to the area of set-aside/marginal grassland that is lost would be required.

5.7 To the east of the Energy Park Land there is a block of semi-natural vegetation which includes a mosaic of bracken, scrub, semi-improved grassland, tall ruderal and swamp, vegetation, ponds and scattered trees (TN14-18, TN20-21 and P1-P5). This area falls within the 'indicative area for glasshouses' shown in green in Appendix E. However, this is an area of substantial ecological value and its loss would result in a significant ecological impact which could not be easily mitigated. It is recommended that this area is transferred to the 'biodiversity and landscaping areas'. In addition, if it was brought under an appropriate management regime, it could easily provide significant gains in biodiversity.

5.8 Losses of habitats that qualify as Habitats of Principal Importance (HPI) should be avoided wherever possible. It is expected that the area of deciduous woodland HPI along the northern Order Limits (TN26) will be retained, as it is located within an area marked for 'biodiversity and landscaping'. The same applies to some of the hedgerows and it is recommended that all other hedgerows are similarly retained.

5.9 Other features which should be retained unless loss is unavoidable includes mature scattered trees, all ditches, watercourses and ponds (including all marginal vegetation), and scattered scrub. Significant habitats along the Southern DHPWN Land include dense and scattered scrub, plantation woodland, scattered trees, tall ruderal vegetation, and ditches.

5.10 Avoidance of harm to retained habitats described above, as well as the River Trent, will be ensured through the development of a detailed Construction Environmental Method Plan (CEMP). The CEMP will cover issues including; pollution, surface water management, noise emission, vibration disturbance, light pollution and biosecurity.

5.7 There are substantial opportunities to compensate for any unavoidable loss of ecologically important habitats and to provide biodiversity gains. Particularly important is the development of a suitable management plan for the block of semi-natural vegetation in the eastern section of the Energy Park Land (referred to in TN14-18, TN20-21, P1-5), This should focus on improving the condition of the mix of heathland, scrub and wetland habitats. Within the areas marked for 'biodiversity and landscaping', areas of 'weedy grassland' vegetation should be created to mitigate the loss of arable farmland and associated set-aside/field margins. Likewise, there are opportunities to mitigate any loss of hedgerow, scrub, trees and narrow strips of plantation woodland by allowing natural regeneration or planting of appropriate native trees and shrubs. The focus of additional measures within the 'biodiversity and landscaping areas' should be on

improving and expanding existing habitats, including the range of grassland, heathland, scrub and wetland habitats that are typical of the block of semi-natural vegetation in the eastern section of the Energy Park Land and adjacent Phoenix Parkway and Atkinson's Warren LNRs.

5.11 It is recommended that a detailed, ecological management plan is developed and implemented for the Project, covering a minimum of five years.

Species

Plants (inc. invasive species)

5.12 The survey identified a stand of rhododendron (TN12) just beyond the Order Limits. In order to avoid causing the spread of this species, it is recommended that this stand is removed in advance of works commencing. Eradication of rhododendron can be achieved through mechanical control which involves excavating the plant and root mass to prevent regrowth. Alternatively, stems can be cut close to the ground and the stumps painted or spot sprayed with herbicide. Plant material should be chipped or burnt in-situ to prevent regrowth. If this specimen cannot be removed prior to works commencement, it is recommended that the plant is cordoned off for the duration of the works, and contractors are made aware of its presence.

5.13 Several stands of cotoneaster (TN37) were identified within 0.1 km of the Southern DHPWN Land. These were recorded in the car park of a hotel in the Gallagher Retail Park. Due to the distance from the works area it is highly unlikely that the Project will impact upon them. Therefore it is recommended that site contractors are made aware of the presence of the species and advised to avoid working in this area.

Bats

5.14 It is anticipated that the Project could result in the loss of moderate quality bat foraging and commuting habitat, including, scrub, grassland and possibly plantation woodland and ditches. As such, it is recommended that further assessment of the use of the land within the Order Limits by bats is carried out, with the aim of determining the species present, frequency of use and the spatial distribution of foraging bats. Surveys will comprise repeated transects of the Energy Park Land, spread out over the active season (**June to August inclusive**). For large sites supporting high quality foraging habitats, a minimum of one visit per transect each month is recommended (Collins, 2016). Automated surveys using static bat detectors will also be used to provide supplementary data on activity levels within the Order Limits.

5.15 In addition to foraging and commuting habitats, bat roosting opportunities are also provided by individual trees located within the Order Limits (T8, T9). It is recommended that these trees are retained and incorporated into the biodiversity and landscaping proposals of the Project. If the trees are to be impacted by the Project, it is recommended that an aerial inspection survey is undertaken to further assess the suitability of potential roosting features and to search for evidence of roosting bats. The survey can be carried out at **any time of year**, and will inform the need for any mitigation measures with respect to roosting bats.

5.16 Three trees with potential to support roosting bats (T10, T11 and T12) were recorded within 0.1 km of the Heat Network route. It is considered unlikely that they will be impacted by the Project due to the distance from the works area. If

the trees are to be impacted, then an aerial inspection survey as outlined in paragraph 5.13 will be required to inform any mitigation measures.

5.17 A line of trees (T1-T7) which had the potential to support roosting bats, as well as a farm house and farm building (B3, B4) were recorded beyond the Order Limits during the survey. These features will be incorporated into the transect and static bat detector surveys described in paragraph 5.8 in order to assess the level of bat activity in this area. This will inform an assessment of the potential impacts to bats roosting in these features.

5.18 As the impacts to bats in relation to buildings B1, B2, B5 and B6 is considered negligible, no additional surveys or mitigation measures are required.

Badger

5.19 A main badger sett is located on the banks of D16 (TN18), as well four outlying setts located along ditch banks in close proximity to the main sett. The indicative landscaping plans for this area include a new road and area highlighted for the Energy Park. Therefore, a license must be obtained from Natural England to interfere with a badger sett for development purposes. The license will be required to exclude badgers from setts. Compensatory habitat and potentially the creation of compensatory setts will be required in order to fulfil the requirements of the license. Mitigation measures for badger are dependent on the detailed landscaping plan which had not been produced at the time of survey. If the main sett is not to be impacted or fragmented from commuting and foraging habitat, then the Project may not require a Natural England license to interfere with a badger sett.

5.20 Badgers are a mobile species and evidence of foraging badger was recorded across the land within the Order Limits. In order to minimise impacts to badger, a **pre-construction walkover** for badgers is recommended. If badgers are found to have colonised within or adjacent to the works area, a mitigation and compensation strategy will be developed in order to minimise impacts.

Other mammals

5.21 Any debris from works should not be left on site and any excavations associated with works should be covered overnight or fitted with egress boards to prevent animals becoming trapped. Any mammals found within the works area during construction should be carefully relocated to sheltered and undisturbed location with plenty of vegetation cover.

5.22 Habitat creation and enhancement measures should take account of SPI mammals which may potentially use the land within the Order Limits, including brown hare and European hedgehog. The creation of a mosaic of habitats, including significant areas of open grassland/heathland and scattered scrub will provide suitable foraging and refugia opportunities. It is also recommended that artificial hedgehog boxes are placed in suitable areas within the Order Limits, and incorporated into a future monitoring programme.

Otter and water vole

5.23 Watercourses within the Order Limits have potential to support water vole and otter. Further survey should be undertaken to inform a detailed impact assessment of these species and address the need for any mitigation and compensation measures. Presence absence surveys for water vole and otter comprise two survey visits, the first undertaken between **mid-April and the end of June** and the second between **July and September**. In addition, trail

cameras should be installed along water courses between **June and September** to monitor for the presence of water vole and otter.

5.24 If water voles are present, works will minimise impacts, including avoiding the fragmentation and isolation of habitats. If there are no reasonable alternatives, mitigation measures undertaken under a Natural England class licence can be used to: 1) encourage water voles to move away from working areas via habitat degradation; or 2) carry out live capture and translocation of water voles.

Birds

5.25 It is recommended that breeding bird surveys are undertaken at the Energy Park Land. This will involve three visits between **April and June**, recording the location, species and territory of all birds encountered. Survey results should be used to inform mitigation and compensatory habitat creation appropriate for the species and spatial distribution of territories.

5.26 As the Humber Estuary SPA is located within 7 km of the Energy Park Land (Bowland Ecology, 2018), it is recommended that winter bird surveys are undertaken to inform an assessment of likely effects on qualifying features of the SPA. Surveys should be undertaken between **November and March** inclusive.

5.27 During works, short-term impacts affecting nesting birds should be minimised by timing the clearance of habitats to be undertaken outside the breeding bird season (**March to August inclusive**). Any clearance of suitable habitats that must be carried out within the bird breeding season will be subject to a pre-clearance bird survey carried out by a suitably experienced ecologist. No works will be carried out within 5 m of an identified nest until the young have fledged and are no longer returning to the nest site. Works will only be undertaken once a scheme ecologist has declared the nest to be no longer in use.

5.28 Examples of compensation measures for the loss of breeding bird habitat include the creation of compensatory grassland, scrub and woodland habitats and the installation of artificial next boxes.

Reptiles

5.29 Mitigation impacts to reptiles will comprise the avoidance of direct impacts and compensatory habitat creation of offset habitat loss. Potential for direct impacts to reptiles stems from the removal of vegetation, groundworks and increased human activity and disturbance levels during the works.

5.30 It is advised a precautionary approach to works is undertaken, displacing any reptiles in areas of suitable habitat, including woodland, scrub tall ruderal and grassland areas. Key to this approach is the proposed progressive phasing of vegetation removal, thereby not simultaneously affecting large areas of habitat. Displacement will be carried out in line with the following measures:

- prior to works commencement, all contractors will receive a ‘tool-box’ talk from a suitably qualified ecologist, making them aware of the potential to encounter reptiles,; the action to take, and the legislative context;
- phased working areas will be clearly defined in order to limit potential disturbance of habitats;
- an ecological walkover prior to each phase of works will confirm a method of vegetation clearance, likely to involve a combination of the following:
    - Woodland and grassland habitats not considered to offer suitable hibernation habitat for grass snakes will be cleared to ground

level between September and March (to avoid the nesting bird season and under no constraints from reptiles).
    - Areas supporting suitable reptile hibernation habitat will be cleared under ecological supervision during the reptile active season (**mid-April – mid-October inclusive**), following a pre-commencement check for nesting birds.
    - Prior to habitat clearance during the reptile active season (**mid-April – mid-October inclusive**), areas will be subject to hand searching by a suitably experienced ecologist. The ecologist will supervise directional strimming of vegetation to 150 mm. A second strim will then be completed 1-2 hours later to 50 mm. Any grass snakes found will be encouraged to move naturally out of the working area into suitable adjacent habitat.
    - Following strimming to 50 mm, any potential hibernation or refuge habitat (such as rock piles, tree roots or wood/brash piles) present within the working area shall be removed carefully under supervision of the ecologist.
- immediately after vegetation clearance, arisings will be removed from the working area to avoid creating suitable habitat. Woody material can be used to create habitat in undisturbed areas;
- post-clearance and during earthworks, all vegetation will be kept short until completion of works in a given area;
- all stored materials, which may provide reptiles with suitable refugia, should be raised off the ground, on pallets stored over bare ground;
- all excavated material will be stored in such a way that does not create habitat for reptiles (i.e. well compacted with no voids); and
- any trenches or other excavations required within the Order Limits will be backfilled before nightfall, or a ramp left to prevent reptiles becoming trapped. Trenches should be carefully inspected in the morning prior to commencement of works.

Amphibians

5.31 Further survey of waterbodies on and within 0.25 km of the Order Limits is required in order to determine the presence of and population size of GCN to inform an appropriate mitigation strategy. Survey will involve eDNA sampling analysis of all ponds to determine presence/absence of GCN. Great crested newt population assessment surveys comprise six visits to each pond, undertaken between **mid-March and mid-June**, with at least three visits in the peak breeding season (**mid-April – mid-May**).

5.32 Following surveys and if deemed necessary, mitigation and compensation measures will inform a method statement to be submitted to Natural England, forming part of a European Protected Species (EPS) licence application. This can only be completed once planning permission has been granted. In order to enable works affecting suitable. The habitat creation and enhancement measures outlined under *Habitats* above has the potential to increase the suitable breeding and terrestrial habitat within the Order Limits for GCN and other amphibians, which could result in a long-term benefit for GCN and amphibians at a local level.

Invertebrates

5.33 The land within the Order Limits offers invertebrate habitat of variable value. Measures to improve the habitat for invertebrates include those outlined under *Habitats* above, as well creating log piles from felled material and providing areas of bare sloping ground for burrowing bees/wasps.

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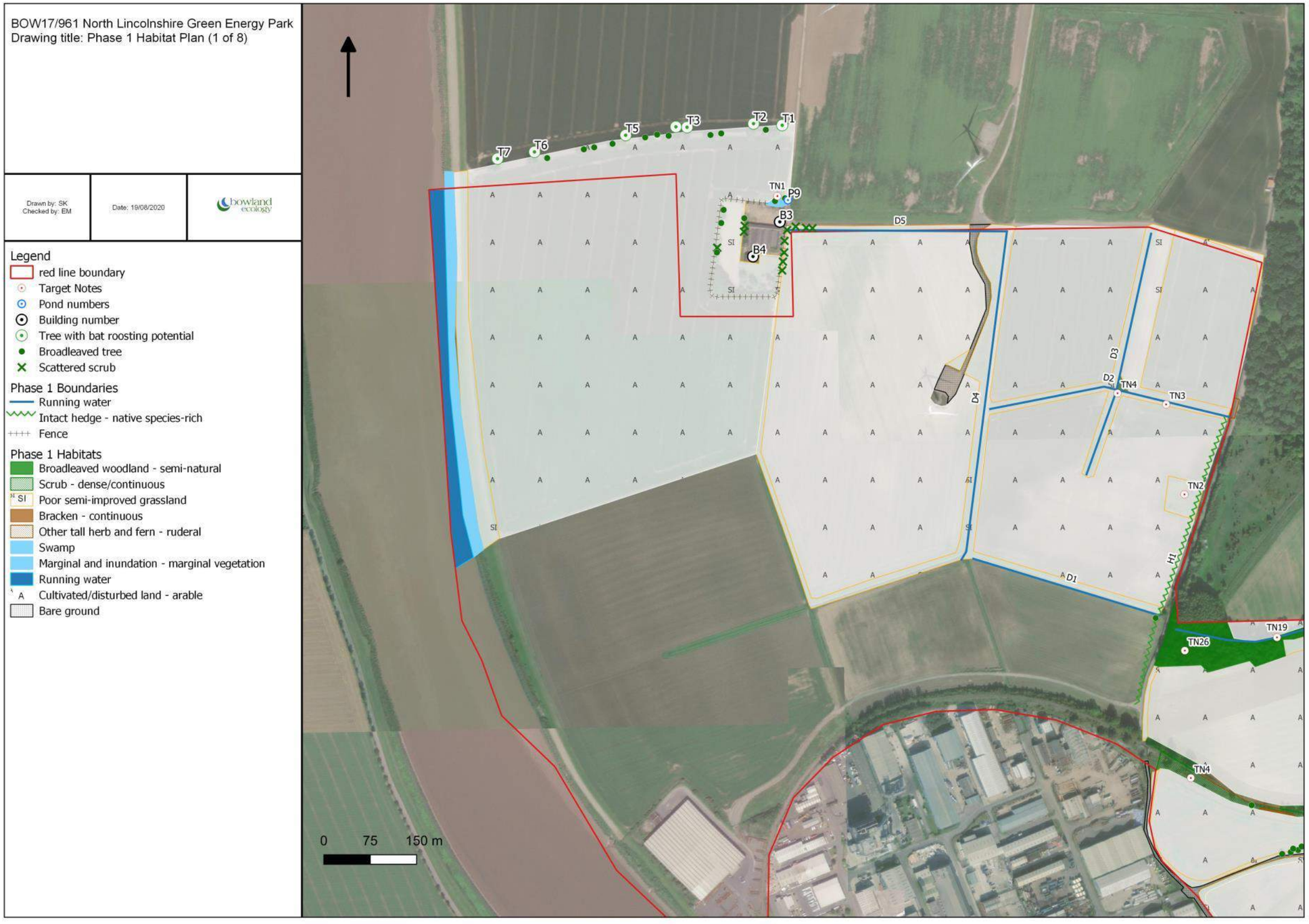
Appendix A – Phase 1 Habitat Plans



BOW17/961 North Lincolnshire Green Energy Park
Drawing title: Phase 1 Habitat Plan (2 of 8)

Drawn by: SK
Checked by: EM

Date: 19/08/2020

bowland ecology

Legend

- red line boundary
- Target Notes
- Tree with bat roosting potential
- Broadleaved tree

Phase 1 Boundaries

- Running water
- Intact hedge - native species-rich
- Hedge with trees - species-poor
- Fence

Phase 1 Habitats

- Broadleaved woodland - semi-natural
- Scrub - dense/continuous
- SI Poor semi-improved grassland
- Bracken - continuous
- Other tall herb and fern - ruderal
- A Cultivated/disturbed land - arable
- Bare ground

BOW17/961 North Lincolnshire Green Energy Park
Drawing title: Phase 1 Habitat Plan (3 of 8)

Drawn by: SK
Checked by: EM

Date: 19/08/2020

bowland ecology

Legend

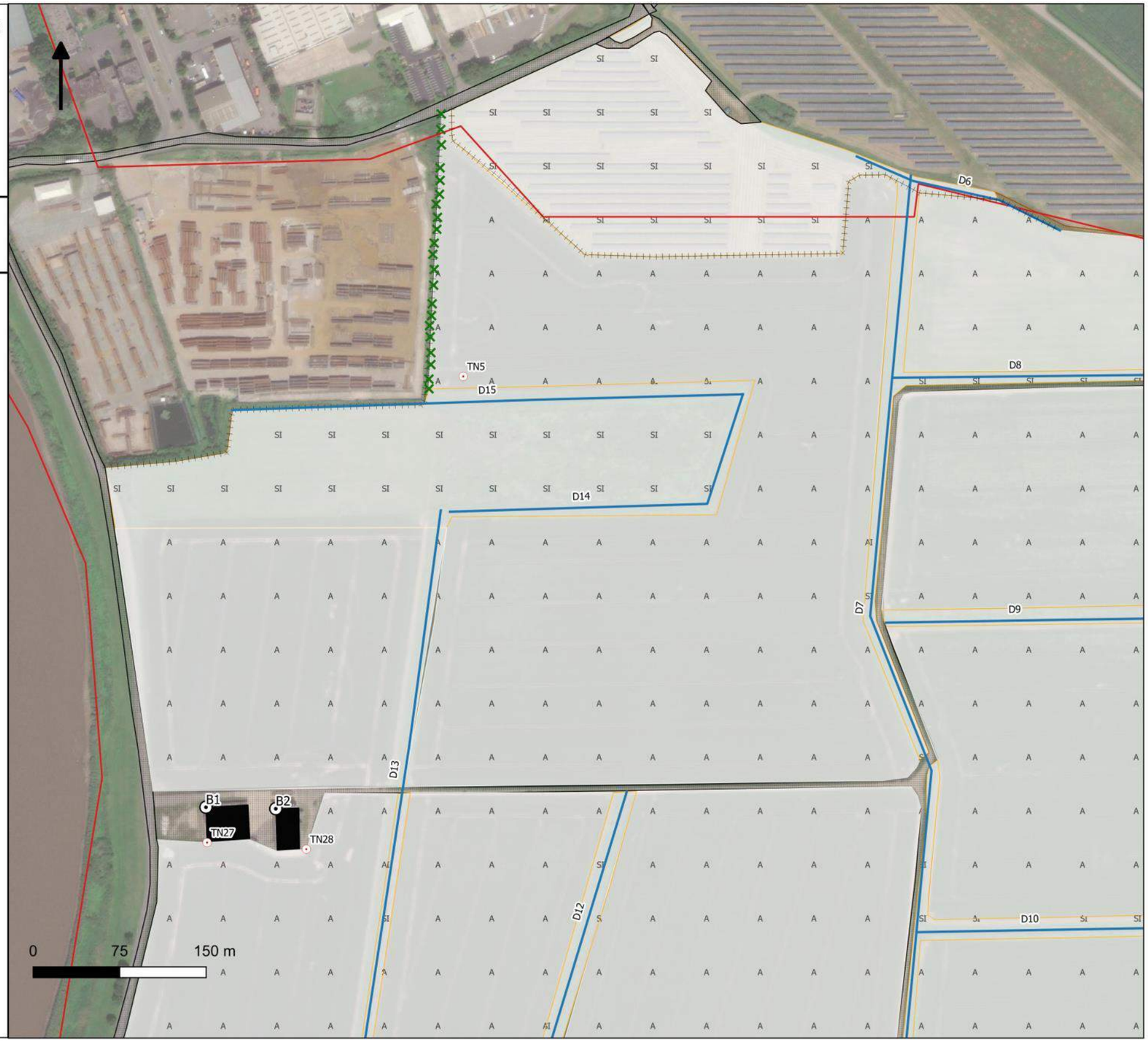
- red line boundary
- Target Notes
- Building number
- Scattered scrub

Phase 1 Boundaries

- Running water
- Fence

Phase 1 Habitats

- SI Poor semi-improved grassland
- Other tall herb and fern - ruderal
- A Cultivated/disturbed land - arable
- Buildings
- Bare ground



BOW17/961 North Lincolnshire Green Energy Park
Drawing title: Phase 1 Habitat Plan (4 of 8)

Drawn by: SK
Checked by: EM

Date: 19/08/2020

bowland ecology

Legend

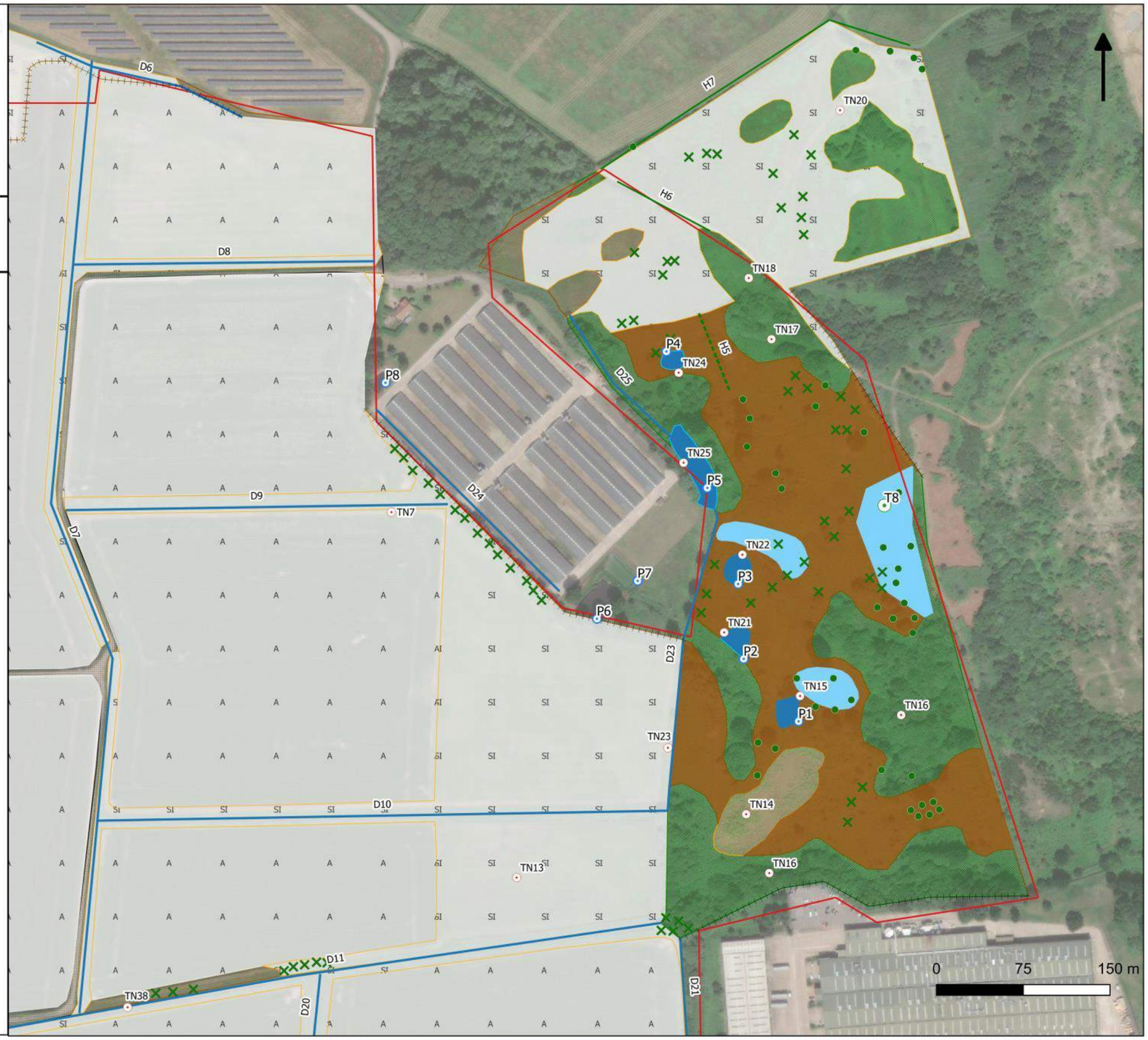
- red line boundary
- Target Notes
- Pond numbers
- Tree with bat roosting potential
- Broadleaved tree
- Scattered scrub

Phase 1 Boundaries

- Running water
- Intact hedge - species-poor
- Defunct hedge - species-poor
- Fence

Phase 1 Habitats

- Scrub - dense/continuous
- Acid grassland - semi-improved
- SI Poor semi-improved grassland
- Bracken - continuous
- Other tall herb and fern - ruderal
- Swamp
- Standing water
- Running water
- A Cultivated/disturbed land - arable
- Bare ground



BOW17/961 North Lincolnshire Green Energy Park
Drawing title: Phase 1 Habitat Plan (5 of 8)

Drawn by: SK
Checked by: EM

Date: 19/08/2020

bowland ecology

Legend

- red line boundary
- Target Notes
- Broadleaved tree
- Scattered scrub

Phase 1 Boundaries

- Running water
- Intact hedge - species-poor
- Defunct hedge - species-poor
- Hedge with trees - species-poor
- Fence
- Dry ditch

Phase 1 Habitats

- Broadleaved woodland - plantation
- Scrub - dense/continuous
- SI Poor semi-improved grassland
- Bracken - continuous
- Other tall herb and fern - ruderal
- Running water
- A Cultivated/disturbed land - arable
- Buildings
- Bare ground

BOW17/961 North Lincolnshire Green Energy Park
Drawing title: Phase 1 Habitat Plan (6 of 8)

Drawn by: SK
Checked by: EM

Date: 19/08/2020

bowland ecology

Legend

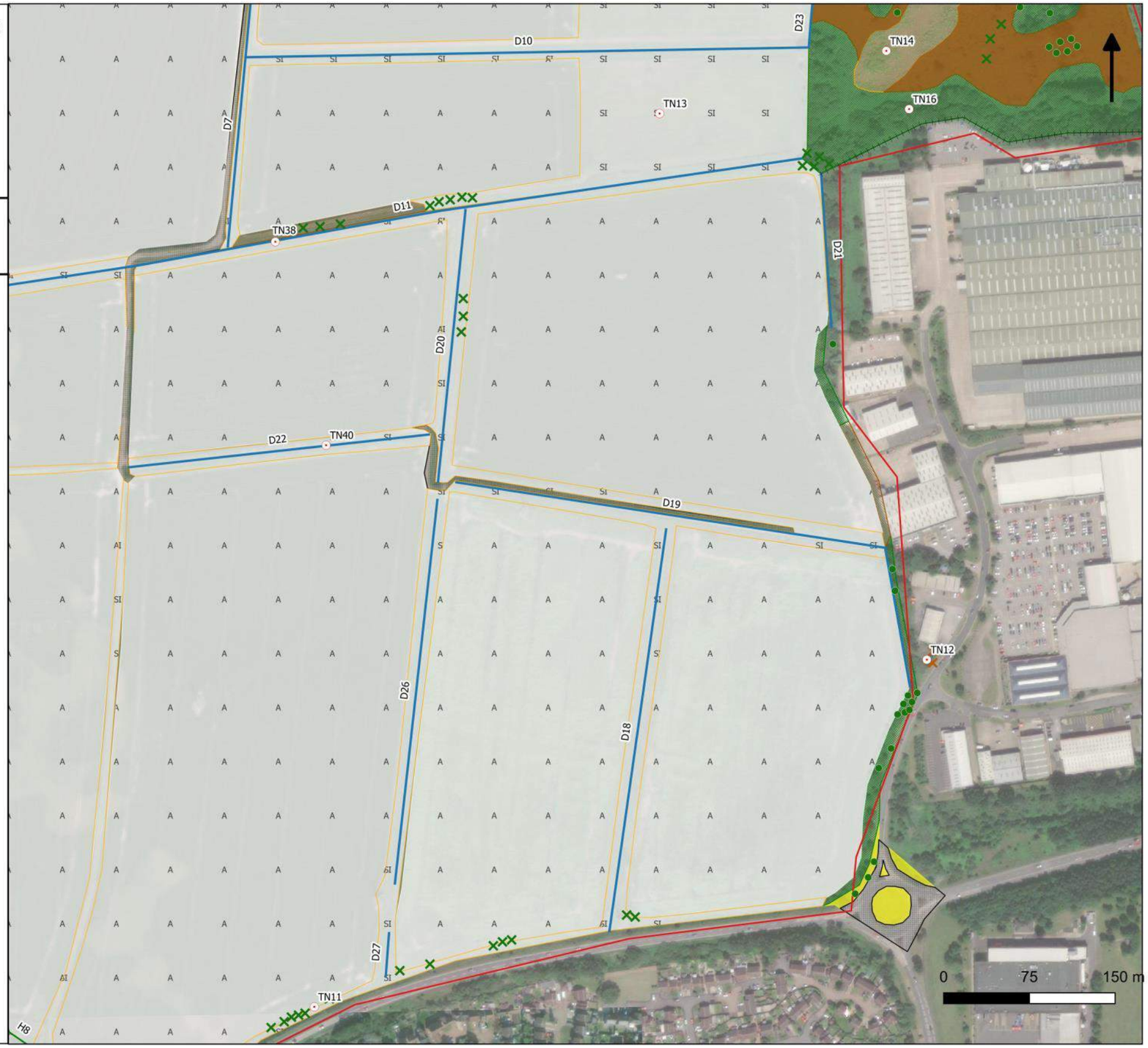
- red line boundary
- Target Notes
- Introduced shrub
- Broadleaved tree
- Scattered scrub

Phase 1 Boundaries

- Running water
- Intact hedge - species-poor
- Fence

Phase 1 Habitats

- Scrub - dense/continuous
- Acid grassland - semi-improved
- SI Poor semi-improved grassland
- Bracken - continuous
- Other tall herb and fern - ruderal
- A Cultivated/disturbed land - arable
- A Cultivated/disturbed land - amenity grassland
- Bare ground



BOW17/961 North Lincolnshire Green Energy Park
Drawing title: Phase 1 Habitat Plan (8 of 8)

Drawn by: SK
Checked by: EM

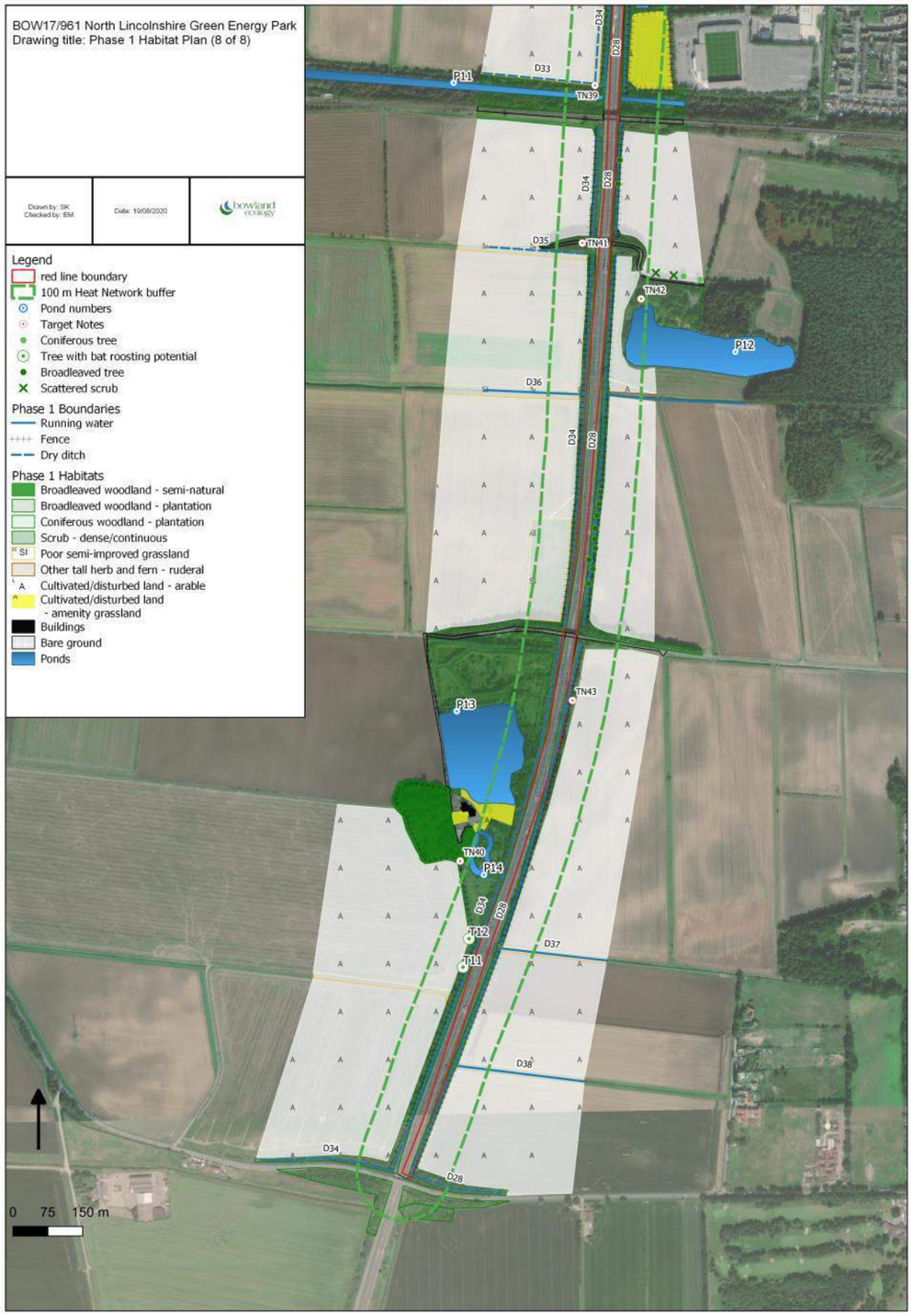
Date: 19/08/2020

bowland ecology

Legend
- red line boundary
- 100 m Heat Network buffer
- Pond numbers
- Target Notes
- Coniferous tree
- Tree with bat roosting potential
- Broadleaved tree
- Scattered scrub

Phase 1 Boundaries
- Running water
- Fence
- Dry ditch

Phase 1 Habitats
- Broadleaved woodland - semi-natural
- Broadleaved woodland - plantation
- Coniferous woodland - plantation
- Scrub - dense/continuous
- Poor semi-improved grassland
- Other tall herb and fern - ruderal
- Cultivated/disturbed land - arable
- Cultivated/disturbed land - amenity grassland
- Buildings
- Bare ground
- Ponds



BOW17/961 North Lincolnshire Green Energy Park
Drawing title: Phase 1 Habitat Plan (7 of 8)

Drawn by: SK
Checked by: EM

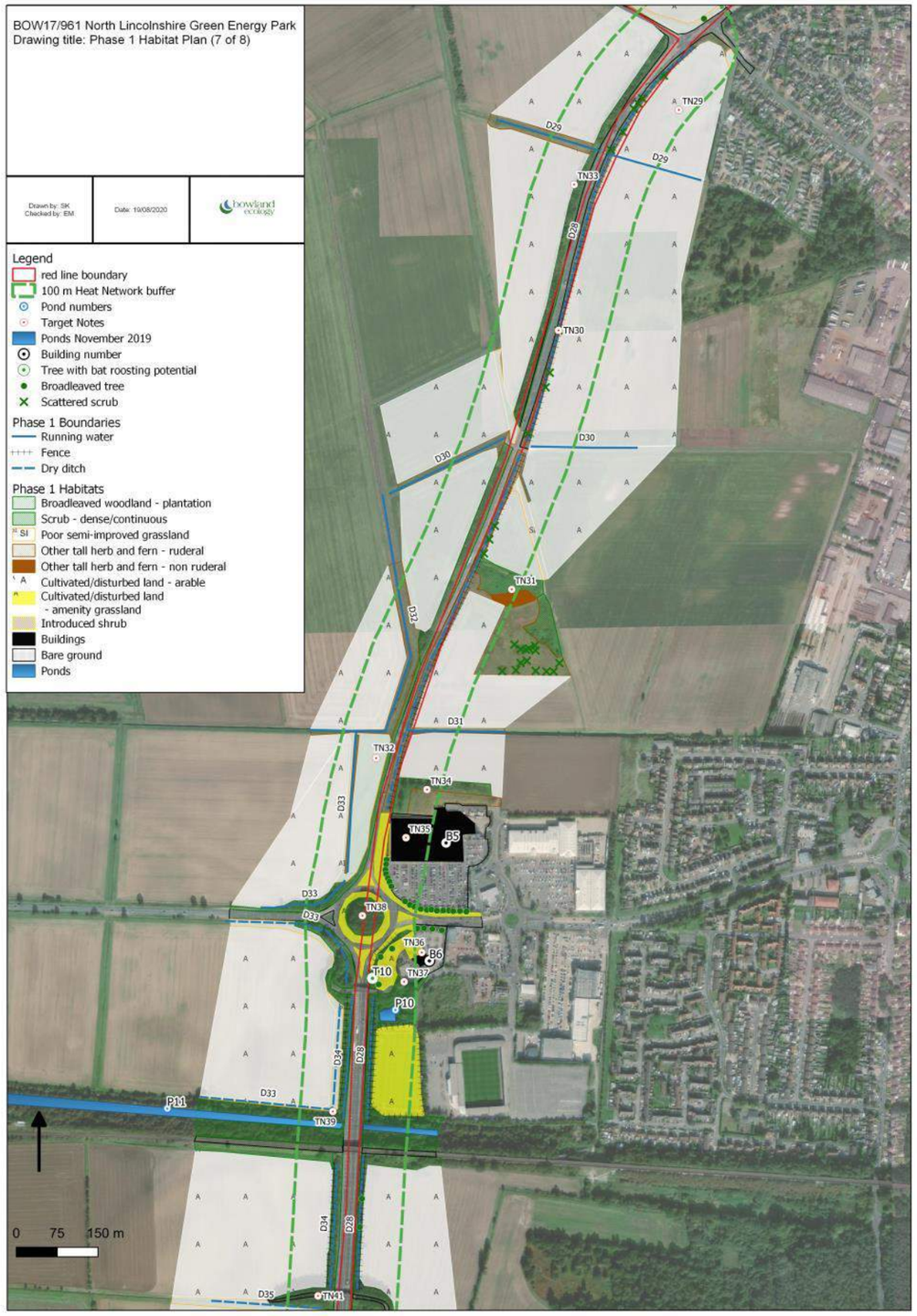
Date: 19/08/2020

bowland ecology

Legend
- red line boundary
- 100 m Heat Network buffer
- Pond numbers
- Target Notes
- Ponds November 2019
- Building number
- Tree with bat roosting potential
- Broadleaved tree
- Scattered scrub

Phase 1 Boundaries
- Running water
- Fence
- Dry ditch

Phase 1 Habitats
- Broadleaved woodland - plantation
- Scrub - dense/continuous
- Poor semi-improved grassland
- Other tall herb and fern - ruderal
- Other tall herb and fern - non ruderal
- Cultivated/disturbed land - arable
- Cultivated/disturbed land - amenity grassland
- Introduced shrub
- Buildings
- Bare ground
- Ponds



Appendix B – Target Notes

Target Notes Table: Description and Photos		
Target note	**Description**	**Photo**
TN1	Pond 9 (P9) is a small area of swamp, located north of the Order Limits, approximately 25 m x 10 m. The water is visible, turbid and dominated by common reed (*Phragmites australis*). There is a shallow banking which slopes at 45° into the swamp. Overall the pond scored a HSI score of 0.39, offering poor suitability for great crested newts.	
TN2	A small area of mosaic arable set-aside land at the eastern boundary of arable fields, adjacent to hedgerow. Rank grassland which is slightly tussocky and tall ruderal vegetation are present, species present comprise rosebay willowherb (*Chamerion angustifolium*), cocksfoot (*Dactylis glomerata*), broad-leaved dock (*Rumex obtusifolius*), common hogweed (*Heracleum sphondylium*), common ragwort (*Senecio Jacobaea*), creeping thistle (*Cirsium arvense*), common reed, sedges, bent grass (*Agrostis* sp.), soft rush (*Juncus effusus*), meadowsweet (*Filipendula ulmaria*) and rough meadow-grass (*Poa trivialis*). Some scrub growth is also present; species noted comprise willow (*Salix* sp.), hawthorn (*Crataegus monogyna*), rose (*Rosa* sp.) and bramble (*Rubus fruticosus* agg.). The area is suitable for small mammals, reptiles, amphibians, ground nesting birds and foraging raptors/owls.	N/A
TN3	Three small mammal burrows noted on the banks of D2.	N/A
TN4	Two small mammal burrows noted on the bankside where D2 and D3 meet.	N/A
TN5	Brown hare (*Lepus europaeus*) flushed from the arable field boundary	
TN6	Outlying badger sett, with two holes, one of which is in use, on the south bank of D11.	
TN7	Badger sett and latrine noted on the bankside of D9	N/A

TN8	Main, active badger sett on the east bank of D16. The banks of D16 feature several, well used mammal paths. Seven, active entrances noted, with latrines present and bedding at the hole entrances. A further three collapsed entrances were also recorded.	
TN9	Outlying badger sett, one entrance noted on the bank of D17.	N/A
TN10	Outlying badger sett, one entrance noted on the bank of D17.	N/A
TN11	The southern arable field boundary and roadside embankment comprise a mosaic habitat of semi-improved grassland and tall ruderal vegetation. Species present include cocksfoot, common hogweed, red fescue (*Festuca rubra*), broad-leaved dock, cow parsley (*Anthriscus sylvestris*), hawkbit (*Leontodon* sp.), common couch (*Elymus repens*), cleavers (*Galium aparine*) and rosebay willowherb (*Chamerion angustifolium*).	N/A
TN12	A small section of rhododendron (*Rhododendron* sp.) is present in the dense scrub, immediately west of the Order Limits	N/A
TN13	Area of set aside land, dominated by red clover (*Triofolium pratense*), perennial ryegrass *(Lolium perenne*), common knapweed (*Centaurea nigra*) and greater bird's-foot-trefoil (*Lotus pedunculatus*). Further botanical assessment surveys will be needed in the summer. Potential habitat for small mammals, foraging raptors and owls, ground nesting birds and brown hare.	
TN14	The eastern section of the Energy Park Land is a mosaic of habitats; predominantly acid semi-improved grassland, dominated by bracken (*Pteridium aquilinum*) with occasional areas of dense common reed swamp, scattered scrub and trees, tall ruderal vegetation and shallow areas of wet ground and standing water (see TN15 and TN22). Flora recorded in the acid semi-improved grassland include heath bedstraw (*Galium saxatile*), daisy (*Bellis perennis*), dandelion (*Taraxacum* agg.), springy turf moss (*Rhytidiadelphus squarrosus*), lichens and occasional heather (*Calluna vulgaris;* less than 25% cover). The sward height is up to 15 cm and the ground is sloped. Bracken encroachment is characterised by dense growth, reaching a height of approximately 1.5 m. Occasional areas of dense common reed swamp are present, some water was noted however the swamps were mainly dry at the time of survey. Scattered scrub species noted comprise hawthorn, willow, bramble, gorse (*Ulex europaeus*) and sapling oak (*Quercus* sp.). Young, semi-mature and mature oak, ash (*Fraxinus excelsior*) and sycamore (*Acer pseudoplatanus*) trees are present throughout. Growth of tall ruderal vegetation was recorded amongst the bracken, comprising rosebay willowherb, cleavers and nettle (*Urtica dioica*). Large mammal paths which appear to be regularly used were noted throughout the bracken, up to 10 roe deer have been observed in the bracken on multiple visits.	

TN15	Pond 1 (P1), is a wet pond situated adjacent to willow scrub. Approximately 6 m x 6 m, circular and shallow, under 10 cm deep, with clear water, an earth substrate and no defined bank. The pond is fully shaded by a semi mature willow tree. No aquatic vegetation was noted, however grasses are submerged indicating that the pond regularly dries out. TN21 was assessed to have **poor suitability for great crested newts** (HSI: 0.47).	
TN16	Dense willow scrub is present in the eastern section of the Energy Park Land. The scrub is dominated by semi-mature willow trees, with occasional hawthorn, ash saplings and silver birch (*Betula pendual*) saplings. Ground flora present comprise bramble, bracken, common reed, marsh thistle (*Cirsium palustre*), creeping buttercup (*Ranunculus repens*), herb-Robert (*Geranium robertianum*), rush (*Juncus* sp.), male fern (*Dryopteris filix-mas*), nettle and mosses. Abundant leaf litter, brash piles, rotting wood and bare ground are present throughout the scrub. There are also occasional wet areas, which provide potential habitat for amphibians. No evidence of badger was noted however there were abundant mammal paths through the scrub. These areas of dense willow scrub provide suitable foraging, commuting and sett building habitat for badgers	
TN17	Dense, semi-mature hawthorn scrub is also present in the eastern section of the Energy Park Land and adjacent to the footpath at TN17. Other shrub species noted comprise bramble, rose, willow and young ash. Ground flora noted comprise occasional nettle, cow parsley, false oatgrass (*Arrhenatherum elatius*) and bracken, however the ground is dominated by leaf litter, bare ground, and brash piles. No evidence of badger was noted, but these areas of dense hawthorn scrub provide suitable foraging, commuting and sett building habitat for badgers.	
TN18	Extensive areas of dense bramble cover, up to 2 m in height, were noted in the eastern section of the Energy Park Land, providing suitable nesting habitat from shrub nesting birds, reptile and amphibian refugia and foraging habitat for badgers.	
TN19	Narrow watercourse which is present along an arable field boundary and flows through the woodland at TN26. The watercourse connects with D1 and is culverted beneath the road. The channel is approximately 0.5 m wide, and under 0.5 m deep, with fast flowing water from east to west. The water is clear, the substrate is silt and stone. The banks are steep with abundant Yorkshire fog, cocksfoot, rosebay willowherb, creeping thistle, common hogweed and nettle recorded. The watercourse was assessed as suboptimal for water vole (*Arvicola amphibius*), however it may provide suitable foraging and commuting habitat for otter (*Lutra lutra*).	N/A
TN20	Semi improved grassland is present in the eastern section of the Energy Park Land. The grassland is unmanaged with a variable sward height of 30 cm up to 1 m. Species present comprise cocksfoot, cleavers, broad-leaved dock, common hogweed, bracken, yarrow, nettle, creeping thistle, greater plantain (*Plantago major*), Yorkshire fog, common ragwort, greater birds-foot-trefoil, red clover, white clover (*Trifolium repens*), creeping buttercup (*Ranunculus repens*), great	

	willowherb (*Epilobium hirsutum*), meadow cranesbill (*Geranium pratense*), red campion (*Silene dioica*), white campion (*Silene latifolia*), ground ivy (*Glechoma hederacea*). Scattered scrub comprising rose, bramble, hawthorn, oak sampling and ash sapling are present, alongside encroachment from areas of dense scrub (TN16, TN17, TN18). The grassland provides suitable nesting habitat for birds, refuge and foraging habitat for amphibians and reptiles, foraging and refuge habitat for small mammals including hedgehog and badger, as well as foraging habitat for bats.	
TN21	Pond 2 (P2) is a small area of wet ground, dominated by sedges. There is pooling water up to 10 cm in depth. The substrate is earth and there are the pond has no banks. The ponds provides potential habitat for amphibians. P2 was assessed to have a HSI score of 0.51, which is regarded as **below average suitability for great crested newts**.	
TN22	Pond 3 (P3) is a wet pond situated within an area of dense bracken growth. Approximately 10 m x 10 m with a water depth of up to 20 cm. The water is clear and the substrate is earth. Aquatic vegetation comprises reedmace (*Typha* sp.), however stands of rush grow in raised tussocks across the pond. No bank is present. TN22 was assessed to have **below average suitability for great crested newts** (HSI: 0.58).	
TN23	Arable field margins are present around all arable fields within the Order Limits, comprising semi-improved grassland. Species noted include false oat-grass, perennial ryegrass, cocksfoot, red fescue, Yorkshire fog (*Holcus lanatus*), common hogweed, cow parsley, coltsfoot (*Tussilago farfara*). The sward length was approximately 15 cm at the time of survey and the margins vary in width from 1 m up to 4 m.	N/A
TN24	Pond 4 (P4) is a small area of standing water, comprising a depression in the ground which is dominated by yellow iris (*Iris pseudacorus*). Approximately 6 m x 5 m, with a water depth of under 10 cm. P4 was assessed to have **below average suitability for great crested newts** (HSI: 0.54).	
TN25	Pond 5 (P5) is located partially within the Order Limits, in an area of dense scrub. The pond is large, approximately 75 m x 15 m, and over 0.5 m deep. The banks are predominantly exposed earth The pond is turbid with no aquatic vegetation. The willow scrub provides 100% shaded cover of the pond and there is abundant leaf litter in and around the pond. P5 was assessed to have **average suitability for great crested newts** (HSI: 0.67).	
TN26	Small corner of broadleaved woodland The woodland qualifies as a Habitat of Principal Importance (HPI) and comprises occasional canopy species and a very dense scrub layer with limited ground flora. Mature oak (*Quercus* sp.) and beech (*Fagus sylcatica*) trees are present in the canopy and the understory is dominated by hawthorn, with elder (*Sambucus nigra*), rose (*Rosa* sp) and willow (*Salix sp*.) also recorded.	

TN27	Building 1 (B1) is a large farm building, comprising red brick and timber slats, with a pitched roof constructed of corrugated sheeting. Overall the building was assessed as providing negligible potential to support roosting bats. The building does provide potential nesting and roosting habitat for barn owl (*Tyto alba*), however no windows or doors are left open, making it unlikely that barn owl can access the building.	
TN28	Building two (B2) is a large farm building constructed of timber slats and metal sheeting. The roof is pitched, comprising corrugated roofing material. The building was assessed as providing negligible potential to support roosting bats; however it provides suitable roosting and nesting habitat for barn owl. As no windows or doors are left open, it is unlikely that barn owl can access the building	
TN29	Arable fields are present to the east and west of the heat network. The field margins vary in width along the route, with the widest up to 5 m in width. Species recorded within the arable field margins include common hogweed, cow parsley, common knapweed, common ragwort, creeping thistle, nettle, hedge bindweed (*Calystegia sepium*), forget-me-not (*Myosotis* sp.), yarrow (*Achillea millefolium*), common mallow (*Malva sylvestris*), poppy (*Papaver rhoeas*).	
TN30	To the east and west of the A1077 road are sloped banks dominated by tall ruderal vegetation. Frequent species comprise great willowherb, wormwood (*Artemisia absinthium*), broad-leaved dock, bramble, Yorkshire fog, false oat-grass and nettle.	
TN31	An area of raised ground in an arable field to the east of the A1077 road. The area is a mosaic of dense and scattered scrub, tall ruderal vegetation and bracken. Species recorded comprise; false oat-grass, Yorkshire fog, great willowherb, common reed, hemlock (*Conium maculatum*), creeping thistle, common knapweed, yarrow, white camption, mugwort (*Artemisia vulgaris*), harebell (*Campanula rotundifolia*), wild mignonette (*Reseda lutea*), poppy, hedge bindweed, forget-me-not, gorse, hawthorn, elder (*Sambucus nigra*), rose, bramble, bracken. Brash piles were also recorded in the area of raised ground. The area was assessed as providing suitable habitat for ground and shrub nesting birds, reptile and amphibian refugia, foraging habitat for small mammals including hedgehog, brown hare and badger. The sloped ground is suitable sett building habitat for badger. It was also assessed as suitable for foraging bats. 1	
TN32	A small area of set-aside agricultural land. Characterised as poor semi-improved grassland, the sward is up to 0.5 m in height and dominated by Yorkshire fog, other species noted include wild mignonette, white campion, nettle, common hogweed, broad-leaved dock, common ragwort and poppy.	

TN33	A narrow strip of mixed plantation woodland is present to the west of the A1077 road. The woodland is young and the canopy and understory are not fully formed. Tree and shrub species recorded include field maple (*Acer campestre*), silver birch, sessile oak (*Quercus petraea*) hawthorn, elder, rose, blackthorn (*Prunus spinosa*), willow, crab apple (*Malus sylvestris*), rowan (*Sorbus aucuparia*), hazel (*Corylus avellana*) and holly (*Ilex aquilfolium*). The trees vary in age, the oldest are semi-mature, with young trees also present. Some trees have tree guards still present. The ground flora is limited; species recorded include cocksfoot, common hogweed and yarrow. No dead wood or brash piles were recorded in the woodland, and no features suitable for roosting bats were recorded. The woodland provides suitable habitat for nesting birds, foraging and commuting bats, foraging and refugia for small mammals including hedgehog and badger. The woodland also provides potential refuge habitat for amphibians and reptiles.	
TN34	A small area of plantation woodland and tall ruderal vegetation is present to the east of the A1077. Species recorded include cherry, hawthorn, false oat-grass, nettle, yarrow, creeping thistle, common hogweed, common knapweed, self-heal (*Prunella vulgaris*), oxeye daisy (*Leucanthemum vulgare*), ladies mantle (*Alchemilla vulgaris*), black medic (*Medicago lupulina*).	
TN35	B5 is located to the east of the A1077, within the Gallagher Retail Park. The building is in use as a Tesco Extra, and is of modern construction. The roof is flat, and constructed of metal sheeting. The building is heavily lit. No features suitable for roosting bats were recorded. The building was assessed as providing **negligible potential to support roosting bats.** Associated hardstanding car parking, ornamental shrub planting and amenity grassland immediately surround the building.	
TN36	B6 is situated to the east of the A1077 road, in the Gallagher Retail Park and is in use as a hotel and restaurant. The building is of modern, brick construction. The roof has multiple pitches and is constructed of tiles. No missing mortar, missing or slipped tiles were recorded. A small section of roof is flat, with roof liner present. Small gaps beneath the roof liner may be suitable for small numbers of roosting bats. Timber cladding is present around some of the windows, however no gaps suitable for roosting bats were recorded. Overall the building was assessed as offering **low potential to support roosting bats.**	
TN37	Small area of young woodland, the canopy is dominated by semi-mature sallow, with young silver birch also present. Understory species comprise hawthorn, ivy (*Hedera helix*), rose, bramble, hawthorn and elder. The ground flora of the woodland is limited; species recorded comprise ivy, nettle and rosebay willowherb. Cotoneaster (*Cotoneaster* sp.), a Schedule 9 listed invasive species, was recorded in the understory of the woodland and the carpark of B6.	

TN38	Plantation woodland located on the central island of a roundabout, along the Southern DHPWN Land, as well as to the west of the M181 road. Canopy species comprise semi-mature silver birch and field maple. Understory species include young rowan, hawthorn, elder and bramble. The ground flora is dominated by bramble and great willowherb, with amenity grassland which is cut a sward height of less than 15 cm also present. The woodland has limited protected species potential as the busy roads create a barrier for commuting mammals, reptiles and amphibians. However the woodland does provide suitable habitat for shrub nesting birds, as well as foraging habitat for bats.	
TN39	Mature, dense scrub is present to the east and west of the M181. Mature hawthorn and willow are present, with cherry, rose and elder also recorded. The ground flora is dominated by bramble and nettle, with cocksfoot, rosebay willowherb, broad-leaved dock, yarrow and woody nightshade () also recorded. Brash piles and leaf litter are abundant. Ditch 35, ditch 28 and pond 11 are located within the dense scrub. The scrub provides suitable habitat for shrub nesting birds, small mammals including hedgehog and badger, amphibians, reptiles and bats.	
TN40	A mosaic of mature, deciduous woodland and dense scrub is located west of the M181 road atTN40. The deciduous woodland is semi-natural, with mature beech, sessile oak and willow trees making up the canopy. The canopy is not closed and the understory is sparse, comprising young sessile oak, young silver birch, hazel, young Scot's pine (*Pinus sylvestris*), bramble and rose. The ground flora is dense bracken, with cocksfoot, false oat-grass, nettle, creeping thistle, herb-Robert and lords-and-ladies (*Arum maculatum*) recorded. Brash piles are present in the woodland. The areas of dense scrub are dominated by young willow, with occasional silver birch, hawthorn, rose and oak saplings. The ground flora is similar in character to the deciduous woodland, with cocksfoot, false oat-grass, bird's-foot-trefoil, ladies mantle, common ragwort, common hogweed, white campion, ribwort plantain (*Plantago lanceolata*), herb-Robert, rosebay willowherb and creeping thistle recorded. Two fishing ponds and a house with associated garden are located within the woodland and scrub, however these features were not accessible for survey. The woodland and scrub provide potential habitat for nesting birds, foraging bats, foraging, commuting and refuge habitat for small mammals (including hedgehogs and badger), amphibians and reptiles. Rabbit burrows were recorded in the woodland.	
TN41	Small, mixed plantation woodland is present on the sloping ground located to the east and west a foot bridge which crosses the M181 road. Canopy species comprise Scot's pine and silver birch, which are sparsely planted, with an open canopy. The understory and ground flora are limited, with rose, rowan, hawthorn, cocksfoot, bramble and common reed recorded. The woodland provides suitable habitat for nesting birds, foraging bats, foraging and refuge for mammals including hedgehog and badger, as well as foraging and	

	refuge for amphibians and reptiles.	
TN42	Coniferous planation woodland is located to the east of the M181 road, dominated by Scot's pine, with larch (*Larix* ap.) also recorded. A large fishing pond (P12) is located adjacent to the woodland which could not be surveyed due to access restrictions. The woodland provides suitable habitat for nesting birds, foraging bats, foraging and refuge for mammals including hedgehog and badger, as well as foraging and refuge for amphibians and reptiles.	
TN43	The southern section of the Southern DHPWN is adjacent to the M181 road. The majority the land directly adjacent to the M181 is dense scrub, situated between the road and the arable fields. The scrub is dominated by hawthorn, with frequent elder, rose, willow, bramble, rowan and Scot's pine. Ground flora species includes tall ruderal vegetation such as great willowherb, common hogweed, nettle and broad-leaved dock. Occasional areas of deciduous woodland were also recorded, including a mature sycamore and oak woodland located to the east of the M181 road. The canopy is close and the understory is dense, species recorded include rose, hawthorn, elder, willow and bramble. The ground flora is limited, with common hogweed and nettle recorded.	
Ditch desctiptions and photos		
Ditch No.	**Description**	**Photo**
D1	Wet ditch in arable field, adjacent to a public footpath. The water is slow flowing, from east to west, the width is approximately 1 m, with a depth of 10-20 cm. The substrate is silt, and the water is turbid likely due to recent heavy rainfall events. The earth banks are steep, at a 45° angle and up to 2 m in height, lessening towards the west to a 30° angle and a height of 0.75 m. The banks are vegetated by short grasses, the southern bank has areas of tall ruderal vegetation, species present include rosebay willowherb, cow parsley and common hogweed. Emergent vegetation is limited to small areas of fools-water-cress (*Apium nodiflorum*). Marginal vegetation is dominated by meadowsweet, also present are water mint (*Mentha aquatica*), water avens (*Geum rivale*), creeping bent (*Agrostis stolonifera*), Yorkshire fog, nettle, bramble, dog's mercury (*Mercurialis perennis*) and occasional rush.	
D2	Wet ditch in arable fields which connects to D3. The water depth is variable; the eastern section is shallow (5 cm deep) and the western section is deeper (under 0.5 m deep). The ditch is approximately 1.5 m wide. The water is still with no direction of flow. The substrate is silt and the water is turbid. The earth banks are steep at a 45° angle, and vegetated by short grasses including perennial ryegrass, bent grass, Yorkshire fog and cocksfoot. Other species present comprise nettle, common hogweed and meadowsweet. The eastern section has been subject to recent dredging, with dredged silt and vegetation on the northern bank, therefore no emergent vegetation is present. The west section, which has not been	

	recently dredged has abundant reedmace. present, alongside occasional rush and common reed.	
D3	Wet ditch situated in arable fields which connects to D2. The water is still with no direction of flow. The ditch has a width of 1-2 m and a depth of less than 0.5 m. The substrate is silt and the water is turbid. The earth banks are very steep, 45°-90° angles, and vegetated with grasses including Yorkshire fog, cocksfoot and common reed. Emergent vegetation includes rush, reedmace, water plantain (*Alisma plantago-aquatica*) and water starwort (*Callitriche* agg.).	
D4	Wet ditch situated centrally in arable fields which connects to D5. The water is slow moving and flowing north to south. The ditch is 2 m in width and deep (over 0.5 m). The substrate is silt and the water is very turbid, potentially due to recent dredging. The earth banks are steep at a 60° angle. Parts of the bank have eroded into the ditch, leaving areas of exposed earth. The banks are vegetated by short grasses including cocksfoot, false oat grass and perennial ryegrass, with occasional meadowsweet, nettles and common hogweed. The ditch has been recently dredged therefore there is no emergent or submerged vegetation in the channel. The dredged silt and vegetation are present along the eastern bank of the ditch. Dredged vegetation includes fools-water-cress, common reed and common duckweed (*Lemna minor*). An old bridge of brick construction is present at the northern boundary of the ditch.	
D5	Wet ditch adjacent to farm track which connects to D4. The water is still with no direction of flow. Approximately 1.5 wide and up to 0.5 m deep. The substrate is silt and the water is turbid, potentially due to recent dredging. The banks are very steep at an 80° angle, and 1.5 – 2 m in height. The banks are vegetated by short and long grasses, including false oat-grass, cocksfoot and perennial ryegrass. Other species present include common hogweed, cow parsley, dandelion, nettle and occasional great willowherb. There is no emergent of submerged vegetation, most likely due to the recent dredging, however there is occasional great willowherb growing in the channel.	
D6	Wet ditch in an arable field which connects to D7. The water is still therefore the direction of flow was not determined. The ditch is 0.5 wide and under 0.5 deep, the eastern section of the ditch was dry at the time of survey. The substrate is silt and the water is turbid. The banks are at a 45° angle and heavily vegetated by grasses on the south banks, species present include false oat-grass, Yorkshire fog, creeping bent and perennial ryegrass. The north bank is dominated by tall ruderal vegetation including nettle and rosebay willowherb. Common reed is present in the western section of the channel, the shallower eastern section has grasses growing in the channel.	

D7	Wet ditch with slow moving water which flows from north to south, connected to D6 and D8. The ditch has a width of 1 m and is under 0.5 m deep. The substrate is silt with clear water. The banks are 45° steep and vegetated by false oat-grass, common hogweed, nettle, cow parsley and occasional bramble. The northern stretch is dominated by common reed, fools-water-cress and water starwort, alongside areas of dense common duckweed cover. The southern stretch has been subject to recent dredging therefore there is no in channel vegetation.	
D8	Wet ditch in arable field which connects with D7. The water is shallow and the width of 1 m. The banks 2 m in height, at a 45° angle and vegetated with nettle, rosebay willowherb, Yorkshire fog, cocksfoot, teasel (*Dipsacus fullonum*), fools-water-cress, rush and cow parsley. The ditch is chocked with common reed in the eastern section, becoming more open to the west. Emergent vegetation present includes fools-water-cress and water starwort. Assessed as having high potential for water vole.	N/A
D9	Wet ditch with slow moving water, flowing east to west, connecting to D7. Approximately 1 m wide and under 0.5 m deep. The substrate is silt and the water is clear. The earth banks are steep, at 30°, and vegetated by false oat-grass, perennial ryegrass, cocksfoot, nettle, marsh thistle, cow parsley and common hogweed. Emergent vegetation is dominated by common reed, alongside frequent reedmace and occasional rush.	
D10	Wet ditch in arable fields connected to D7. The water is still with no direction of flow. Approximately 1 m wide, with a silt substrate and turbid water. The banks are steep at a 45° angle, and 2 m high. The banks are dominated by common reed, other species present comprise cocksfoot, Yorkshire fog, nettle, cow parsley, fools-watercress, and cleavers. No emergent vegetation is present, potentially due to recent dredging.	N/A
D11	The main wet ditch in the Energy Park Land, flowing from east to west and draining at the western Order Limits where it creates a wide, deep standing body of open water. The flow varies from low – moderate throughout the channel, alongside varying in width; from 1.5 to 5 m wide, and varying in depth; from under 0.5 m to over 0.5 m deep. The substrate is silt with some areas of stone and gravel. The water is turbid throughout. The banks at the eastern section are very steep, up to an 80° angle, and up to 4 m in height. The banks at the western section feature reinforced metal sheeting on the southern bank. The banks are vegetated by false oat-grass, nettle, teasel, common reed, bramble, common hogweed and cow parsley. There is dense bramble scrub with scattered hawthorn scrub present at the western section. The majority of the ditch features no emergent vegetation, most likely due to dredging, however the eastern section of the ditch had not been subject to dredging at the time of survey and was chocked by common reed, with occasional water mint present.	

D12	Wet ditch in arable fields which connects to D11. The water was still therefore no direction of flow was determined. The substrate is silt and the water is turbid. Approximately 1 m wide and under 0.5 deep, with some areas drying. The banks are steep at a 45° angle, marginal vegetation recorded comprises false oat grass, perennial ryegrass, marsh thistle, common hogweed, cow parsley, cleavers and nettle. Chocked by common reed throughout the channel length. Small mammal tracks and burrows are present along the banks.	
D13	Wet ditch in arable field which connects to D11 and D14. Approximately 0.5-1 m wide and 10 cm deep with a silty substrate. The banks are 1.5 m high and steep at an angle of 45 and vegetated by cocksfoot, Yorkshire fog, dock, nettle, bramble and common reed. Emergent vegetation includes common reed, water starwort and fools-water-cress.	N/A
D14	Wet ditch in arable field, adjacent to area of set aside land. The water is still with no direction of flow. There is a stilt substrate. The ditch connects with D13 and D15, and is approximately 1 m wide. The banks are steep, at a 45° angle and up to 1 m in height. In channel the ditch is choked with common reed, the bankside vegetation includes cocksfoot, Yorkshire fog and nettle.	N/A
D15	Narrow, wet ditch which connects with D14. Situated in arable field, adjacent to an area of set aside land. The substrate is silt and the water is still. Under 0.5 m wide and under 0.5 m deep, the ditch has steep banks which are sloped at a 60° angle, and up to 1 m in height. Marginal vegetation includes false oat-grass, common reed, nettle, common hogweed and cow parsley. In channel, common reed is abundant.	
D16	Wet ditch in arable fields flowing south to north and connecting to D11. The ditch is culverted beneath the road to the south. The substrate is silt and the water is turbid. The dich is up to 3 m wide in areas and over 0.5 m deep. The banks are steep, approximately 45° and high, up to 4 m in height. The majority of the banks are vegetated, with some areas of erosion leaving exposed earth. The eastern bank has areas of dense bramble scrub, bracken growth, scattered hawthorn scrub and tall ruderal vegetation. The western bank is dominated by short and long grasses. Species present comprise perennial ryegrass, false oat-grass, common hogweed, yarrow, nettle, bramble and bracken. There is limited emergent vegetation due to recent dredging. The dredged silt and vegetation is piled on the west bank, species present in the dredged vegetation include common weed, brooklime (*Veronica beccabunga*) and fools-water-cress. Multiple small mammal tracks and burrows are present and an active badger sett was noted on the east bank of the ditch.	
D17	Wet ditch in arable fields which connects to D16. Shallow, 5-10 cm deep with a slow flow. The substrate is silt and an oily sheen is present on the eastern section of the ditch. . The banks are steep, at a 45° angle, up to 3 m in height, have been recently cut and are dominated by grasses; cocksfoot, Yorkshire fog and common reed. Occasional bramble, common hogweed and bent grass are also present. Small amounts of fools-water-cress were noted in channel. Three	N/A

	badger setts are present along the ditch, alongside multiple small mammal burrows.	
D18	Wet ditch in arable fields which connects to D19. A culvert is present at the south, under the road. Turbid with a silt substrate and slow flowing from south to north. Shallow, with a width of 0.5 m and steep, high banks; 45° and up to 2 m in height. The banks are vegetated with short and long grasses, some areas of erosion are present, species noted comprise Yorkshire fog, cocksfoot, cow parsley, cleavers and nettle. No emergent vegetation was noted.	N/A
D19	Wet ditch in arable fields, adjacent to industrial park and connecting to D18 and D20. A culvert is present at the east within the industrial estate. The substrate is silt and the water is turbid with a slow flow from east to west. Up to 1 m wide and 10 cm deep, with high, steep banks; 3 m in height at a 45° angle. The banks have been recently cut and comprise grasses and tall ruderal vegetation. Species noted include cocksfoot, Yorkshire fog, nettle, dock, common reed, bramble, red fescue and cow parsley. The eastern section of the ditch is narrower with stony banks.	N/A
D20	Wet ditch in arable fields which connects with D11, D19, D22 and D26. Approximately 2 m wide, under 0.5 m deep. The substrate is silt, the water is clear and flows from south to north. The banks are steep, at a 60° angle, up to 3 m in height and vegetated by short and long grasses, cow parsley, nettles, cranesbill, the eastern bank is vegetated by common reed and areas of bramble scrub. No emergent or submerged vegetation are present as the ditch has been recently dredged. Vegetation and silt have been deposited on the eastern bank, common reed and water mint were noted in the deposits.	
D21	A small section of shallow wet ditch situated on an arable field boundary, immediately adjacent to an industrial park and within an area of dense willow scrub. The banks are bare earth, the substrate is silt and there is abundant leaf litter in the channel. Assessed as having negligible potential for water vole.	N/A
D22	Narrow, wet ditch in arable fields. The water is turbid and still with no direction of flow. Approximately 0.5 m wides and under 0.5 m deep, with a silt substrate. The banks are steep, 45°, and vegetated by short and long grasses. Species present comprise nettle, hogweed, cow parsley, common reed, creeping thistle, perennial ryegrass, Yorkshire fog and false oat-grass. In channel, the ditch is dominated by common reed with occasional fools-water-cress and water mint.	
D23	Wet ditch situated on an arable field boundary adjacent to area of dense will scrub and bracken. The substrate is silt, there is no water visible. Very shallow and chocked with reedmace, sedges, common reed and bracken. The banks are steep, 45°, up to 2 m in height and vegetated by short and long grasses. The ditch connects to P5 (TN25).	N/A
D24	Dry ditch with a hawthorn hedgerow planted on the eastern bank. The substrate is earth and the ditch appears to have been dry for some time, no aquatic vegetation is present. The banks are steep at a 45° angle, and up to 1 m in height. Predominantly bare earth, the banks are vegetated by false oat grass, ground ivy and nettle.	N/A

D25	Wet ditch which connect to P5 (TN25). The water is shallow (approximately 15 cm deep), with no flow and an earth substrate. In channel the ditch is chocked with common reed, making very little water visible. The banks are at a 30° angle, 1 m in height and vegetated by common reed, perennial ryegrass, nettle, dock, yarrow and common hogweed.	N/A
D26	Wet ditch situated between arable fields and connecting to D20 and D27, culverted at both the north and south. The water is shallow, under 10 cm deep, with a slow to still flow from south to north. The channel width is variable, from 0.5 m to 1.5 wide, on a silt substrate with occasional pebbles present. In channel vegetation comprises dominant common reed, frequent fools-water-cress, alongside occasional brooklime, water-starwort and water-crowfoot (*Ranunculus aquatilis*). The banks are earth, steep at a 45° angle and up to 2 m in height. Bankside species recorded comprise common reed, nettle, cow parsley, creeping thistle, false oat-grass, ground ivy and common hogweed.	
D27	Short section of wet ditch approximately 20 m long, situated in arable fields, connecting to D31 by a culvert at the north, as well as a culvert under the road at the south. The water is shallow, under 20 cm in depth, with a slow, almost still flow from south to north. The water is clear and the substrate is silt. Emergent vegetation comprise dominant fools-water-cress and occasional common reed. The banks are earth, steep, approximately 45° and up to 2 m in height. Marginal vegetation comprises common reed, false oat-grass, common hogweed, ground ivy, rosebay willowherb and nettle.	N/A
D28	A dry ditch which runs to the east and parallel of the A1077 and M181. Connecting wet ditches comprise D29, D30, D31, D36, D37 and D38. The channel is 1.5 – 2 m in width. The banks and vary in gradient between 30° and 60°. The banks and substrate are earth, the ground is wet underfoot. Emergent vegetation is dominated by common reed, with occasional reedmace also recorded. Hawthorn, willow, bramble, great willowherb and hedge bindweed were frequently recorded in the channel, suggesting that the ditch regularly dries out. Marginal vegetation in the northern section comprises tall ruderal vegetation, scattered scrub and occasional dense scrub. Species recorded include Yorkshire fog, false oat grass, great willowherb, wormwood, broadleaved dock, hedge bindweed, nettle, yarrow, hemlock, hawthorn and willow.	
D29	A wet ditch which connects to D28 and culverts beneath the A1077. The ditch has shallow water, which is under 0.5 m deep, with no flow and silt substrate. The channel is 1 m in width, with steep, 45°, earth banks. The emergent vegetation is dominated by common reed. Marginal vegetation recorded includes Yorkshire fog, common hogweed, common reed, cleavers and great willowherb.	

D30	A wet ditch which connects to D28 and culverts beneath the A1077. To the east of the road the ditch has shallow water, which is under 0.5 m deep. To the west of the road, the water depth is over 0.5 m and the channel is 1.5 m in width, with banks up to 4 m in height. The substrate of the ditch is silt and the water is still, with no direction of flow. The channel is 1 m wide, with steep, 45° earth banks. The channel is dominated by common reed. Marginal vegetation includes common reed, Yorkshire fog, cocksfoot, broad-leaved dock, cleavers, common hogweed, white campion, poppy, nettle, common ragwort and great willowherb.	
D31	Wet ditch which connects to D28 and has a large cement culvert beneath the A1077 road. Approximately 1.5 m wide, with a water depth of greater than 0.5 m. The earth banks are steep and up to 3 m in height. The substrate is silt, the water is still with no direction of flow. Emergent vegetation comprises common reed and yellow iris. Marginal vegetation includes cocksfoot, Yorkshire fog, false oatgrass, broad-leaved dock, poppy, common ragwort, white camption, nettle, yarrow, creeping thistle, spear thistle, great willowherb, herb-Robert, ribwort plantain, black medic, and meadow cranesbill.	
D32	Large wet ditch which connects to D31. The channel is up to 2 m in width, with a water depth of more than 0.5 m. The water is clear and still, with no direction of flow. The banks are steep and up to 4 m in height. Vegetation recorded in channel comprises yellow iris and common reed. The banks are grassy, with Yorkshire fog, cocksfoot, yarrow, poppy, common ragwort, white campion, bramble, and common hogweed recorded in the marginal vegetation.	
D32	A wet ditch which connects to D31. The water is approximately 0.5 m deep, still, with no direction of flow. The channel is 1.5 in width and the substrate is suit. Common reed dominated the channel, with occasional reedmace and yellow iris also recorded. The earth banks are steep and deep cut, up to 3 m in height. Marginal vegetation comprises Yorkshire fog, cocksfoot, common reed, broad-leaved dock, nettle, common ragwort, poppy, great willowherb and white campion.	
D33	Dry ditch in arable field, adjacent to public footpath, located in an area of dense hawthorn scrub. The ditch is approximately 1 m in width, with steep earth banks and an earth substrate. The channel is dominated by common reed. Marginal vegetation includes Yorkshire fog, cocksfoot, great willowherb, common reed, creeping thistle, bramble and nettle.	
D34	A dry ditch runs parallel to the west side of the heat network, located to the west of the M181 road. The ditch has a channel which is approximately 1.5 m wide. Steep earth banks, which are up to 2 m in height. In some areas the banks are reinforced with concrete. In channel vegetation is dominated by common reed, with reedmace and yellow iris also recorded. Hawthorn, willow, bramble, great willowherb and nettle were frequently recorded in the channel, suggesting	

	that the ditch regularly dries out. The ditch is located in a continuous strip of scrub. Marginal vegetation includes hawthorn, bramble, rose, willow, cocksfoot, false oat-grass, spear thistle, rosebay willowherb, great willowherb, bracken, hemlock and white campion.	
D35	Dry ditch which connects to D34. Approximately 1 m wide, with steep earth banks which are up to 2 m in height. The channel is dominated by common reed, with common ragwort, creeping thistle and nettle also recorded in the channel. Banks; cocks foot, ragwort, common reed, n, suggesting that the ditch regularly dries out. Marginal vegetation comprises nettle, creeping thistle, cow parsley, common vetch (*Vicia sativa*), hedge bindweed, bramble, great willowherb. The vegetation on the north bank is cut to under 20 cm, whereas the vegetation on the south bank has a sward length of over 1 m.	
D36	A wet ditch which connects to D28 and D34 and is culverted beneath the M181 road. The channel is 2 m wide, and the water has a depth of greater than 0.5 m. The water is still and turbid, with no direction of flow. The banks are earth and steep, at a 45 ° angle. The substrate is silt. The channel is dominated by common reed. Marginal vegetation recorded comprises cocksfoot, bracken, hemlock, common hogweed, creeping thistle and poppy.	
D37	A wet ditch which connects with D28. The channel is 1.5 m wide, with steep earth banks that are deep cut and up to 2 m in height. The substrate is silt. The ditch has a water depth of approximately 0.5 m. The channel is chocked with common reed. Marginal vegetation includes Yorkshire fog, cocksfoot, false oat-grass common ragwort, poppy, common hogweed and nettle.	
D38	A wet ditch which connects to D28. Approximately 1 m in width, with a water depth of under 0.5 m. The water is still, with no direction of flow. The banks are earth and steep. Common reed is abundant in the channel. Marginal vegetation comprises cocksfoot, false oat-grass, common ragwort, poppy, common hogweed and nettle.	
Hedgerow table: Descriptions and photos		
Hedge No.	**Description**	**Photo**
H1	A young, intact native species-rich, roadside hedgerow planted in a slight banking. Tree guards are present on the majority of specimens. The hedgerow is approximately 1.5 m in height, under 0.5 m wide and has multiple gaps. Species present comprise abundant hawthorn, occasional hazel, rose, field maple and blackthorn. Ground flora comprises cocksfoot, tufted hair-grass, creeping thistle, nettle, meadow cranesbill and wood avens.	
H2	A small section of intact species-poor hedgerow situated adjacent to the roadside. Outgrown, with a height of 3 m and	

	width of 1.5-2 m. Dominated by hawthorn, with occasional rose. Scattered, semi-mature ash and ash saplings are present, alongside dense bramble scrub and ivy cladding on hawthorn. Ground flora comprises meadow cranesbill, wood avens (*Geum urbanum*), herb-Robert and ivy.	
H3	Mature intact species-poor hedge and trees with evidence of historical laying. Predominantly 3 m high and 2 m wide, but with some shorter, more defunct sections. Species present include hawthorn and field maple, with areas of bramble. Ground flora includes nettle and cow parsley.	N/A
H4	Mature, native intact species-rich, unmanaged hedgerow, with evidence of historical laying. Approximately 4 m high and 2 m wide, the hedgerow is not dense to the ground. Species present comprise hawthorn, holly, rose, elder and oak, alongside bramble scrub.	N/A
H5	Short section of defunct species-poor hedgerow with evidence of historical laying. Approximately 5 m high and 3 m wide, with large gaps throughout the length of the hedgerow. Species-poor, comprising hawthorn, a ground flora dominated by dense bracken growth, alongside occasional nettle, bramble false oat grass, perennial ryegrass and cleavers.	
H6	Mature, intact hedgerow adjacent to a public footpath. There is evidence of historical laying, approximately 4 m high and 3 m side, with multiple gaps throughout the length of the hedgerow. Species-poor, limited to hawthorn with areas of dense ivy cladding. Ground flora present comprise bramble scrub, nettle, cow parsley, false oat grass, cocksfoot and ground ivy.	
H7	Outgrown, intact hedgerow with evidence of both historical laying and recent planting, tree guards are present on some specimens. Situated on the northern bank of a dry ditch. Up to 4 m high and 1.5 m wide with multiple gaps. Species present comprise hawthorn with occasional elder and young ash saplings. Ground flora is limited with abundant ground ivy present and large areas of exposed earth and rotting wood.	
H8	Situated adjacent to ferry road west, the hedgerow is outgrown and planted in a raised bank. Dominated by hawthorn with frequent blackthorn, the hedgerow is 3 m in height and 2 m in width. Ground flora is dominated by tall ruderals including nettle and common hogweed, with occasional cow parsley and cleavers. There is abundant leaf litter and occasional debris. Fieldfare (*Turdus pilaris*), redwing (*Turdus iliacus*), yellowhammer (*Emberiza citrinella*) and dunnock (*Prunella modularis*) were recorded in the hedgerow.	

H9	Dense leylandii (*Cupressus* × *leylandii*) hedgerow situated adjacent to farmyard. Approximately 1.8 m in height and 0.5 in width, the hedgerow is well-managed and neatly trimmed. The ground flora is limited to nettles with bare earth and dense leaf litter.	
H10	Neatly trimmed intact species-poor hedge and trees situated between a garden and an arable field. Evidence of historical laying, species limited to hawthorn with occasional scattered semi-mature horse chestnut (*Aesculus hippocastanum*) trees. The ground flora includes Yorkshire fog, perennial ryegrass, false oat grass, nettle, common hogweed and cow parsley.	

Trees with Potential Roosting Features (PRF) for bats: Description and Photos

Tree No.	Description	Photo
T1	Semi – mature ash tree, situated in an arable field, in a line of trees including mature trees and saplings with tree guards still present. Approximately 20 m high with a diameter of 0.75 m. The tree is located to the north of the Order Limits. PRF's comprise – several knot holes, branch tear-outs and rotting bark in the canopy. **Moderate potential for roosting bats.**	
T2	Mature ash tree, situated in an arable field, in a line of trees including mature trees and saplings with tree guards still present. Over 20 m high with a diameter of 0.8 m. The tree is located to the north of the Order Limits. PRF's comprise – knot hole present on the south east elevation, a wound fall in the main trunk and a compression fork. **Moderate to high potential for roosting bats.**	
T3	Semi – mature ash tree, situated in an arable field, in a line of trees including mature trees and saplings with tree guards still present. Under 20 m high with a diameter of 0.6 m. The tree is located to the north of the Order Limits. PRF's comprise a broken limb on the north elevation of the main trunk which could lead to a cavity and a knot hole on the south elevation. **Low to moderate potential for roosting bats.**	

T4	Semi – mature ash tree, situated in an arable field, in a line of trees including mature trees and saplings with tree guards still present. Under 20 m high with a diameter of 0.5 m. The tree is located to the north of the Order Limits. PRF's comprise – cavities on all elevations, suggests that this would be draughty but could potentially lead to a large cavity further up the trunk, a torn limb was also noted on the south elevation. **Low to moderate potential for roosting bats.**	
T5	Semi – mature ash tree, situated in an arable field, in a line of trees including mature trees and saplings with tree guards still present. Under 20 m high with a diameter of 0.5 m. The tree is located to the north of the Order Limits. PRF's comprise – a split trunk running from ground level to 3 m in height on the north east elevation and a large tear out on the southern elevation. Both features are very exposed and do not appear to lead to cavities. **Low potential for roosting bats.**	
T6	Very mature ash tree situated in an arable field, in a line of trees including mature trees and saplings with tree guards still present. Over 20 m high, with a diameter of 0.8 m and a large canopy. The tree is located to the north of the Order Limits. PRF's comprise – multiple knot holes, torn limbs which feature dead wood and cavities, snapped limbs in the canopy and multiple wounds. **Moderate to high potential for roosting bats.**	
T7	Semi – mature ash tree, situated in an arable field, in a line of trees including mature trees and saplings with tree guards still present. Under 20 m high with a diameter of 0.6 m. The tree is located to the north of the Order Limits. PRF's comprise – occasional knot holes and rotting bark in the canopy. **Low potential for roosting bats.**	
T8	Semi-mature oak tree situated in area of dense bracken growth, near to multiple semi-mature trees, hedgerows, dense willow scrub, dense bramble scrub and areas of open water. Under 20 m high with a diameter of 0.6 m. PRF's comprise – compression fork located on the south facing aspect of the trunk. **Low potential for roosting bats.**	
T9	Dead oak tree located in an arable field, close to areas of dense scrub. The tree appears to have been struck by lightning. PRFs comprise: large split in the trunk which may lead to a large internal cavity **Moderate potential for roosting bats**	N/A

T10	Mature willow tree which is situated in the grounds of B6, to the east of the Southern DHPWN Land. The tree is under 20 m in height, with a diameter of 0.7 m. PRFs comprise - several torn limbs and lifted bark. **Low potential for roosting bats.**	
T11	Mature willow tree which is located adjacent to an area of dense scrub, within 0.1 km of the Southern DHPWN Land. The tree is approximately 20 m in height, with a diameter of 0.6 m. PRF's comprise – a large crack in the trunk approximately 2 m from ground level. Lifted bark and split branches are present higher in the canopy. **Low potential for roosting bats.**	
T12	Mature willow tree which is located close to an area of dense scrub, within 0.1 km of the Southern DHPWN Land. The tree is approximately 20 m in height, with a diameter of 0.8 m. PRF's comprise – a split in the trunk approximately 1 m from ground level. Lifted bark is present higher in the canopy. **Low potential for roosting bats.**	

Offsite ponds: Descriptions and Photos of ponds within 0.25 km of the Order Limits		
Pond No.	**Description**	**Photo**
P6	Rectangular, 550m^2 deep, turbid pond, located adjacent to the Order Limits. The pond is situated on a chicken farm and is fenced off from the adjacent arable land. reedmace was noted on the north and east margins however no aquatic vegetation was present. **Assessed as average suitability for great crested newts (HSI: 0.64)**	N/A
P7	Rectangular, 160m^2, turbid pond, also located next to the Order Limits, situated on a chicken farm and fenced off from the adjacent arable land. The banks are largely exposed earth with no aquatic vegetation present. Shading is present along 20% of the banks. **Assessed as below average suitability for great crested newts (HSI: 0.58)**	N/A
P8	No accessible for survey. A review of aerial imagery indicates that the pond is approximately 125m^2. P8 is also located within the chicken farm, immediately adjacent to the Order Limits.	N/A
P9	Located to the north of the Order Limits (TN1), pond 9 is approximately 25 m x 10 m. The pond is dominated by dense common reed growth, with only a small area of water visible. The water is turbid and shallow. There is shallow banking which slopes down at a 45° angle. **Assessed as poor suitability for great crested newts (HSI: 0.39)**	

P10	Circular, 120m^2 pond situated between a small area of woodland. The banks are shallow and largely earth. Common reed grows around the margins of the pond, with two small common reed islands in the pond centre. The pond is entirely covered by duckweed, with no other emergent vegetation present. The turbidity of the water was unassessed due to the blanket cover of duckweed. The pond margins are 80% shaded by hawthorn and willow scrub. **Assessed as good suitability for great crested newts (HSI: 0.78)**	
P11	Long, narrow, 1700m^2 pond situated to the of a railway embankment. The area immediately surrounding the pond is a dense willow woodland with dense bramble growth throughout. Arable land is situated north of the pond. The banks are exposed earth with no aquatic vegetation present; however, the western section of the pond is chocked with common reed. The water is shallow and clear, with an earth substrate The pond margins are 100% shaded by willow. **Assessed as average suitability for great crested newts (HSI: 0.64)**	
P12	Not accessible for survey	N/A
P13	Not accessible for survey, the pond is a commercial fishing lake.	N/A
P14	Not accessible for survey, the pond is a commercial fishing lake.	N/A

Appendix C – Bat Roost Potential and Habitat Suitability Categories

Guidelines for assessing the potential suitability of proposed development sites for bats, based on the presence of habitat features within the landscape (Collins, 2016).

Suitability	Description of Roosting Habitat	Commuting & Foraging Habitats
Negligible	Negligible habitat features on site likely to be used by roosting bats	Negligible habitat features on site likely to be used by commuting or foraging bats.
Low	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 habitats to be used on a regular basis or by a larger number of bats (i.e. unlikely to be suitable maternity or hibernation). A tree of sufficient size and age to contain potential roosting features but with none seen from the ground, or feature seen with only very limited roosting potential.	Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or unvegetated stream, but isolated i.e. not very well connected to the surrounding landscape by other habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
Moderate	A structure or 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 of high conservation status.	Continuous habitat connected to the wider landscape that could be used by bats for commuting, such as lines of trees and scrub or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging, such as trees, scrub, grassland or water.
High	A structure or 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.	Continuous high quality habitat that is well connected to the wider landscape that is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines of trees and woodland edge. High quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats, such as broadleaved woodland, tree-lined watercourses and grazed parkland. Site is close and connected to known roosts.

Appendix D – Legal Information

This report provides guidance of potential offences as part of the impact assessment. This report does not provide detailed legal advice and for full details of potential offences against protected species the relevant acts should be consulted in their original forms i.e. The Wildlife and Countryside Act, 1981, as amended, The Countryside and Rights of Way Act 2000, The Natural Environment and Rural Communities Act, 2006 and The Conservation of Habitats and Species Regulations 2017.

Species	Legislation	Offences	Notes on licensing procedures and further advice
Species that are protected by national legislation			
Badger	Protection of Badgers Act 1992	Wilfully kill, injure or take a badger; Intentionally or recklessly damage, destroy or obstruct access to a badger sett; Disturb a badger in its sett. It is not illegal to carry out disturbance activities in the vicinity of setts that are not occupied.	Where required, licences for development activities involving sett loss, damage or disturbance are issued by Natural England (NE). Licences for activities involving watercourse maintenance, drainage works or flood defences are issued under a separate process. Licences are normally not granted from December to June inclusive because cubs may be present within setts. https://www.gov.uk/badgers-protection-surveys-and-licences
Bats *European protected species*	Conservation of Habitats and Species Regulations 2017 Reg 41	Deliberately[1] capture, injure or kill a bat; Deliberate disturbance[2] of bats; Damage or destroy a breeding site or resting place used by a bat. The protection of bat roosts is considered to apply regardless of whether bats are present.	An NE licence in respect of development is required in England. https://www.gov.uk/bats-protection-surveys-and-licences *European Protected Species: Mitigation Licensing- How to get a licence* (NE 2010) *Bat Mitigation Guidelines* (English Nature 2004) *Bat Workers Manual* (JNCC 2004) *BS8596:2015 Surveying for bats in trees and woodland* (BSI, 2015)
	Wildlife and Countryside Act 1981 (as amended)[4] S.9	Intentionally or recklessly[3] obstruct access to any structure or place used for shelter or protection or disturb a bat in such a place.	Licence from NE is required for surveys (scientific purposes) that would involve disturbance of bats or entering a known or suspected roost site.

Species	Legislation	Offences	Notes on licensing procedures and further advice
Birds	Conservation of Habitats and Species (Amendment) Regulations 2012	N/A	Authorities are required to take steps to ensure the preservation, maintenance and re-establishment of a sufficient diversity and area of habitat for wild birds in the United Kingdom, including by means of the upkeep, management and creation of such habitat. This includes activities in relation to town and country planning functions.
	Wildlife and Countryside Act 1981 (as amended)[4] S.1	Intentionally kill, injure or take any wild bird; Intentionally take, damage or destroy the nest of any wild bird while that nest is in use or being built; Intentionally take or destroy the nest or eggs of any wild bird. **Schedule 1 species** Special penalties are liable for these offences involving birds on Schedule 1 (e.g., most birds of prey, kingfisher, barn owl, black redstart, little ringed plover). Intentionally or recklessly[3] disturb a Schedule 1 species while it is building a nest or is in, on or near a nest containing eggs or young; intentionally or recklessly disturb dependent young of such a species.	No licences are available to disturb any birds in regard to development. Licences are available in certain circumstances to damage or destroy nests, but these only apply to the list of licensable activities in the Act and do not cover development. General licences are available in respect of 'pest species' but only for certain very specific purposes e.g. public health, public safety, air safety. https://www.gov.uk/wild-birds-protection-surveys-and-licences https://www.gov.uk/prevent-wild-birds-damaging-your-land-farm-or-business
Great crested newt *European protected species*	Conservation of Habitats and Species Regulations 2017 Reg 41	Deliberately[1] capture, injure or kill a great crested newt; Deliberate disturbance[2] of a great crested newt; Deliberately take or destroy its eggs; Damage or destroy a breeding site or resting place used by a great crested newt.	Licences issued for development by NE. https://www.gov.uk/great-crested-newts-protection-surveys-and-licences *European Protected Species: Mitigation Licensing - How to get a licence* (NE 2010) *Great Crested Newt Mitigation Guidelines* (English Nature 2001)
	Wildlife and Countryside Act 1981 (as amended)[4] S.9	Intentionally or recklessly[3] obstruct access to any structure or place used for shelter or protection or disturb a great crested newt in such a place.	Licences issued for science (survey), education and conservation by NE.
Otter	Conservation of Habitats and Species	Deliberately[1] capture, injure or kill an otter; Deliberate disturbance[2] of otters;	Licences issued for development by NE. https://www.gov.uk/otters-protection-surveys-and-licences

Species	Legislation	Offences	Notes on licensing procedures and further advice
European protected species	Regulations 2017 Reg 41	Damage or destroy a breeding site or resting place used by an otter.	*European Protected Species: Mitigation Licensing- How to get a licence* (NE 2010)
	Wildlife and Countryside Act 1981 (as amended)[4] S.9	Intentionally or recklessly[3] obstruct access to any structure or place used for shelter or protection or disturb an otter in such a place.	No licence is required for survey in England. However, a licence would be required if the survey methodology involved disturbance.
Reptiles (species that are not European protected): **Adder** **Common lizard** **Grass snake** **Slow worm**	Wildlife and Countryside Act 1981 (as amended)[4] S.9(1) (part); S.9(5)	Intentionally kill or injure any common reptile species.	No licence is required in England. However an assessment for the potential of a site to support reptiles should be undertaken prior to any development works which have potential to affect these animals. https://www.gov.uk/reptiles-protection-surveys-and-licences
Water vole	Wildlife and Countryside Act 1981 (as amended)[4] S.9	Intentionally kill, injure or take water voles; Intentionally or recklessly[3] damage, destroy or obstruct access to any structure or place used for shelter or protection; Disturb a water vole in such a place.	No licence is required for survey in England, unless you are likely to commit an action that is otherwise illegal. There are currently no licensing purposes that explicitly cover development activities or activities associated with the improvement or maintenance of waterways. However, when a proposed lawful activity has no opportunity to retain water voles within a development site and their translocation would result in a conservation benefit then a licence from NE may be obtained. *The Water Vole Conservation Handbook* (R. Strachan, T. Moorhouse & M. Gelling, Wildlife Conservation Research Unit (WildCRU), 3rd Edition 2011). https://www.gov.uk/water-voles-protection-surveys-and-licences Water voles and development licensing policy -NE Technical Information Note TIN042 2008

Species	Legislation	Offences	Notes on licensing procedures and further advice
Other species			
Rabbits, foxes and other wild mammals **For BAP species and Species of Principal Importance, see below**	Wild Mammals (Protection) Act 1996	Intentionally inflict unnecessary suffering to any wild mammal.	Natural England provides guidance in relation to rabbits (Technical Information note TIN003, Rabbits- management options for preventing damage, July 2007) and foxes (which are also protected under the Wildlife and Countryside Act 1981 from live baits and decoys, see Species Information notes SIN003 (2011), *Urban foxes* and SIN004 (2011) *The red fox in rural areas* as well as other wild mammals. Lawful and humane pest control of these species is permitted.

[1]Deliberate capture or killing is taken to include "accepting the possibility" of such capture or killing

[2]Deliberate disturbance of animals includes in particular any disturbance which is likely a) to impair their ability (i) to survive, to breed or reproduce, or to rear or nurture their young, or (ii) in the case of animals of hibernating or migratory species, to hibernate or migrate; or b) to affect significantly the local distribution or abundance of the species to which they belong.
Lower levels of disturbance not covered by the Conservation of Habitats and Species Regulations 2017 remain an offence under the Wildlife and Countryside Act 1981 although a defence is available where such actions are the incidental result of a lawful activity that could not reasonably be avoided. Thus deliberate disturbance that does not result in either (a) or (b) above would be classed as a lower level of disturbance.

[3]The term 'reckless' is defined by the case of Regina versus Caldwell 1982. The prosecution has to show that a person deliberately took an unacceptable risk, or failed to notice or consider an obvious risk.

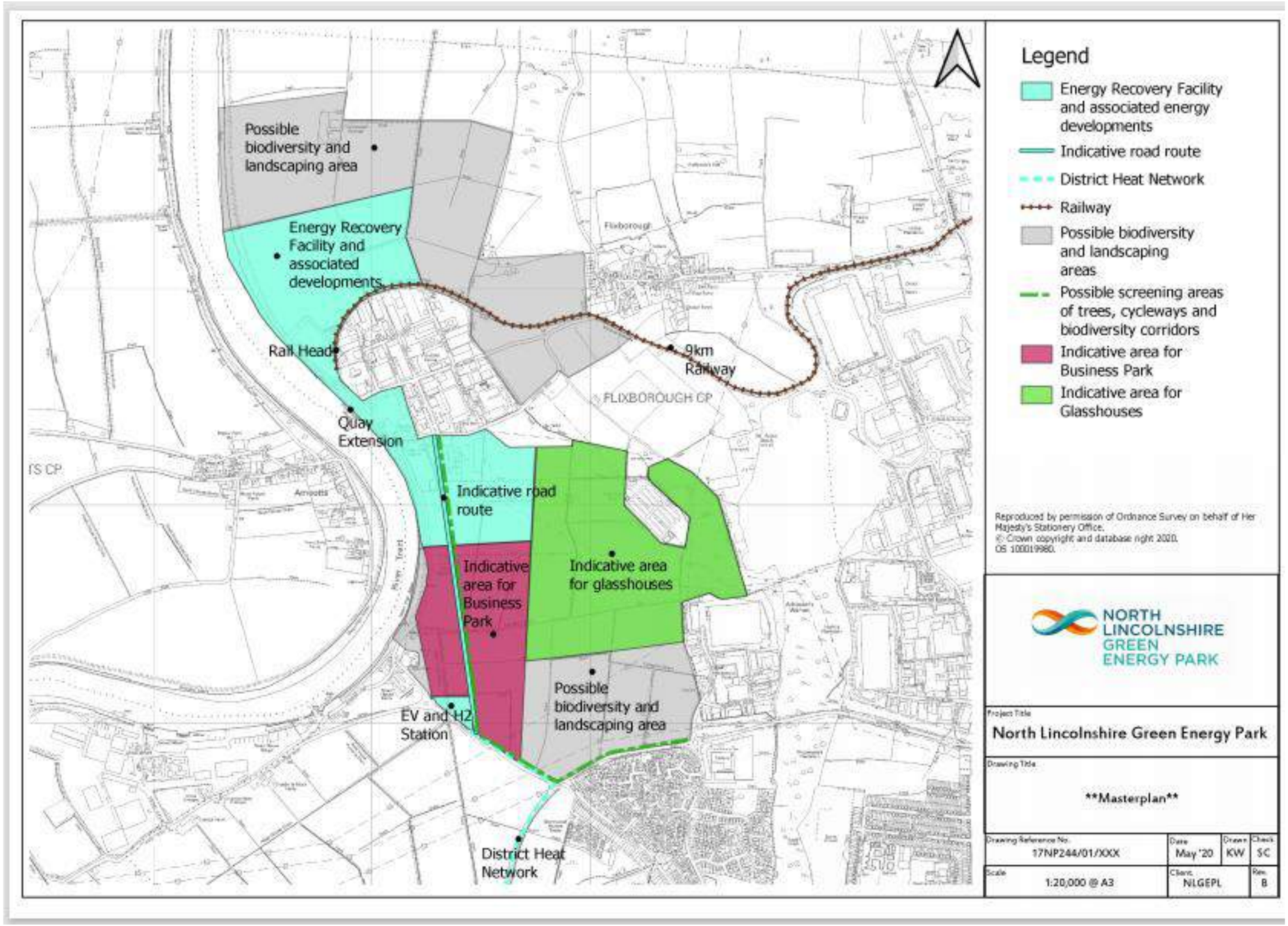
[4] The Wildlife and Countryside Act (1981) has been updated by various amendments, including the Countryside and Rights of Way Act 2000 and the Natural Environment and Rural Communities Act 2006. A full list of amendments can be found at http://jncc.defra.gov.uk/page-1377.

Site Designation	Legislation	Protection	Guidance
Special Area of Conservation (SAC) **Special Protection Area (SPA)** **Wetland of International Importance (Ramsar site)**	Conservation of Habitats and Species Regulations 2017 Conservation of Habitats and Species (Amendment) Regulations 2012 EC Directive on the conservation of natural habitats and of wild fauna and flora (92/42/EEC). EC Directive on the conservation of wild birds (79/409/EEC). Convention on Wetlands of International Importance especially as Waterfowl Habitat 1971 (the Ramsar Convention).	Planning controls are effected through Part 2 of the Conservation of Habitats and Species regulations 2017 (Reg 21) and Part 6 (Regs 61- 67). The legislation for the Site of Special Scientific Interest which will underpin each designation also applies. These sites are given protection through policies in the Local Development Plan.	Formal Appropriate Assessment is required before undertaking, or giving consent, permission or other authorisation for a plan or project which is likely to have a significant effect on such a site. Further guidance can be found in the National Planning Policy Framework and the accompanying joint Circular (ODPM Circular 6/2005 & Defra Circular 01/2005), which is still valid. Consent under S28 is required from NE for actions likely to damage a SSSI. The Conservation of Habitats and Species Regulations (Amendment) 2012 simplifies the Regulations in the case of a European site which is also a SSSI. All applications for carrying out operations on such as site are now made under S28 of the WCA.

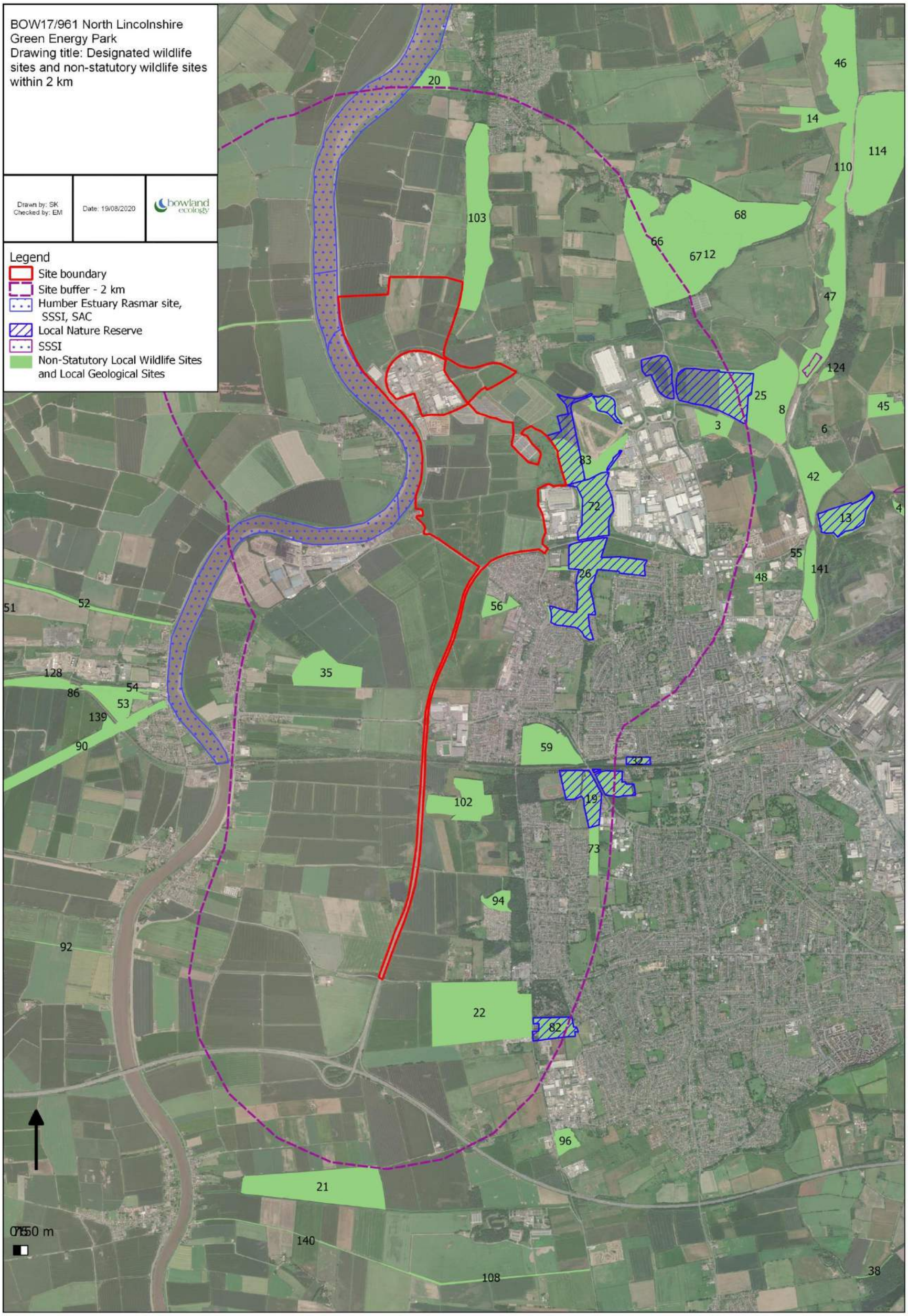
Habitats & Species	Legislation	Guidance
Species and Habitats of Principal Importance for the Conservation of Biodiversity	Natural Environment & Rural Communities Act 2006 S.40 (which superseded S.74 of the Countryside & Rights of Way Act 2000).	S.40 of the NERC Act 2006 sets out the duty for public authorities to conserve biodiversity in England. Habitats and species of principal importance for the conservation of biodiversity are identified by the Secretary of State in consultation with NE, are referred to in S.41 of the NERC Act for England. The list of habitats and species was updated in 2008: http://webarchive.nationalarchives.gov.uk/20140605090108/http:/www.naturalengland.org.uk/ourwork/conservation/biodiversity/protectandmanage/habsandspeciesimportance.aspx The habitats and species listed are not necessarily of higher biodiversity value, but they may be in decline. Habitat Action Plans and Species Action Plans are written for them or are in preparation, to guide their conservation. Ecological impact assessments should include an assessment of the likely impacts to these habitats and species.
Hedgerows	The Hedgerow Regulations 1997	Under the regulations, it is against the law to remove or destroy hedgerows that are classified as “important” under the regulations without permission from the local planning authority. The regulations apply if a hedgerow is in or runs alongside agricultural land, common land including town or village greens, land used for forestry or for the breeding or keeping of horses etc, a local nature reserve or Site of Special Scientific Interest. A hedgerow can be classified as ‘Important’ due to its wildlife and landscape value or due to its heritage value. In general, permission will be required before removing hedges that are at

Site Designation	Legislation	Protection	Guidance
		least 20 metres in length, over 30 years old and contain certain species/diversity of plant. The local planning authority will assess the importance of the hedgerow using criteria set out in the regulations. See Defra and Natural England websites for further guidance and information.	
Cotoneaster **Rhododendron**	Wildlife and Countryside Act 1981 (as amended) S.14	It is illegal to plant these species or otherwise cause them to grow or spread in the wild. Any contaminated soil or plant material containing Japanese knotweed or giant hogweed is classified as controlled waste and should be disposed of in a suitably licensed landfill site, accompanied by appropriate Waste Transfer documentation, and must comply with section 34 of the Environmental Protection Act 1990. *Managing and controlling invasive rhododendron* (Forestry Commission, 2006) *Guidance on Section 14 of the Wildlife and Countryside Act, 1981* (Defra, 2010)	

Appendix E – Project Masterplan (2020)



Appendix F – Statutory and Non-Statutory Wildlife Sites



Appendix G – Information Sheets for Contractors

Amphibians

Information, legal responsibilities and best practice for the construction industry

bowland ecology

Legal Information

In England it is **illegal** to deliberately capture, injure or kill a GCN, deliberately disturb a GCN, deliberately take or destroy GCN eggs, damage or destroy a breeding site or resting place used by a GCN. Penalties on conviction: the maximum fine is £5,000, up to six months in prison, per offence and forfeiture of items used to commit the offence, e.g. vehicles, plant, machinery. The following points are defences:

- ✓ Tending/caring for a GCN solely for the purpose of restoring it to health and subsequent release.
- ✓ Mercy killing where there is no reasonable hope of recovery (provided that person did not cause the injury in the first place – in which case the illegal act has already taken place).

Good to know-

- Newts are also carriers of the waterborne fungi- chytrid fungus. This fungus can be spread between water bodies and can cause the disease chytridiomycosis. If any work is being carried out around standing water then disinfection of footwear and equipment is important to prevent the spread of the disease.
- If a great crested newt is found before or after work (for example, pond management work) is commenced, then work should be immediately postponed and then started another time or with different methodology. If the newts cannot avoid being harmed then a license must be applied for,

Life cycle and seasonal appearances

April-May= This is when newts undertake courtship displays and mate with females. Certain amphibians can start this process as early as February.
June-August= Larval growth and development of newly hatched juveniles- This event can occur anytime between March and October (depending on pond conditions and other factors such as climatic conditions)
August-October= Metamorphosis and juvenile emigration to terrestrial environments occurs at this stage
November-February= Hibernation on land
February-May= Emergence of adult form newts and dispersal to ponds

Other protected amphibians

The other two species of **newts (smooth and palmate) are protected under Section 9 (5) of the Wildlife & Countryside act 1981**, which prohibits the 'sale, barter, exchange, transporting for sale and advertising to sell or to buy. Common toads and common frogs are also protected under this legislation. **The natterjack toad** (which are smaller than common toads at 6-7cm) are given **full protection** by section 9 of the same act due to the fact they are a threatened and rare species in the UK, being confined to only a couple coastal territories. It is an offence to 'intentionally kill. Injure or take (capture. etc); possession; intentional disturbance whilst occupying a 'place used for shelter or protection' and destruction of these places; sale, barter, exchange, transporting for sale or advertising to sell or buy'.

Common frog (top), common toad (middle), natterjack toad (bottom)

Key ID Features

Smooth Newt (*Lissotriton vulgaris*)

Egg stage- Smooth eggs are indistinguishable against palmate newt eggs, are rounded (not oval) and a grey/brown colour when freshly laid.

Larvae stage- Larvae are up to 3-4cm long (shorter than GCN), and have less obvious speckling and smaller gills.

Adult stage- Adult smooths measure up to 10cm, have a paler body than GCN with an orange belly stripe. Smooths lack some features of palmate newts (notably pink chin, and a cream spot). There is a slight silver/ orange strip along the base of the tail. The crest is wavy along whole back and tail, unlike palmates where it is more of a ridge shape.

(Young smooth)

Species protected by UK and European law
Great Crested Newt (GCN)- Triturus cristatus

GCN eggs are oval shaped with a pale yellow to white colour, these are usually found singly wrapped in folded leaves. Smooth and Palmate eggs are grey/ brown when freshly laid.

Adults are black, and are also covered in bright yellow spots on the underside and irregular blotches.

Larvae (Efts) are up to 5-9cm long and have distinguishable black speckling on the tail and body

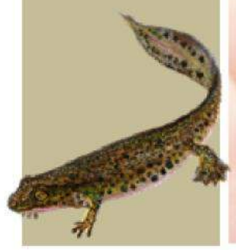
Adults also have a jagged crested tail with a recognisable stripe. Both males and females also have white speckling on the sides.

Palmate Newt (*Lissotriton helveticus*)

Egg stage- Palmate eggs are indistinguishable against smooth newt eggs, are rounded (not oval) and a grey/brown colour when freshly laid.

Larvae stage- Larvae are up to 3-4cm long (shorter than GCN), and have less obvious speckling and smaller gills.

Adult stage- Adult palmates measure up to 10cm, have a paler body than GCN with an orange belly stripe. They also have a pink chin with no spots/ speckles and a cream spot on both hind feet.



References:
Acknowledgements:

Version 10 December 2018

Reptiles

Information, legal responsibilities and best practice for the construction industry

Legal Information

All of the UK's native reptiles are protected (to varying levels) under the Wildlife and Countryside act 1981 (as amended in 1988 and 1991). The reptiles summarised in this information poster are all natives. FULL protection is granted only to the sand lizard, which means that **'the intentional killing. injuring or taking (capture. etc); possession; intentional disturbance whilst occupying a 'place used for shelter or protection' and destruction of these places; sale, barter. exchange. transporting for sale and advertising to sell or to buy.'** Is strictly prohibited. Protection against killing, injuring and the sale of… applies to the four other 'widespread' species of reptiles- namely slow worm, adder, grass snake and the common lizard.

Exceptions to this legislation include allowing things to happen that are reasonable, unavoidable and unpredictable, such as running over a reptile.

Life cycle

April/May- reptiles emerge from hibernation, shortly after which males compete for mating

June/July- Female grass snakes lay/ give birth (however smooth snakes tend not to give birth every year!)

July/August- Lizards give birth to live young

September- smooth snakes give birth to live young

August-October- reptiles prepare for winter by feeding (lizards eat invertebrates and snakes

November-March- reptiles hibernate over winter (lizards often amongst groups around rocks and dead wood).

Other reptiles

Sand Lizard (*Lacerta agilis*)- Strictly protected by UK and European law. A license is required in order to carry out work in their vicinity. They reach up to 20cm in length and require both undisturbed sand and mature sunny habitats on dunes

Common Lizard (*Lacerta vivipara*)- Protected under UK law. Most common reptile in Britain. Found in various habitats such as heathland, moorland and woodland. Variable in colour but usually brownish-grey with rows of darker spots and stripes.

Smooth snake (*Coronella austriaca*)-

Like the sand lizard this species is fully protected by UK and European law. It looks similar to an adder, however does not have the distinctive adder zig zag pattern across it's back, and has a more slender appearance. The smooth snake is a rarity in the UK and can only be found in a few places (usually similar habitats to the sand lizard). As with other snakes, the smooth basks in the sun

Slow worm- *Anguis fragilis*

Identifiable features

- Up to 50cm long
- Leg-less lizard (not a worm or a snake!)
- Shiny
- Golden brown

Conservation status and other information

Protected in the UK under the Wildlife and Countryside Act 1981. Also a priority species under the UK Post-2010 biodiversity framework.

The slow worm is distinguishable from snakes due to its ability to blink with its eyes. They can be found on habitats such as heathland, woodland edges and tussocky grassland. Snakes are much larger than slow worms, and females of the latter can sport a dark stripe down their backs whilst being larger than their male counterparts. Slow worms can live up to 20 years in the wild.

Grass Snake- *Natrix natrix (Natrix helvetica)*

Identifiable features

- Length can range from 90-150cm
- Yellow collar
- Black bars on flanks
- Grey/green in colour

Conservation status and other information

Protected in the UK under the Wildlife and Countryside act 1981. Also a priority species under the UK Post-2010 biodiversity framework.

The grass snake is our largest snake in the UK, and can weigh more than double the amount of an adder. They can be found in wetland habitats, and dry grasslands and gardens with ponds. Females are bigger than males, and lay up to 40 eggs in rotting vegetation; in order to incubate them until prime hatching time in early autumn. These snakes can be seen from April to October. Females often seek out places of warmth such as manure heaps and rotting reeds.

Adder- *Vipera berus*

Identifiable features

- Venomous species
- Dark zig-zag pattern down back
- Length= 60-80cm
- Grey to brown in colour but males tend to be more silvery-grey

Conservation status and other information

Protected in the UK under the Wildlife and Countryside act 1981. Also a priority species under the UK Post-2010 biodiversity framework. Adders are a relatively small species of snake, and prefer to nest in heathland, moorland and woodland habitats. Females give birth to up to 20 live young. The first warm days of March is the most likely time adders can be found in the warm cover underneath rocks and logs. Adder bites are rare and are usually only dangerous towards the young or elderly. However they can be very painful and **medical attention should be sought immediately.**

References:

Acknowledgements:

Version 1 December 2018

BATS AND ARBORICULTURAL WORKS

Information, legal responsibilities and best practice

Legal Protection

All UK Bat species are protected by European and UK law, in practical terms this means it is an offence to:

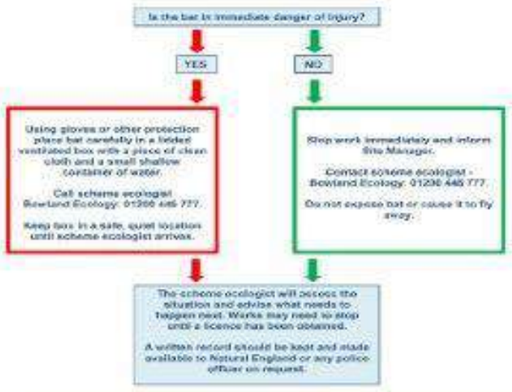
- Deliberately capture, injure or kill a bat;
- Deliberately disturb bats;
- Damage or destroy a breeding site or resting place (even if bats are not occupying the roost at the time);
- Intentionally or recklessly obstruct access to any structure or place used for shelter or protection or disturb a bat in such a place;
- Possess or advertise/sell/exchange a bat (dead or alive) or any part of a bat.

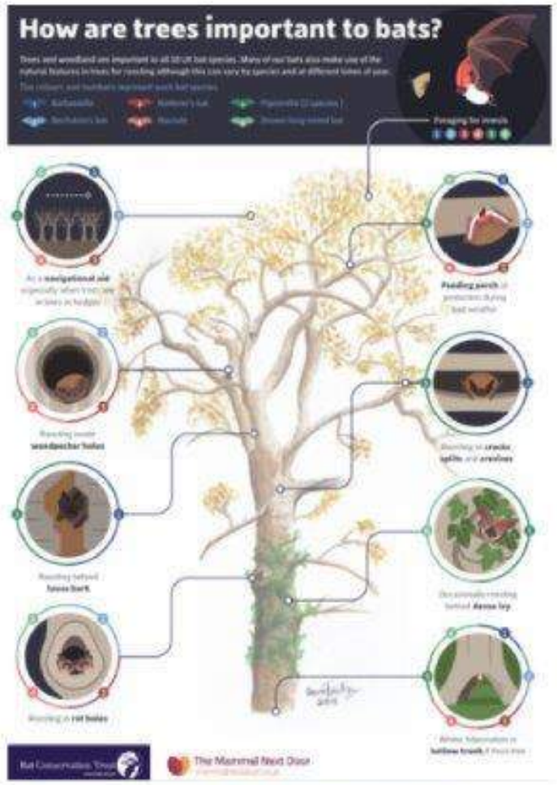
Penalties on conviction: the maximum fine is £5,000 per incident or per bat (some roosts contain several hundred bats), up to six months in prison, and forfeiture of items used to commit the offence, e.g. vehicles, plant, machinery.

Defences include:

1. Tending/caring for a bat solely for the purpose of restoring it to health and subsequent release.
2. Mercy killing where there is no reasonable hope of recovery (provided that person did not cause the injury in the first place – in which case the illegal act has already taken place).

Found a bat during unsupervised works?





Bats can roost in the following places:

- Woodpecker holes, rot holes, hazard beams;
- Vertical or horizontal cracks and splits in stems or branches;
- Partially detached platey bark, gaps between overlapping stems, double leaders forming compression forks
- Knot holes arising from naturally shed branches, or branches previously pruned back to the branch collar.
- Man –made holes, cankers caused by localised bark death;
- Cavities created by branches tearing out from parent stems;
- Other hollows and cavities, including butt-rot
- Partially detached ivy with stem diameters over 50mm.

Field signs of bat presence:

- Live or dead bats: the smallest UK bat species, the pipistrelle is only 3.5-4.5cm long.
- Droppings: bat droppings look like mouse droppings but will crumble between your fingers (they are dry and made entirely of insects).
- Feeding remains: piles of butterfly/moth wings are often left below bat feeding perches.

Why wear gloves?

There is a small risk that some bats carry a rabies virus – European Bat Lyssavirus. The purpose of wearing gloves is to reduce the chance of being bitten, as the virus is transmitted via bat saliva. Thick leather gloves are appropriate for removing a bat from imminent danger but these should be clean.

In the event that you are bitten, wash the wound, gently but thoroughly, with soap and water. Speak to a health professional immediately, advising them that you have been bitten by a bat.

References:
Bat Conservation Trust. August 2016. Why wear gloves when handling bats?
BCT Bat Surveys for Professional Ecologists, Good Practice Guidelines, 3rd Edition, 2016

version 1 November 2017

North Lincolnshire Green Energy Park

Technical Appendix B: Phase 1 Habitat Survey (Northern DHPWN Land and Dragonby Rail Sidings)

June 2021

Control sheet

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1. Introduction

1.1 Bowland Ecology Ltd was commissioned to complete a Preliminary Ecological Appraisal of the proposed Northern District Heat and Private Wire Network (DHPWN) and the Dragonby Rail Sidings. The Northern DHPWN follows the Phoenix Parkway Road (A1077), which extends east from NGR: SE 87490 12937 to NGR: SE 89259 12810 before heading south to the North Lincolnshire Council Building (NGR: SE 89897 11613). The Dragonby Sidings is located on land to the west of Dragonby (central NGR: SE 89783 14142) is under investigation for use as a site compound and access for upgrading works planned on the disused section of railway which extends to Flixborough Wharf. The survey areas are part of the wider North Lincolnshire Green Energy Park (NLGEP) Project. For the purposes of this report the two surveyed areas are described as: 1. the Northern DHPWN Land, and 2. the Dragonby Sidings (see Appendix E for a plan of the survey areas).

1.2 The proposed Northern DHPWN Land follows the road, with the majority of adjacent habitats comprising hardstanding, amenity grassland, introduced shrub, scattered scrub, scattered trees, buildings, and private gardens. Habitats of greater ecological value, including dense scrub, plantation woodland, semi-natural woodland, watercourses, neutral semi-improved grassland and hedgerows occur adjacent to the Phoenix Parkway Road section. Atkinson's Warren Local Nature Reserve (LNR) lies adjacent in the eastern section of the Phoenix Parkway Road (see Appendix A for the Phase 1 Habitat Plan).

1.3 The Dragonby Sidings features existing access tracks; a disused quarry pit which is part of the Conesby Quarry Local Wildlife Site (LWS) and has been colonised by scrub, grassland and swamp habitats with a large open water body present; a covered landfill site to the south of the access track which is dominated by grassland; as well as areas of scrub and ephemeral vegetation. A large industrial unit and associated hardstanding yard/car-parking areas were also recorded in the survey area.

1.4 The purpose of the survey was to: 1) identify and map all habitats occurring within the survey area, and 2) identify the presence of (or potential for) wildlife interests. This report includes a description of survey methods and presents the results from the surveys and Phase 1 habitat plan. As this report is part of a wider Ecological Impact Assessment for the Project, an assessment of ecological impacts is not included.

2. Methodology

2.1 The desk study, extended Phase 1 Habitat survey and Ecological Appraisal followed the Guidelines for Preliminary Ecological Appraisal and the Guidelines for Ecological Report Writing (CIEEM, 2017 a, b), and are in line with the British Standard BS42020:2013 'Biodiversity – Code of practice for planning

Desk Study

2.2 A wider survey area has previously been subject to a desk study (Bowland Ecology, 2018, 2020) which took account the wider Project Order Limits. This highlighted the potential of the Project to impact on qualifying bird species associated with the Humber Estuary Special Protection Area (SPA), as well as the suitability of habitat in the vicinity for protected mammals/birds and bird species of conservation concern recorded within 5 km of the original survey area (Bowland Ecology, 2018).

2.3 For the purpose of this report a targeted desk study was undertaken, which aimed to identify the presence of statutory and non-statutory wildlife sites within 2 km and any Habitats of Principal Importance (HPI) for the conservation of biodiversity (Section 41 NERC Act 2006) within 1 km. For the full review see Bowland Ecology (2020).

2.4 Desk study details on protected species are not included in this report, as this has been covered extensively in separate species reports.

2.5 In addition, a review of aerial photos and OS maps was conducted to identify ponds within 0.25 km of the Order Limits. This followed the advice given in Natural England's great crested newt licensing method statement template (Form WML-A14-2, version November 2017[1]), which advises that, for developments resulting in permanent or temporary habitat loss at distances over 0.25 km from the nearest pond, careful consideration should be given as to whether a survey of relevant habitats is appropriate. In this instance a 0.25 km search radius was considered appropriate due to the majority of habitats being commonly occurring and largely species poor.

Field Survey

2.6 The extended Phase 1 Habitat survey followed standard methodology (JNCC, 2010 and CIEEM, 2017a). All features of ecological significance were target noted (see Appendix B) and a colour coded map of the habitats within the Order Limits has been produced (Appendix A).

2.7 This survey methodology records information on the habitats together with any evidence of and potential for legally protected and notable fauna, in particular:

- potential roosting sites for bats within buildings and trees (identification of suitable cracks and crevices – survey undertaken externally and from ground level only). An assessment of the suitability of bat roosting, foraging and commuting habitat was undertaken according to the Bat Conservation Trust's Good Practice Guidelines 3rd Edition (Collins, 2016) (Appendix C);

[1] https://www.gov.uk/government/publications/great-crested-newts-apply-for-a-mitigation-licence

- assessing the suitability of habitats for other notable and protected species such as nesting birds (including any active or disused nests), reptiles, water vole (*Arvicola amphibius*), otter (*Lutra lutra*), white-clawed crayfish (*Austropotamobius pallipes*), badger (*Meles meles*) and invertebrates;
- checking for the most common invasive plant species subject to strict legal control including: Japanese knotweed (*Fallopia japonica*), giant knotweed (*F. sachalinensis*), hybrid knotweed (*F. x bohemica*), giant hogweed (*Heracleum mantegazzianum*), rhododendron (*Rhododendron. ponticum, R. ponticum x R. maximum* and *R. luteum*) and Himalayan balsam (*Impatiens glandulifera*); and
- assessing suitability of the habitat for amphibians and the protected great crested newt (*Triturus cristatus*). Ponds on and within 0.25 km (access permitting) of the Order Limits were subject to a Habitat Suitability Index (HSI)[2] assessment for great crested newt (Oldham *et al*. 2000).

2.8 The surveys were carried out by Sophie King MSc, BSc on the 14th, 15th and 16th October 2020 and the 8th and 9th of December 2020, and by Helena Davies BSc and Sam Robinson BA on the 14th and 15th of April 2021. The weather during the surveys is presented in Table 1.

Table 1: Weather conditions

Date	Weather
14.10.2010	Mild (approximately 13°C), dry, with 60% cloud cover and a gentle breeze (Beaufort Scale No. 3).
15.10.2020	Mild (approximately 12°C), dry, with 40% cloud cover and a gentle breeze (Beaufort Scale No. 2).
16.10.2020	Mild (approximately 11°C), scattered showers, with 80% cloud cover and a gentle breeze (Beaufort Scale No. 2).
08.12.2020	Cool (approximately 3°C), dry, with 60% cloud cover and a gentle breeze (Beaufort Scale No. 2).
09.12.2020	Cool (approximately 5°C), dry, with 70% cloud cover and a light breeze (Beaufort Scale No. 1).
14.05.2021	Warm (approximately 15°C), dry, with 40% cloud cover and a light breeze (Beaufort Scale No. 1).
51.05.2021	Warm (approximately 17°C), dry, with 70% cloud cover and a light breeze (Beaufort Scale No. 2).

Limitations

2.9 The timing of most of the extended Phase 1 Habitat surveys was outside the optimum period (April to September inclusive) (JNCC, 2010). However, there was sufficient information to confidently recognise the type of habitats present.

[2] A HSI is a numerical index, between 0 and 1. Values close to 0 indicate unsuitable habitat, 1 represents optimal habitat. The HSI for the great crested newt incorporates ten suitability indices, all of which are factors known to affect this species. The HSI for great crested newt is a measure of habitat suitability - it is not a substitute for newt surveys.

Therefore, a valid assessment of the habitats present and their potential to support legally protected species was undertaken.

2.10 Ecological surveys are limited by factors that affect the presence of plants and animals such as the time of year, migration patterns and behaviour. Therefore, the survey of the study area has not produced a complete list of plants and animals.

2.11 The list of invasive plant species included on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) is extensive and these plants are found in a range of different habitats, including aquatic habitats. The extended Phase 1 habitat survey checked, in particular, for the presence of Japanese knotweed, giant knotweed, hybrid knotweed, giant hogweed, rhododendron and Himalayan balsam. There may be other invasive plant species present within the Order Limits which were not recorded, but it is considered that this survey was sufficient to identify any significant constraints posed by invasive plants.

3. Results

Designated Sites and Habitats of Principal Importance

3.1 The desk study included in Bowland Ecology (2018) identified four statutory designations applying to the Humber Estuary: Ramsar Site, Special Protection Area (SPA), Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI). The qualifying features, site descriptions and their distance from the Order Limits are described in Bowland Ecology (2018).

3.2 An additional seven statutory designated wildlife sites on or within 2 km of the Northern DHPWN Land and Dragonby sidings were identified:

- Phoenix Parkway LNR) is located adjacent to a section of the Northern DHPWN Land, comprising a complex of dry habitats on sand, plus a short stretch of shaded stream. Woodland predominates, but there is also scrub, coarse grassland and rabbit-grazed short turf, all contributing to a structurally-diverse and species-rich site;
- Atkinson's Warren LNR, located immediately south of the Order Limits. The LNR sits on area of coversands heathland, comprising areas of acid grassland and mixed woodland;
- Phoenix LRN, located 0.5 km north of the Order Limits, predominantly woodland which connects to the Phoenix Parkway LNT;
- Sawcliffe LNR, located 1.1 km east of the Order Limits, is an area of recently created habitat on a land-filled former sand quarry. Habitats include grassland and planted woodland;
- Frodingham LNR. Located 1.3 km south of the Order Limits, a rectangular site including a diverse mixture of grassland, wetland, scrub and woodland;
- Conesby Quarry LNR, situated 1.4 km north of the Order Limits at its closest point. An ironstone quarry which is part of a working quarry, the main habitats within the Order Limits include scrub, neutral grassland, acid grassland and standing water; and
- Brumby Wood LNR; located 1.7 km south of the Order Limits. Most of the woodland is included in the Ancient Woodland Inventory, with substantial amounts of semi-natural woodland present. Neutral grassland, acid grassland and scrub are also present.

3.3 There are 27 non-statutory wildlife sites within 2 km of the Northern DHPWN Land and Dragonby Sidings; 19 LWS, seven Local Geological Sites (LGS), and one Regionally Important Geological Sites (RIGS), comprising 23 sites some of which have multiple designation. Geological sites which are not 'wildlife sites' are included in this report for completeness. Table 3 describes each non-statutory site, ordered in distance from the Northern DHPWN Land or Dragonby sidings at its closest point, four of which are located within the Order Limits of the Project:

- Phoenix Park LWS, LGS which is also designated as an LNR and is described above;

- Conesby Quarry LWS, LGS is located within the Order Limits of the Dragonby Sidings and is described above;
- Yorkshire East Gullet LWS, which is located within the Order Limits of the Dragonby Sidings; and
- Atkinson's Warren LWS, LGS which is also designated as a LNR and is described above.

Designation Type and Name	Location in relation to Order Limits	Description of Site
LWS Phoenix Parkway	Part of the Order Limits / adjacent to the DNH/PWN	21.5 ha of structurally diverse, species-rich sandy dry habitats including semi-natural woodland, scattered and dense scrub, with unimproved and semi-improved acid grassland in the northern end of the site.
LWS and LGS Conesby Quarry	Part of the Order Limits / adjacent to the Dragonby Sidings	A large (60.1 ha) ironstone quarry, with the western and central parts in filled and a deep depression in the east. The main habitat types include scrub, semi-improved neutral grassland, ruderal, and unimproved acid grassland. There is also wetland vegetation in the east.
LWS Yorkshire East Gullet	Part of the Order Limits / adjacent to the Dragonby Sidings	Unmanaged former ironstone quarry complex which centres around an elongated lake. The lake is bordered by a steep slope which supports scrub and woodland vegetation with some smaller areas of grassland bracken (*Pteridium aquilinum*). Conesby (Yorkshire East) Quarry SSSI is contained within this LWS in the south-east.
LWS, LGS Atkinson's Warren	Part of the Order Limits / adjacent to the DNH/PWN	32.8 ha of sloping rough grassland and woodland with some scrub. Tree species include birch (*Betula* sp.) and oak (*Quercus* sp.) with additional plantings of Scots pine (*Pinus sylvestris*) and sycamore (*Acer pseudoplatanus*).
LWS Slag Banks	0.5 km north of the Northern DHPWN Land	Wetland and grassland on the north-eastern and south-eastern margins of an infilled ironstone quarry, and a botanically rich sandy area in the south-west within the Phoenix LNR.
LWS Dragonby Gullet	Adjacent to the Dragonby Sidings	Former ironstone quarry which is dissected by a disused railway. The south-west area of the site comprises a fishing lake which is fringed with unmanaged trees, scrub, grassland, and hay meadows. The north-east area of the site comprises another fishing lake with surrounding coarse grassland and scrub. Botanically diverse and likely to support a range of invertebrates and birds.
LGS Conesby Rock Store	0.1 km south of the Dragonby Sidings	A 0.7 ha area of low-lying ironstone ore stockpiled by North Lincolnshire Council as an educational resource.
LWS Normanby Park	0.1 km north	A variety of habitats including planation woodland, grassland (both managed and unmanaged), stream, pond, marsh, and wet woodland. A section of the park is managed for deer. These habitats support a range of birds, brown hare (*Lepus europaeus*), and amphibians.
LWS, LGS	0.2 km north of the	An area of extensive planting of trees and shrubs with botanically interesting areas of grassland as well as

Normanby Park Community Woodland	Dragonby Sidings	bracken and a pond. Supports a good variety of invertebrates, birds, and amphibians.
LGS Dragonby Dragon	0.3 east of the Dragonby Sidings	The Dragonby Dragon is a sinuous ridge over 20 metres long, with a maximum width of 5 metres and a height of less than 2 metres. It is composed of hard travertine, (a form of calcareous tufa) precipitated from lime rich waters emerging from a spring at the base of the Northampton Sand Ironstone bed slightly higher up the slope. Its ridge like form with 'limbs' like a dragon or prehistoric monster almost certainly gave rise to the local legend that it is the body of a dragon turned to stone
LWS Bessemer Way Brownfield Sites	0.3 km east of the Northern DHPWN Land	Former industrial site which comprises areas of grassland and scrub. Species are typical of open sandy swards and include neutral grassland species.
LWS Land adjacent to Johnson's Transport	0.5 km south-east of the Dragonby Sidings	Moderately sized area of grassland habitat with some areas of woodland and wetland habitat close to housing, with a bordering ditch to the west.
LWS, LGS Sawcliffe	0.5 km south-east of the Dragonby Sidings	Land-filled former sand quarry comprising recently planted woodland and neutral grassland. A track running north-west to south-east consists of diverse flora typical of sandy soils.
LWS Sawcliffe Medieval Village	0.6 m east of the Northern DHPWN Land	Semi-improved neutral grassland field which is hummocky and contains three botanically rich ponds and bordering hedgerows.
LWS Normanby Park Golf Course	0.8 km north of the Dragonby Sidings	Roughly 49 ha site comprising area of improved grassland with unmanaged areas including acid grassland, bracken, stream, and marshy grassland. The unmanaged areas are botanically interesting.
LWS Mannaberg Way Drainage Area	0.9 km east of the Northern DHPWN Land	Flood alleviation basin on the west side of the A1029 with wetland vegetation at the lowest levels which supports a mixture of plants, invertebrates, and birds.
LGS Crosby Warren Quarry	1 km east of the Dragonby Sidings	Quarry restoration adjacent to a fishing lake. SSSI designated due to the well-preserved ammonite fauna.
LWS Frodingham Railway Cutting	1.3 km south-west of the Northern DHPWN Land	Rectangular area comprising semi-natural woodland, scrub, grassland (unimproved and damp grassland), marsh and fen.
LWS, RIGS Bagmoor Gullet and Bagmoor Quarry	1.5 km north east of the Dragonby Sidings	Botanically diverse strip of a former ironstone quarry complex. The central spine is an elongated lake bordered by scrub and grassland.
LWS Kingsway Golf Course	1.7 km south of the Northern DHPWN Land	This woodland and grassland site in Scunthorpe occupies land that ranges from wet to dry and from acidic to neutral, supporting a diverse flora. It is surrounded by housing to the west and north, the A18 to the east and a railway line on embankment to the south. Although the grassland areas were used as a golf course at the time of survey, the land is now managed for local recreation and nature conservation
LWS Brumby Wood	1.7 km south-west of the	Woodland divided into three blocks by two roads. Supports a substantial amount of semi-natural woodland

	Northern DHPWN Land	with neutral grassland and areas of scrub. There are several veteran trees.
LWS Burton Wood, Burton upon Stather	2 km west of the Dragonby Sidings	Several springs and small streams, the entire site is listed on the ancient woodland inventory as re-planted ancient woodland.

3.4 The local records centre provided details of priority habitats within 1 km of the Northern DHPWN Land and Dragonby Sidings:

- 11 records of Lowland Dry Acid Grassland HPI. The nearest record is located within Atkinson's Warren LNR, LWS, immediately to the south of the Northern DHPWN Land;
- Three records of Traditional Orchard HPI, the nearest is 0.3 km south of the Dragonby Sidings;
- One count of Wood pasture and Parkland HPI, comprising an extensive area within the Normanby Estate, located 0.1 km north of the Dragonby Sidings.
- One record of Reedbed HPI, located 0.7 km south-west of the Dragonby Sidings;
- Four records of Coastal Saltmarsh HPI, all of which are located along the banks of the River Trent, which is 0.9 km west of the Northern DHPWN Land at the closest point;
- Three records of Lowland Fens HPI, with the closest located approximately 0.9 km south of the Dragonby Sidings; and
- Three records of Wet Woodland, all located to the north of the Dragonby Sidings. The closest is 1 km from the Dragonby Sidings;

3.5 The search of MAGIC identified three areas of ancient woodland within 2 km of the Order Limits. Two records are of ancient, semi-natural woodland contained with Brumby Wood LNR, LWS, located 1.6 km south east of the Northern DHPWN Land. The third, is located within the Burton Wood LWS, approximately 2 km west of the Dragonby Sidings.

3.6 The desk study revealed no ponds within 0.25 km of the Northern DHPWN Land.

3.7 Previous surveys have identified ponds which fall within 0.25 km of the Dragonby Sidings, most of which have been subject to further surveys for great crested newts (GCN), with the confirmed presence of this protected species established. The addition of the Dragonby Sidings to the Project has increased the NLGEP Order Limits, meaning that an additional seven waterbodies fall within 0.25 km.

Habitats

3.8 Target notes summarising key interest features for wildlife recorded during the extended Phase 1 Habitat survey are included in Appendix B. The Phase 1 Habitat plan is presented in Appendix A includes the locations of the target notes. Plant species nomenclature follows Stace (2010).

Semi-natural broadleaved woodland (TN8, TN23, TN24)

3.9 Areas of woodland are present near the road along the Northern DHPWN Land, with woodland recorded in the Atkinson's Warren LNR, LWS (TN24) to the south

and the Phoenix Parkway LNR, LWS (TN23) to the north. The section of Phoenix Parkway contains mature ash (*Fraxinus excelsior*), oak (*Quercus* sp.) and silver birch (*Betula pendual*), with a limited understory of willow (*Salix* sp.), hawthorn (*Crataegus monogyna*), bramble (*Rubus fruticosus* agg.) and gorse (*Ulex europaeus*). The canopy and understory are open. The ground flora is dominated by dense bracken (*Pteridium aquilinum*) growth, up to 2 m in height. Recent tree planting has been undertaken, with sapling trees in tree guards present.

3.10 The woodland to the south of the Northern DHPWN Land; Atkinson's Warren (TN24), has a canopy of semi-mature oak and sycamore (*Acer psuedoplatanus*). The canopy is varied in structure, with the eastern section more closed, and the western section more open. The understory is limited, with hawthorn, rose (*Rosa* sp.), rowan (*Sorbus aucuparia*) and sapling trees recorded. Leaf litter, bare ground and brash piles are abundant. Species recorded in the ground flora include male fern (*Dryopteris filix-mas*), bramble, bracken, ivy (*Hedera helix*), nettle (*Urtica dioica*) and dog's mercury (*Mercurialis perennis*).

3.11 A narrow strip of semi-natural broadleaved woodland is present to the east of the Foxhills Industrial Estate (TN8). The canopy is dominated by semi-mature ash and sycamore, with willow and leylandii (*Cupressus* × *leylandii*) also recorded. The understory is limited, with hazel (*Corylus avellana*), bramble, hawthorn and rose recorded. The following cultivated species were also recorded in the understory; Wilson's honeysuckle (*Lonicera nitida*) and common snowberry (*Symphoricarpos albus*). The ground flora is sparse, with sapling trees, bramble and ivy recorded.

Broadleaved plantation woodland (TN22)

3.12 Narrow bands of plantation woodland are located along the Northern DHPWN Land, adjacent to the Phoenix Parkway Road (A1077). The bands of plantation woodland border the adjacent Atkinson's Warren LNR, LWS and Phoenix Parkway LNR, LWS. Most of the trees in the canopy are semi-mature. Species recorded include; silver birch, sycamore, rowan, and ash. The understory is limited, with sapling sessile oak (*Quercus petraea*) and sapling hawthorn recorded. Bramble dominates the ground flora, with yarrow (*Achillea millefolium*) and common ragwort (*Senecio jacobaea*) also recorded. Tree guards are still present around some trees and where plantings have failed.

Dense/continuous scrub (TN6, TN9, TN15, TN18, TN21,TN25

3.13 Areas of scrub which vary in character are present near the Northern DHPWN Land. Approximately 0.9 ha of dense willow and silver birch scrub is present within a compound area (TN6) of the area. The area is on uneven ground, with abundant debris and litter present. A substantial area of dense hawthorn and willow scrub is present to the south of the Phoenix Parkway Road (A1077; TN9). A field to the north of the Phoenix Parkway Road (A1077; TN15) comprises continuous scrub dominated by sapling hawthorn and sapling willow, which are less than 2 m in height. The ground flora is dominated by tall ruderal species; creeping thistle (*Cirsium arvense*) and rosebay willowherb (*Chamaenerion angustifolium*). Narrow strips of dense scrub grow to the north and south of the Phoenix Parkway Road (A1077; TN18, TN25). These bands of scrub are more diverse, with scrub and trees of varying age. Species recorded include hazel, sycamore, willow, silver birch, bramble, hawthorn, rose, gorse and sapling sessile oak. An area to the south of the road (TN21) is dominated by willow trees of a similar age, growing densely, to a height of approximately 4 m.

3.14 Scrub is abundant within the Dragonby Sidings, with bramble, willow, hawthorn, gorse, broom (*Cytisus scoparius*), silver birch and rose scrub recorded adjacent to the access track, in more extensive areas to the south of the track (TN36), and dominating a large area to the north of the access track in the disused quarry pit which is part of the Conesby Quarry LWS. Ground flora species frequently recorded in the disused pit area include reed canary grass (*Phalaris arundinacea*), soft rush (*Juncus effusus*), teasel (*Dipsacus fullonum*) and broad-leaved dock (*Rumex obtusifolius*).

Hedgerow

3.15 The following four hedgerows were recorded within the Northern DHPWN Land:

- TN12, located to the north of the Phoenix Parkway Road (A1077), along a field boundary. Dominated by mature hawthorn, the hedgerow is 3.5 m high, 2 m wide and dense to ground level. The ground flora is limited with cocksfoot (*Dactylis glomerata*), perennial ryegrass (*Lolium perenne*), Yorkshire fog (*Holcus lanatus*), common mallow (*Malva sylvestris*), common mugwort (*Artemisia vulgaris*), common ragwort, dandelion (*Tarraxacum* agg.), ground ivy (*Glechoma hederacea*), ribwort plantain (*Plantago lanceolata*) and vipers bugloss (*Echium vulgare*) recorded. The hedgerow qualifies as a HPI;
- TN16, a mature hawthorn hedgerow between the Phoenix Parkway Road (A1077) and a field of continuous scrub (TN15). The hedge is up to 3.5 m high, 2 m wide, with occasional willow, rose and bramble also recorded. Species recorded in the ground flora include; cocksfoot, common ragwort, ribwort plantain and common mugwort. The hedgerow qualifies as a HPI;
- TN17, a hedge to the south of the Phoenix Parkway Road (A1077), dominated by mature hawthorn, up to 3 m high and 1.5 m wide. Yorkshire fog, bramble, common hogweed (*Heracleum sphondylium*) and common mallow were recorded in the ground flora. The hedgerow qualifies as a HPI; and
- TN20, a hedgerow is present along the eastern field boundary of a TN19, located within 0.1 km. The hedgerow is growing along the channel of a dry ditch. The hedgerow is uncut, with dense scrub present making the hedge over 3.5 m wide in areas and up to 2 m high. Hawthorn, blackthorn (*Prunus spinosa*), willow, rose and bramble were recorded. Species noted in the ground flora include cocksfoot, ribwort plantain, common ragwort and common mugwort. The hedgerow qualifies as a HPI.

Neutral, semi-improved grassland (TN19, TN25)

3.16 Within the Northern DHPWN Land, neutral semi-improved grassland was recorded in a field to the south of the Phoenix Parkway Road (TN19) and in a small area or dense and scattered scrub to the north of the road (TN25). Species recorded include tufted hair grass (*Deschampsia cespitosa),* Yorkshire fog, cocksfoot, bracken, white campion (*Silene latifolia*), yarrow, viper's bugloss, cow parsley (*Anthriscus sylvestris*), common ragwort, common mugwort, meadow vetchling (*Lathyrus pratensis*), common bird's-foot-trefoil (*Lotus corniculatus*), white clover (*Trifolium repens*) and meadow buttercup.

3.17 At the Dragonby Sidings, neutral, semi-improved grassland was recorded along the steep banks of the disused quarry pit (TN37) and in areas to the south of the access track where the vegetation has a longer sward (TN33). Species recorded include tufted hair grass, cocksfoot, false oat grass, creeping buttercup,

cleavers, ribwort plantain, meadow vetchling, red clover (*Trifolium pratense*), yarrow, broad-leaved dock, creeping thistle and coltsfoot (*Tussilago farfara*).

Species poor, semi-improved grassland (TN10, TN13)

3.18 Along the Northern DHPWN Land, occasional fields to the south of the Phoenix Parkway Road were assessed as species poor, semi-improved grassland. Frequently recorded species include false oat grass, broad-leaved dock, bittercress (*Cardamine* sp.), cleavers (*Galium aparine*) and nettle.

3.19 A field to the south of the access track in the Dragonby Sidings area was assessed as species poor, semi-improved grassland; comprising a field managed to a short sward of less than 30 cm. Species recorded in the sward include Yorkshire fog and meadow foxtail (*Alopecurus pratensis*).

Tall ruderal vegetation

3.20 Tall ruderals were frequently recorded along the Northern DHPWN Land. An area of note comprises a field to the north of the Phoenix Parkway Road (A1077) which is dominated by tall ruderal vegetation; Yorkshire fog, cocksfoot, perennial ryegrass, common hogweed, nettle, creeping thistle, spear thistle (*Cirsium vulgare*), teasel and cow parsley. Sapling willow and sapling lime (*Tilia* sp.) were present.

Ephemeral vegetation

3.21 Ephemeral vegetation was abundant within the Dragonby Sidings, surrounding the access tracks and in more extensive areas to the south of the access track as part of a mosaic of ephemeral vegetation, dense scrub and scattered scrub on disturbed, stony ground. Species recorded in the ground flora include ribwort plantain, oxeye daisy (*Leucanthemum vulgare*), broad-leaved dock, common daisy (*Bellis perennis*), groundsel (*Senecio vulgaris*) and English stonecrop (*Sedum anglicum*).

3.22 Occasional, scattered areas of ephemeral vegetation were also recorded along the Northern DHPWN Land.

Amenity grassland

3.23 Road-side landscape planting along the Northern DHPWN Land frequently featured areas of amenity grassland, which was managed to a short sward (<5cm). Species recorded include Yorkshire fog, broadleaf plantain (*Plantago major*), common daisy, common ragwort, dandelion and yarrow.

Scattered scrub and trees

3.24 Scattered planted trees and scrub of varying maturity from young to semi-mature were recorded along the Northern DHPWN Land. Recorded species include; ash, beech (*Fagus sylvatica*), field maple (*Acer campestre*), holly (*Ilex aquifolium*), horse chestnut (*Aesculus hippocastanum*), leylandii, lime, rowan, silver birch and sycamore. The majority of trees occur within private properties or roadside landscaping.

3.25 Scattered scrub is abundant within the Dragonby Sidings. The most frequently recorded species include bramble, hawthorn, rose, broom, gorse, and sapling trees.

Introduced shrub

3.26 The roadside landscaping of the Northern DHPWN Land included ornamental species such as barberry (*Barberis* sp.), cherry laurel (*Prunus laurocerasus*),

cotoneaster (*Cotoneaster* sp.), evergreen spindle (*Euonymus japonicus*) and Wilson's honeysuckle.

Watercourse (TN26, 30, 31)

3.27 One watercourse was recorded adjacent to the Northern DHPWN Land (TN26). This comprised a short stretch of ditch in an area of dense scrub (TN25) to the north of the Phoenix Parkway Road (A1077). The ditch which culverts beneath a path. It is approximately 0.75 m wide and less than 0.1 m deep, with a moderate flow from south-east to north-west. The substrate is concrete, and the banks are concrete and sloped at a steep gradient (~45°). There is no submerged/emergent vegetation present in the channel. Gorse and bramble scrub is encroaching from the banks.

3.28 Within the Dragonby Sidings, there are two shallow ditches and streams adjacent to an access track (at TN30 and 31). Both are shallow, with a depth of less than 0.3 m, feature still water and are not connected to any other watercourses.

Hardstanding and buildings

3.29 Hardstanding is the dominant habitat within the Northern DHPWN Land, including roads and footpaths. Buildings were abundant within the NLGEP Order Limits of the Northern DHPWN Land, including residential and commercial properties.

3.30 The main access route and large areas within the Dragonby Sidings comprise hardstanding. A large industrial warehouse which is in commercial use is located adjacent to the railway and is surrounded by a hardstanding works-yard and carpark.

3.31 It is understood that no buildings within the Order Limits for the Dragonby Sidings or Northern DHPWN Land will be impacted, therefore detailed surveys of the buildings were not undertaken.

Other habitat

3.32 Private gardens and allotments are located within 0.1 km of the Northern DHPWN Land. These areas were not surveyed due to access restrictions

Species

Plants (incl. invasive species)

3.33 Along the Northern DHPWN Land, Japanese knotweed was recorded in one location adjacent to the road. This species is listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended). The area of Japanese knotweed appears well established and it is likely that rhizomes are extensive in the surrounding amenity grassland.

3.34 Cotoneaster was occasionally recorded in the ornamental shrub planting along the Northern DHPWN Land. Certain species of cotoneaster are listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended). Identifying cotoneaster to species level is difficult; therefore, as a precaution, it is advised that the species present are treated as being listed on Schedule 9.

Bats

3.35 Along the Northern DHPWN Land, habitats which provide the most suitable foraging resources and commuting routes for bats are located along the Phoenix

Parkway Road (A1077). These habitats include the Phoenix Parkway LNR and Atkinson's Warren LNR, which contain two areas of mature, deciduous semi-natural woodland, as well as areas of dense and scattered scrub, plantation deciduous woodland, hedgerows, grassland, and an allotment. Overall, where the Northern DHPWN Land is located along the Phoenix Parkway Road, the habitats provide moderate suitability for foraging and commuting bats (in accordance with Collins, 2016). As the Northern DHPWN Land progresses into Scunthorpe city centre, the surrounding landscape is dominated by hardstanding, buildings and amenity grassland with occasional small gardens, scattered trees and ornamental shrubs present. This area is considered to provide low potential for foraging and commuting bats (in accordance with Collins, 2016). Bat species for which the Northern DHPWN Land provides suitable foraging and commuting habitat include species which show a preference for utilising 'edge' habitats. Such species include common pipistrelle and myotid species (*Myotis* spp.), which are flexible in their foraging habitat.

3.36 Within the Dragonby Sidings, the mosaic of habitats includes open water, grassland, dense and scattered scrub. These features are well connected to other semi-natural landscapes within the local area, including LWS, LNR and SSSI sites. Bat species for which the land within the Dragonby Sidings provides suitable foraging a commuting habitat includes the Daubenton's bat (*Myotis daubentonii*) which favour foraging over open water, noctule bats (*Nyctalus noctula*) which show a preference for feeding in 'open' habitats, and pipistrelle species which are flexible in the habitat preference.

3.37 As indicated above, it is understood that the Project will not impact upon buildings within the Order Limits of the Dragonby Sidings or Northern DHPWN Land. Therefore, a detailed preliminary roost assessment of buildings for bats was not undertaken on buildings which were identified as being in use either as residential properties or commercial units. However, along the Northern DHPWN Land there are numerous terraced houses with pitched, tiled roofs which are likely to offer roosting opportunities for bat species including common pipistrelle (*Pipistrellus pipistrellus*) and soprano pipistrelle (*Pipistrellus pygmaeus*). Within the Dragonby Sidings, roosting potential for bats appears to be more limited, with the large commercial warehouse and occasional units of site infrastructure including shipping containers offering negligible potential for roosting bats (in accordance with Collins, 2016).

3.38 No trees with the potential to support roosting bats were recorded within the NLGEP Order Limits of the Northern DHPWN Land or Dragonby Sidings.

Badgers

3.39 No evidence of badgers, including setts, feeding remains or trails, were recorded within the survey area. However, badgers are known to be active in the area. Suitable refuge, foraging and commuting habitats within the survey area include areas of woodland, dense and scattered scrub, hedgerows, and grassland. In addition, there is sloped ground in both survey areas which are favoured for sett building. In particular, the Conesby Quarry LWS within the Dragonby Sidings provides abundant suitable habitat in an area with limited human disturbance.

Water vole and otter

3.40 One watercourse was present within the NLGEP Order Limits of the Northern DHPWN Land. This was assessed as providing negligible potential for water vole as it had concrete substrate and banks. No suitable laying up habitat for otter

was recorded, however this species may use the watercourse for foraging and commuting.

3.41 Within the Dragonby Sidings, wet ditches run parallel to the access track. It is considered unlikely that water voles are active in the watercourses which are shallow, with shallow banks and not connected to other watercourses or more suitable wetland habitat. The absence of connectivity to other watercourses and suitable laying-up habitat also limits the likelihood of otter being active within the watercourses.

Other mammals

3.42 Roe deer (*Capreolus capreolus*) were observed foraging in the Dragonby Sidings during ongoing surveys in the area. Mammals which are Species of Principal Importance (SPI) likely to be present with the Dragonby Sidings and/or Northern DHPWN Land include brown hare and European hedgehog (*Erinaceus europaeus*). Non-SPI mammals likely to be present include wood mouse (*Apodemus sylvaticus*), common shrew (*Sorex araneus*) and field vole (*Microtus agrestis*).

Birds

3.43 Habitats along and adjacent to the Northern DHPWN Land, which provide suitable habitat for breeding birds that nest in scrub and/or trees, include hedgerows, grassland, deciduous woodland, dense and scattered scrub and allotments. The Phoenix Parkway LNR/LWS and The Atkinson's Warren LNR/LWS abut the Northern DHPWN Land in the western section. To the south, towards Scunthorpe city centre, the habitats either side of the Northern DHPWN Land include hardstanding, buildings, gardens, ornamental planting and small areas of scrub and tall ruderal vegetation.

3.44 The mosaic of habitats within the Dragonby Sidings offer greater potential for a range of nesting bird species which are of conservation concern and/or afforded greater legal protection. The grassland provides potential for ground nesting species such as skylark (*Alauda arvensis*); the areas of open water and associated marginal and tall ruderal vegetation offer potential for species included reed bunting (*Emberiza schoeniclus*) and Cetti's warbler (*Cettia cetti*); there is abundant scrub which provides habitat for scrub and tree nesting species including willow warbler (*Phylloscopus trochilus*); and the areas of open, disturbed ground could be used by ground nesting species such as oystercatcher (*Haematopus ostralegus*), common ringed plover (*Charadrius hiaticula*) and little ringed plover (*Charadrius dubius*).

Reptiles

3.45 Suitable basking, foraging and refuge habitat for reptiles within the NLGEP Order Limits of the Northern DHPWN Land include Atkinson's Warren LNR/LWS, Phoenix Parkway LNR/LWS and an area of allotments. Reptile species which may be present include grass snake (*Natrix natrix*) and slow worm (*Anguis fragilis*). It should be noted that only small areas of the LNR/LWS/allotments are present within the Order Limits.

3.46 The land within the Dragonby Sidings provides greater opportunities for reptile species. The mosaic of semi-natural habitats, including open water, scrub and grassland, and open, sunny-banks may support common lizards (*Zootoca vivipara*), grass snake and slow worm.

Amphibians (GCN, common toad, a SPI)

3.47 No ponds were identified on or within 0.25 km of the Northern DHPWN Land, therefore it is highly unlikely that GCN are present.

3.48 Within the Dragonby Sidings, two bodies of open water are present. An additional eleven water bodies were recorded within 0.25 km of the Dragonby Sidings, six of which have been subject to HSI/GCN surveys (or not surveyed due to access restrictions) prior to this report during 2019 by Bowland Ecology.

3.49 For the purposes of this report, the results of previously surveyed ponds are included in Table 2 below. The methodology, results and evaluation of these surveys are presented in a separate amphibian report (Bowland Ecology, 2021).

3.50 The ponds which are undergoing amphibian surveys are described in paragraphs 3.50 and 5.51. See Appendix E for pond locations and the 0.25 km buffer from the Order Limits of the Dragonby Sidings.

Table 2: Summary of pond survey results

Pond No.	HSI Score	GCN Presence / Absence survey	GCN Population Assessment
P11	0.68	GCN present	Medium GCN population
P12	0.38	N/S	N/S
P13	0.77	N/S	N/S
P14	0.67	N/S	N/S
P15	0.67	GCN present	Medium GCN population
P16	0.82	No GCN recorded	N/A

Pond suitability: <0.5 'poor', 0.5 – 0.59 'below average', 0.6 – 0.69 'average', 0.7 – 0.79 'good', >0.8 'excellent'

N/S – Not Surveyed due to access restrictions.

N/A – Not Applicable as not taken forward for GCN population assessment

3.51 The two waterbodies within the NLGEP Order Limits of the Dragonby Sidings comprise:

- Pond 17 - located in the basin of the Conesby Quarry LWS, comprises a large, deep water body which is approximately 115 m x 85 m. The area is managed by the Lincolnshire County Council. It is understood that the water body is drained quarterly as part of the ongoing management of the quarry and that historically, the water body was drained monthly. Conversations with a site manager indicate that the water volume fluctuates rapidly; with the area being dry after drainage, then forming a deep lake in the following months. It is understood from conversations with the site manager that GCN have been recorded in the water body previously. The substrate and banks are the exposed, bare earth of the quarry pit. No aquatic vegetation was recorded in the waterbody. Marginal vegetation is limited, with patches of scrub present on the eastern banks. Access to the waterbody is limited as the banks are unstable; and
- Pond 19 – also located within the quarry pit of the Conesby Quarry LWS, immediately south of Pond 17. The pond comprises two waterbodies which are adjacent to each other, for the purposes of the survey they are recorded as one pond. Approximately 500m^2, the pond has shallow areas towards to the banks, increasing to a depth of up to 0.5 m. Shallow, sloped earth banks are present along the western section, with steep banks of the quarry pit present along the eastern edge. The eastern bank was not accessible for survey. Willow and bramble scrub shade

approximately 50% of the pond edge and water is dominated by common reed (*Phragmites australis*).

3.52 The following five waterbodies, which were recorded within the 0.25 km of the NLGEP Order Limits of the Dragonby Sidings, have not been previously surveyed:

- Pond 18 - located within the disused quarry pit of the Conesby Quarry LWS but could not be accessed as it is located on a stepped section of the quarry sides. Surveyors were made aware of the pond by site management and the pond was viewed from a vantage point to the west. The pond appears to be dominated by common reed and according to conversations with the site managers GCN have been previously recorded;
- Pond 20 – a long, narrow water body which was previously a stocked, fishing lake. The site is now gated off and not maintained as a fishing lake. It is located within the Yorkshire East Gullet LWS and measures approximately 380 m x 35 m. The pond is very deep, with a depth of 0.3 m along the bankside. The eastern bank was not accessible for survey; it has very steep banks covered by dense woodland. The full length of the western bank was accessible. The banks are steep, which is likely to accommodate fishing. Willow scrub shades the majority of the western bank. Aquatic vegetation includes water mint (*Mentha aquatica*), duckweed (*Lemna minor*) and water lily (*Nymphaea* sp.);
- Pond 21 - a large water body which was a previously a stocked, fishing lake. The pond is also located within the Yorkshire East Gullet LWS. The pond is very deep and measures approximately 400 m x 100 m. At the time of survey, the pond had flooded its banks, with deep water present along the western banks which are sloped grassland. The eastern banks were not accessible for survey as they are dominated by dense scrub;
- Pond 22 - located in area of disturbed ground, close to the steel works. It measures approximately 50 m x 20 m, and the water is shallow along the banks, with deeper areas towards to the centre of the pond. The pond is not shaded. The surrounding vegetation comprising sparse ephemeral and tall ruderal species. Aquatic vegetation includes submerged grasses and occasional water mint; and
- Pond 35 - known as the Blue Lagoon and forming part of the Conesby Quarry LNR. This is a very deep, large water body which measures approximately 370 m x 140 m. The waterbody features large areas of open water, with banks which are dominated by common reed. Small areas of willow scrub are present along the bank, providing small areas of shading. There is a public footpath around the perimeter of the waterbody which is heavily used by dog walkers;

3.53 The HSI scores of the ponds 17-22 and 35 are present in Table 3 below.

Table 3: HSI Scores of ponds 17-22 and 35.

No.	SI1 - Location	SI2 - Pond area	SI3 - Pond drying	SI4 - Water quality	SI5 - Shade	SI6 - Fowl	SI7 - Fish	SI8 - Ponds	SI9 – Terrestrial habitat	SI10 - Macrophytes	HSI
17	1	N/A	0.1	0.67	1	1	1	1	1	0.3	0.65

No.	SI1 - Location	SI2 - Pond area	SI3 - Pond drying	SI4 - Water quality	SI5 - Shade	SI6 - Fowl	SI7 - Fish	SI8 - Ponds	SI9 – Terrestrial habitat	SI10 - Macrophytes	HSI
18	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S
19	1	1	1	1	0.67	1	0.67	1	1	0.8	0.90
20	1	N/A	0.9	1	0.67	0.67	0.01	1	1	0.5	0.50
21	1	N/A	0.9	0.67	0.9	0.67	0.01	1	1	0.4	0.48
22	1	0.95	1	0.67	1	0.67	0.67	1	1	0.4	0.81
35	1	N/A	0.9	0.67	1	0.67	0.33	1	0.67	0.3	0.67

Pond suitability: <0.5 'poor', 0.5 – 0.59 'below average', 0.6 – 0.69 'average', 0.7 – 0.79 'good', >0.8 'excellent'

N/S – Not Surveyed due to access restrictions.

N/A – Not Applicable, for water bodies larger than 2000m^2, this factor was omitted from HSI calculations as recommended in the guidance.

3.54 At the time of writing, GCN surveys of ponds 17-22 and 35 are ongoing.

3.55 Terrestrial habitats which provide suitable refugia and foraging resources for amphibians, including GCN, common toad and common frog, within the Dragonby Sidings include abundant areas of scrub and grassland. In addition, the quarry pit features cliffs and rocks which offer suitable overwinter hibernacula for these species.

Invertebrates

3.56 The range of semi-natural habitats across both survey areas, including hedgerows, woodland, scrub, grassland and open water, support a diversity of invertebrate species. In particular the Conesby Quarry LWS has the potential to support invertebrate species of greater conservation importance.

3.57 The ornamental planting, including amenity grassland and ornamental shrubs recorded within the Northern DHPWN Land, are considered to be of less value for invertebrate species.

References

Bowland Ecology (2018) BOW17.961 NLGEP – Appendix B Extended Phase 1 Survey Report.

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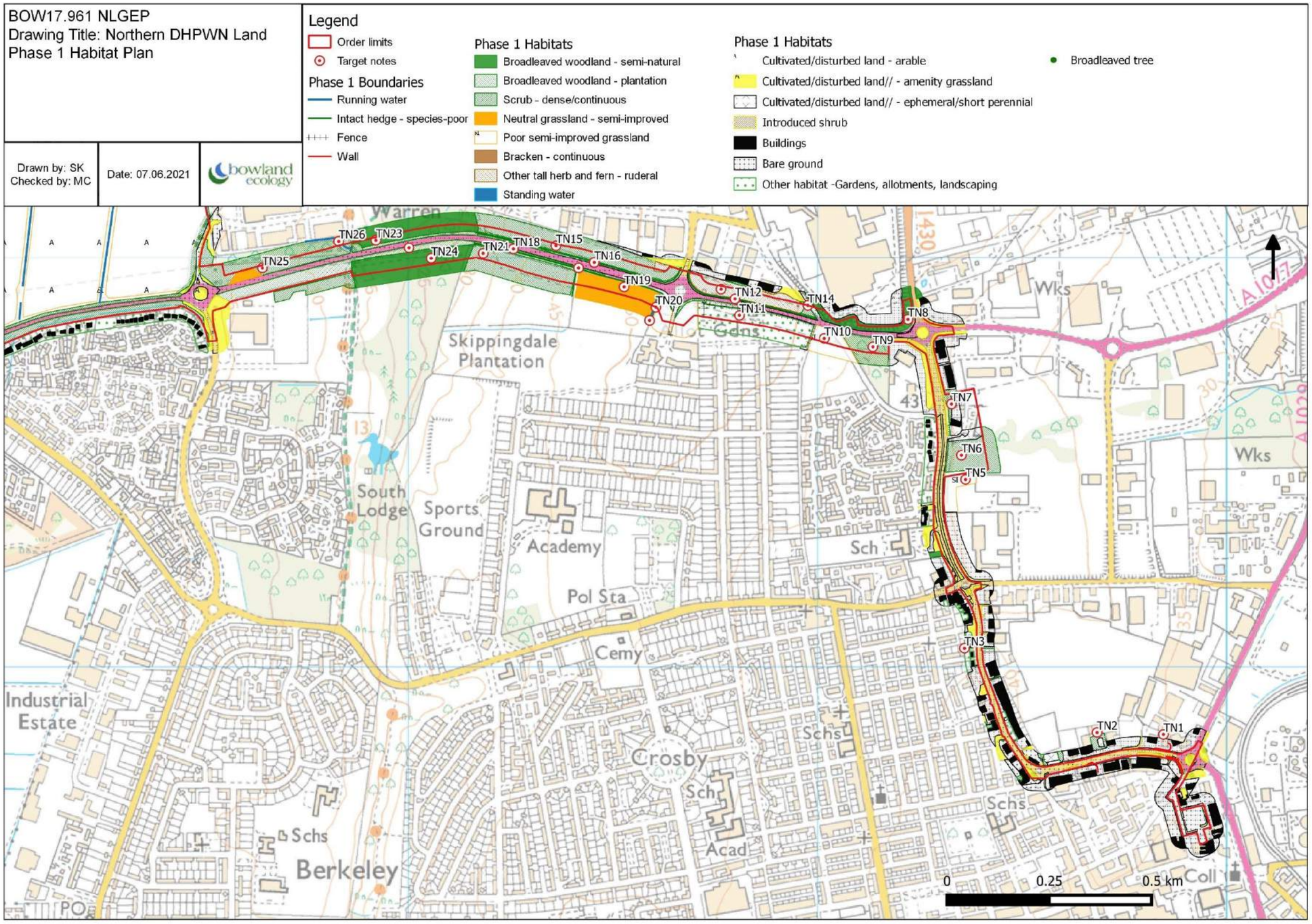
Appendix A – Phase 1 Habitat Plan



BOW17.961 NLGEP
Drawing Title: Dragonby Sidings Phase 1 Habitat Plan

Drawn by: SK
Checked by: MC

Date: 07.06.2021

bowland ecology

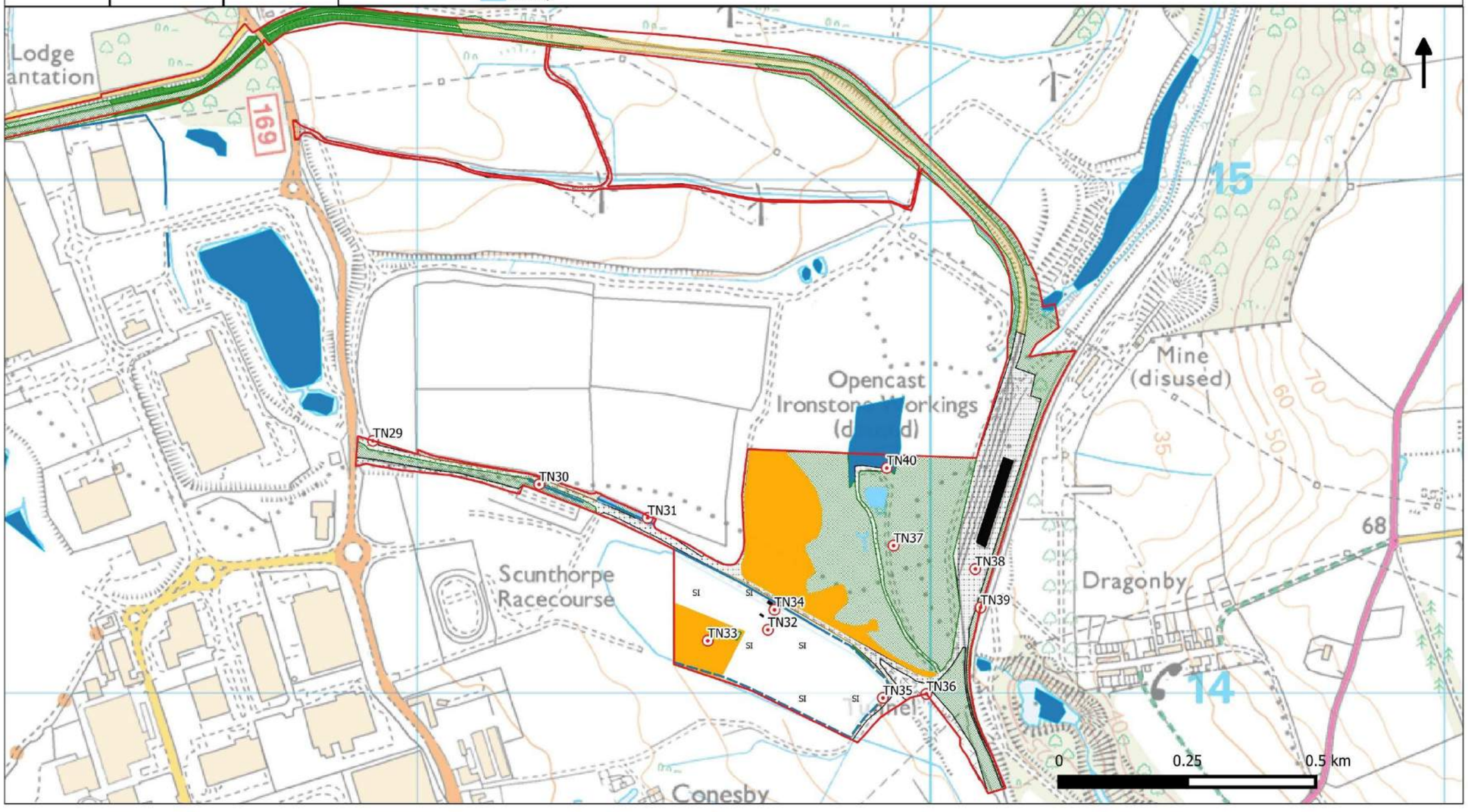
Legend

Order limits
Target notes

Phase 1 Boundaries
Running water
Dry ditch

Phase 1 Habitats
Broadleaved woodland - semi-natural
Broadleaved woodland - plantation
Scrub - dense/continuous
Neutral grassland - semi-improved
Calcareous grassland - semi-improved
Poor semi-improved grassland
Other tall herb and fern - ruderal
Swamp

Phase 1 Habitats
Marginal and inundation - marginal vegetation
Standing water
Cultivated/disturbed land// - ephemeral/short perennial
Buildings
Bare ground



BOW17.961 NLGEP
Drawing title: Dragonby Sidings Pond Plan

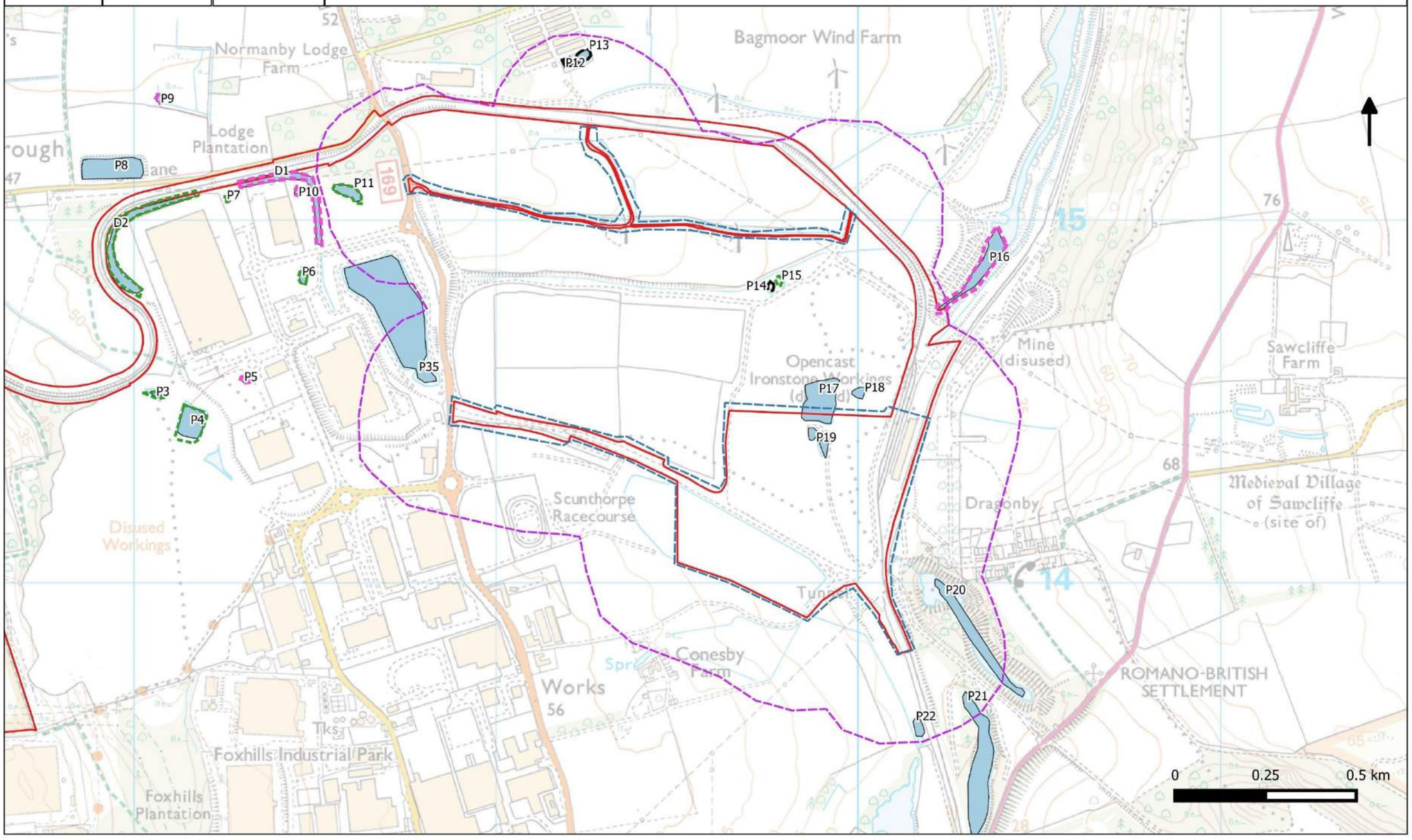
Drawn by: SB
Checked by: JJ

Date: 14/03/17

bowland ecology

Legend

- 250 m buffer area
- Survey areas
- Order limits
- Pond/ditch with no GCN
- Pond/ditch with medium GCN population
- Pond/ditch with small GCN population
- Pond/ditch not surveyed
- Ponds



Appendix B – Target Notes

No	Description	Photograph
Northern DHPWN Land		
TN1	The most eastern section of the survey area is located close to Scunthorpe town centre, adjacent to the North Lincolnshire Council building. From here the survey area extends north, passing through residential and retail areas. The surrounding habitats are dominated by hardstanding (roads and pathways), buildings (residential, retail public houses). Landscaped areas comprising amenity grassland, scattered planted trees and ornamental shrubs are present along the road side. The areas of amenity grassland are managed to a short sward (<5cm), species recorded include Yorkshire fog (*Holcus lanatus*), broadleaf plantain (*Plantago major*), common daisy (*Bellis perennis*), common ragwort (*Senecio jacobaea*), dandelion (*Taraxacum* agg.) and yarrow (*Achillea millefolium*). The scattered planted trees are of varying maturity from young to semi-mature. Recorded species comprise; ash (*Fraxinus excelsior*), beech (*Fagus sylvatica*), field maple (*Acer campestre*), holly (*Ilex aquifolium*), horse chestnut (*Aesculus hippocastanum*), leylandii (*Cupressus* × *leylandii*), lime (*Tilia* sp.), rowan (*Sorbus aucuparia*), silver birch (*Betula pendula*), sycamore (*Acer pseudoplatanus*). Species recorded within the ornamental shrub planting include barberry (*Barberis* sp.), cherry laurel (*Prunus laurocerasus*), cotoneaster (*Cotoneaster* sp.), evergreen spindle (*Euonymus japonicus*), Wilson's honeysuckle (*Lonicera nitida*).	 Image 1: Road and surrounding landscaping in the most eastern section of the survey area.
TN2	Two unused plots located in the most eastern section of the survey area, adjacent to the road; feature encroaching ephemeral vegetation and continuous scrub. The substrate is hardstanding; species recorded include false oat grass (*Arrhenatherum elatius*), bramble (*Rubus fruticosus* agg), butterfly-bush (*Buddleja davidii*), English stonecrop (*Sedum anglicum*), rosebay willowherb (*Chamerion angustifolium*), sow thistle (*Sonchus* sp.) and willow (*Salix* sp.) trees.	 Image 2: Land plot of scrub and ephemeral vegetation
TN3	Abundant terraced and semi-detached housing is present with 30 m of the Northern DHPWN Land. These houses include private gardens which could not be closely surveyed due to access restrictions. For the purpose of this ecological assessment; private gardens were mapped as 'other habitat' in the Phase 1 Plan, and comprise areas of amenity grassland, ornamental planting, introduced shrubs, scattered trees, walls, fences and hard standing.	 Image 3: Private gardens adjacent

TN4	Cotoneaster was occasionally recorded in the ornamental shrub planting along the Northern DHPWN Land. Certain species of cotoneaster are listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended). Identifying cotoneaster to species level is difficult; therefore as a precaution, it is advised that the species on within the Order Limits are treated as being listed on Schedule 9.	 Image 4: Cotoneaster
TN5	Area of species poor, semi-improved grassland, with tall ruderal species on stony ground is located along the eastern boundary of the survey area. Species recorded include false oat grass, broad-leaved dock (*Rumex obtusifolius*), bittercress (*Cardamine* sp.), cleavers (*Galium aparine*), common mallow (*Malva sylvestris*), common mugwort (*Artemisia vulgaris*) ground ivy (*Glechoma hederacea*), groundsel (*Senecio vulgaris*), hedge bindweed (*Calystegia sepium*), nettle (*Urtica dioica*), rosebay willowherb, shepherd's purse (*Capsella bursa-pastoris*) and teasel (*Dipsacus fullonum*).	 Image 5: land plot of grassland
TN6	Large area of dense scrub (approximately 0.9 ha). The ground is sloped and uneven, providing potential sett-building habitat for badger (*Meles meles*). Species present comprise; willow, silver birch, bramble, butterfly-bush, mature hawthorn (*Crataegus monogyna*), young sycamore, young ash, rose (*Rosa* sp.), elder (*Sambucus nigra*), teasel and common mugwort. Litter and debris is abundant in the scrub.	 Image 6: Dense scrub
TN7	A large stand of Japanese knotweed (*Fallopia japonica;* Schedule 9 listed species) is present to the east of the road, on the east side of a fence. The area of Japanese knotweed appears well established and it is likely that rhizomes are present in the amenity grassland which is adjacent.	 Image 7: Japanese knotweed
TN8	A narrow strip of semi-natural broadleaved woodland is located to the north of the Phoenix Parkway Road (A1077). The canopy is dominated by sycamore and ash, with willow abundant and leylandii recorded as rare in abundance. The understory is limited, with willow, hawthorn, hazel (*Corylus avellana*), sapling sycamore, bramble, rose recorded. Introduced shrubs; Wilson's honeysuckle and common snowberry (*Symphoricarpos albus*) were also recorded in the understory. The ground flora is sparse, with sapling trees, bramble and ivy recorded. Sections of the woodland are located on sloping ground which provides suitable sett-building habitat for badger.	 Image 8: Woodland

TN9	A substantial area of dense scrub is present to the south of the Phoenix Parkway Road (A1077). Hawthorn, willow, bramble and young sycamore specimens were recorded. The scrub has a height of approximately 3 m and has formed a dense canopy. Due to access restrictions the full extent of the area could not be surveyed, however it is likely that there are mature trees present with the area.	 Image 9: Dense scrub
TN10	A field to the south of the Phoenix Parkway Road (A1077) was assessed as species-poor, semi-improved grassland. The sward was less than 0.3 m in height. False oat grass, Yorkshire fog, cocksfoot (*Dactylis glomerata*), broadleaved dock, nettle and bramble were recorded in the sward. Large piles of deadwood from felled trees are present with the field. Sapling, scattered birch (*Betula* sp.) and sycamore trees were also recorded.	 Image 10: Field to the south of A1077
TN11	A large area to the south of the Phoenix Parkway Road (A1077) comprises allotments; as such a detailed habitat map was not conducted. This area is mapped as 'Other Habitat' in the Phase 1 Plan (see Appendix A). The habitats within the area are typical of allotments and include vegetation plots, ornamental planting, grass/tall ruderal verges, scattered trees, scattered small buildings (greenhouses and timber sheds). The area is fenced off, with scrub growing along all fence lines.	 Image 11: Allotments
TN12	A hedgerow which is located to the north of the Phoenix Parkway. Dominated by mature hawthorn, the hedgerow is 3.5 m high, 2 m wide, dense to ground level and had not been recently cut at the time of survey. The ground flora is limited, with cocksfoot, perennial ryegrass (*Lolium perenne*), Yorkshire fog, common mallow, common mugwort, common ragwort, dandelion ground ivy, ribwort plantain (*Plantago lanceolata*), vipers bugloss (*Echium vulgare*) recorded. Leaf litter was abundant.	 Image 12: Hedgerow
TN13	A field to the north of the Phoenix Parkway Road (A1077) is dominated by tall ruderal vegetation; Yorkshire fog, cocksfoot, perennial ryegrass, common hogweed (*Heracleum sphondylium*), nettle, creeping thistle (*Cirsium arvense*), spear thistle (*Cirsium vulgare*), teasel and cow parsley (*Anthriscus sylvestris*). Sapling willow and sapling lime were present, if unmanaged this area will become dense scrub.	 Image 13: field to north of A1077

TN14	Line of semi-mature lime trees present between a footpath and small area of amenity grassland. Scattered and dense hawthorn sand willow scrub is present close to the trees.	 Image 14: line of trees
TN15	A field to the north of the Phoenix Parkway Road (A1077) is dominated by sapling hawthorn and sapling willow, which are less than 2 m in height and have formed an area of continuous scrub. Tall ruderal species were recorded in the ground flora, including; meadow foxtail (*Alopecurus pratensis*), broadleaved dock, creeping thistle, oxeye daisy (*Leucanthemum vulgare*), poppy (*Papaver rhoeas*), white clover (*Trifolium repens*), red clover (*Trifolium pratense*), ribwort plantain, rosebay willowherb and common ragwort.	 Image 15: scrub field
TN16	Mature hawthorn hedgerow between the Phoenix Parkway Road (A1077) and a field of continuous scrub (TN15). Approximately 3.5 m high, 2 m wide, with occasional willow, rose and bramble recorded. Cocksfoot, common ragwort, ribwort plantain and common mugwort were recorded in the ground flora. Litter is abundant.	 Image 16: hedgerow
TN17	The hedgerow to the south of the Phoenix Parkway Road (A1077), is dominated by mature hawthorn, 3 m high and 1.5 m wide. Species recorded in the ground flora include Yorkshire fog, bramble, common hogweed and common mallow.	 Image 17: hedgerow
TN18	Narrow strips of dense scrub are present either side of the Phoenix Parkway Road (A1077), located to the north of hedgerow TN17 and to the south of hedgerow TN16. Species recorded include hazel, sycamore, willow, silver birch, hawthorn, bramble, rose, common gorse (*Ulex europaeus*) and sapling sessile oak (*Quercus petraea*)	 Image 18: dense scrub.

TN19	A field to the south of the Phoenix Parkway Road (A1077) comprises an area of neutral semi-improved grassland. The sward was at a height of less than 30 cm at the time of survey. Species recorded in the sward include tufted hair grass (*Deschampsia cespitosa*), meadow foxtail, cocksfoot, marestail (*Equisetum* sp.), meadow vetchling (*Lathyrus pratensis*), common bird's-foot-trefoil (*Lotus corniculatus*) and white clover.	 Image 19: grassland
TN20	A hedgerow is present along the eastern field boundary of TN19. The hedge is uncut, with dense scrub present making the hedgerow over 3.5 m wide in areas and approximately 2 m high. Hawthorn, blackthorn (*Prunus spinosa*), willow, rose and bramble were recorded. Species present in the ground flora include cocksfoot, ribwort plantain, common ragwort and common mugwort.	 Image 20: hedgerow
TN21	A field to the south of the Phoenix Parkway Road (A1077) is dominated by young, dense willow scrub. The willow trees are of a similar age, growing densely and approximately 4 m high. Occasional young hawthorn, bramble, rose and gorse were also recorded in the scrub. Species recorded in the ground flora include cocksfoot, bramble, compact rush (*Juncus conglomeratus*), soft rush (*Juncus effusus*), common mugwort, ribwort plantain, yarrow, dandelion, meadow buttercup (*Ranunculus acris*), creeping thistle, oxeye daisy and meadowsweet (*Filipendula ulmaria*).	 Image 21: Scrub
TN22	Narrow bands of broadleaved plantation woodland are present to the north and south of the Phoenix Parkway Road (A1077). The bands of plantation woodland border the road and the adjacent Atkinson's Warren Local Nature Reserve (LNR); which the Phoenix Parkway Road transects. To the south of the road, the band of plantation woodland becomes wider in the western section. The majority of trees in the canopy are semi-mature, the south-west section of the woodland has a closed canopy, whereas the canopy is not fully developed to the east and to the north of the road. Species recorded include silver birch, sycamore, rowan and ash. The understory is limited; species recorded include sapling sessile oak and sapling hawthorn. The ground flora is sparse, with abundant bare earth, brash piles and leaf litter. Bramble dominates the ground flora, other species recorded include yarrow and common ragwort. Tree guards are still present around some specimens and where trees have failed.	 Image 22: Plantation woodland

TN23	To the north of the Phoenix Parkway Road (A1077) is a small section of Atkinson's Warren LNR, comprising a semi-natural, broadleaved woodland. Canopy species include mature ash, mature oak (*Quercus* sp.) and mature silver birch trees. The canopy is open, with tree planting (sapling trees with tree guards still present) in the more open areas. The understory is limited with willow, hawthorn, bramble and gorse recorded. The ground flora is dominated by bracken (*Pteridium aquilinum*) which is up to 2 m in height. The area is a Deciduous Woodland Habitat of Principal Importance (HPI). Footpaths are present in the woodland.	 Image 23: Woodland
TN24	Atkinson's Warren LNR is also present to the south of the Phoenix Parkway Road (A1077). The area is comprised of semi-natural broadleaved woodland. Canopy species include mature and semi-mature oak and sycamore. To the east the canopy is closed and the west the canopy is more open. The understory is sparse with rowan, sapling oak, sapling sycamore, rose, silver birch and hawthorn recorded. Leaf litter, bare ground and brash piles are abundant. Species recorded in the ground flora include male fern (*Dryopteris filix-mas*), bramble, bracken, ground ivy, nettle and dog's mercury (*Mercurialis perennis*). The area is classed as a Deciduous Woodland HPI. Multiple footpaths are present.	 Image 24: Woodland
TN25	An area of dense scrub and grassland is present to the north of the Phoenix Parkway Road (A1077), with hawthorn, willow, apple (*Malus* sp.), bramble, young/sapling oak, young rowan, rose, hazel and silver birch recorded in the scrub. False oat grass, Yorkshire fog, cocksfoot, bracken, white campion (*Silene latifolia*), yarrow, viper's bugloss, cow parsley, common ragwort, common mugwort, and meadow buttercup are present in the grassland.	 Image 25: Scrub and grassland
TN26	A short section of watercourse comprising a ditch is present in the area of dense scrub (TN25) to the north of the Phoenix Parkway Road (A1077). The watercourse if a ditch which culverts beneath a path. Approximately 0.75 m wide and less than 0.1 m deep, with a moderate flow from south-east to north-west. The substrate is concrete, the banks are concrete and sloped at a steep gradient (~45°). There is no submerged/emergent vegetation present in the channel. Gorse and bramble scrub is encroaching from the banks. The watercourse was assessed as offering negligible potential for water vole. No suitable habitat for laying-up otter was recorded.	 Image 26: Watercourse
Dragonby Sidings		

TN29	An access track runs from the Normanby Road to the Dragonby Sidings. The verges of track include areas of tall ruderal vegetation, species-poor semi-improved grassland, ephemeral vegetation, dense bramble scrub, scattered, willow scrub, marginal vegetation and areas of hardstanding. For the purposes of this assessment, the dominant habitats were mapped on the Phase 1 Plan (Appendix A). Species recorded in the habitats adjacent to the track include; Yorkshire fog, tufted hair grass, broadleaved dock, teasel, rosebay willowherb, common daisy, creeping buttercup (*Ranunculus repens*), nettle, gorse, butterfly-bush, bramble, rose, willow, hawthorn and sapling ash.	 Image 27: Access track
TN30	A short section, of narrow, shallow, ditch is present to south of the access track. The channel is approximately 0.5 m wide, less than 0.2 m deep and 110 m in length. The banks are earth and sloped at a gentle gradient. No aquatic emergent vegetation was recorded. Marginal vegetation is limited to byrophytes and grasses; Yorkshire fog, cocksfoot, and tufted hair grass. The ditch is situated in a band of dense willow scrub and is fully shaded. No watercourses connect to ditch. Overall, the ditch is unsuitable for water vole and otter. The ditch provides suitable aquatic breeding habitat for amphibians such as common frog and common toad, however the ditch is not considered suitable for great crested newts.	 Image 28: Watercourse
TN31	A short section of ditch is present to the north of the access track. The ditch varies in width from 0.5 to 1.5 m, with a depth of approximately 0.3 m and a length of 120 m. The banks are earth and sloped at a gentle gradient. Emergent vegetation recorded includes soft rush and reed canary grass (*Phalaris arundinacea*). Marginal vegetation includes abundant reed canary grass, occasional soft rush, and grasses; tufted hair grass, cocksfoot. Scattered willow and hawthorn scrub is present occasionally along the channel. No watercourses connect to ditch. Overall, the ditch is unsuitable for water vole and otter. The ditch provides suitable aquatic breeding habitat for amphibians such as common frog and common toad, however the ditch is not considered suitable for great crested newts.	 Image 29: Watercourse
TN32	Land to the south of the access track is dominated by species-poor, semi-improved grassland with a short sward of less than 30 cm. Species frequently recorded in the sward include Yorkshire fog, meadow foxtail (*Alopecurus pratensis*), cocksfoot, false-oat grass, common ragwort, cleavers, forget-me-not (*Myosotis* sp.), cow parsley and nettle. The ground is sloped at a gentle gradient. Underground valves/site infrastructure are scattered across the field.	 Image 30: Grassland

TN33	Areas of the field to the south of the track have been allowed to grow to a greater sward height of approximately 0.6 m. The vegetation in these areas is denser and scattered is present. Species recorded include bramble, teasel, false oat grass, Yorkshire fog, cocksfoot, ribwort plantain, meadow vetchling, red clover, creeping buttercup, yarrow, broad-leaved dock, creeping thistle and coltsfoot (*Tussilago farfara*).	 Image 31: Grassland
TN34	Site infrastructure included solar panels and a building constructed of metal. No features for roosting bats or other protected species were recorded.	 Image 32: Site infrasturcture
TN35	A ditch surrounds the field to the south of the track. The majority of the ditch is dry, however the stretch closest to the access track was wet at the time of survey, with a water depth of less than 0.2 m. The channel is with is approximately 0.5 m and features a plastic lining along the base and banks of the ditch. No aquatic vegetation was recorded, marginal vegetation grows along the banks and in the channel. Species recorded include Yorkshire fog, tufted hair grass, false-oat grass, cocksfoot, creeping buttercup, dandelion and bryophytes. Occasional willow, rose and bramble scrub is present along the channel. The ditch provides suitable aquatic breeding habitat for amphibians such as common frog and common toad, however the ditch is not considered suitable for great crested newts. The plastic lining and scrub provide refuge habitat for amphibians, reptiles, small mammals, and invertebrates.	 Image 33: Watercourse
TN36	Surrounding the access track and in more extensive areas to the south of the access track are mosaic habitats of ephemeral vegetation, dense scrub, and scattered scrub on disturbed, stony ground. Species recorded include young and semi-mature hawthorn, silver birch, stands of gorse, young willow, rose and broom (*Cytisus scoparius*). Species recorded in the ground flora include ribwort plantain, oxeye daisy, broad-leaved dock, daisy, groundsel, and English stonecrop. Areas of open, stony ground were noted as suitable for ground nesting birds; ringed plover (*Charadrius hiaticula*) and little ringed plover (*Charadrius dubius*).	 Image 34 Mosaic habtiats

TN37	The area of to the north of the access track comprises a disused quarry pit which is part of the Conesby Quarry LWS. The sides of the quarry pit are steep and there a large waterbody at the base of the pit (TN40). The area is subject to regeneration and has a mosaic of habitats present including scrub, ephemeral vegetation, grassland, swamp, pooling water, and bare ground. Species recorded include gorse, silver birch, willow, bramble, hawthorn, blackthorn, broom, reed canary grass, soft rush, teasel, broad-leaved dock. There is an access track which is made of bare earth and several smaller trails through the area. Due to the extensive scrub cover and steep gradient of the pit, not all areas were surveyed.	 Image 35: Conesby Quarry LWS
TN38	Large warehouse building and associated yard and car parking are present surrounded by security fencing.	 Image 36: Warehouse and hardstanding
TN39	Section of railway line which is in use.	N/A
TN40	Large drainage pond which is approximately 115 m x 85 m. The area is managed by the Lincolnshire County Council and is part of the Conesby Quarry LWS. It is understood that the water body is drained quarterly as part of the ongoing management of the quarry and that historically, the water body was drained monthly. Conversations with a site manager indicate that the water volume fluctuates rapidly; with the area being dry following drainage, then forming a deep lake in the following months. The substrate and banks are the exposed, bare earth of the quarry pit. No aquatic vegetation was recorded in the waterbody. Marginal vegetation is limited, with patches of scrub present on the eastern banks	 Image 37: Waterbody in the Conesby Quarry LWS

Appendix C – Bat Roost Potential and Habitat Suitability Categories

Guidelines for assessing the potential suitability of proposed development sites for bats, based on the presence of habitat features within the landscape (Collins, 2016).

Suitability	Description of Roosting Habitat	Commuting & Foraging Habitats
Negligible	Negligible habitat features on site likely to be used by roosting bats	Negligible habitat features on site likely to be used by commuting or foraging bats.
Low	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 habitats to be used on a regular basis or by a larger number of bats (i.e. unlikely to be suitable maternity or hibernation). A tree of sufficient size and age to contain potential roosting features but with none seen from the ground, or feature seen with only very limited roosting potential.	Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or unvegetated stream, but isolated i.e. not very well connected to the surrounding landscape by other habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
Moderate	A structure or 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 of high conservation status.	Continuous habitat connected to the wider landscape that could be used by bats for commuting, such as lines of trees and scrub or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging, such as trees, scrub, grassland or water.
High	A structure or 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.	Continuous high quality habitat that is well connected to the wider landscape that is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines of trees and woodland edge. High quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats, such as broadleaved woodland, tree-lined watercourses and grazed parkland. Site is close and connected to known roosts.

Appendix D – Legal Information

This report provides guidance of potential offences as part of the impact assessment. This report does not provide detailed legal advice and for full details of potential offences against protected species the relevant acts should be consulted in their original forms i.e. The Wildlife and Countryside Act, 1981, as amended, The Countryside and Rights of Way Act 2000, The Natural Environment and Rural Communities Act, 2006 and The Conservation of Habitats and Species Regulations 2017.

Species	Legislation	Offences	Notes on licensing procedures and further advice
Species that are protected by European and national legislation			
Badger	Protection of Badgers Act 1992	Wilfully kill, injure or take a badger; Intentionally or recklessly damage, destroy or obstruct access to a badger sett; Disturb a badger in its sett. It is not illegal to carry out disturbance activities in the vicinity of setts that are not occupied.	Where required, licences for development activities involving sett loss, damage or disturbance are issued by Natural England (NE). Licences for activities involving watercourse maintenance, drainage works or flood defences are issued under a separate process. Licences are normally not granted from December to June inclusive because cubs may be present within setts. https://www.gov.uk/badgers-protection-surveys-and-licences
Bats *European protected species*	Conservation of Habitats and Species Regulations 2017 Reg 41	Deliberately[1] capture, injure or kill a bat; Deliberate disturbance[2] of bats; Damage or destroy a breeding site or resting place used by a bat. The protection of bat roosts is considered to apply regardless of whether bats are present.	An NE licence in respect of development is required in England. https://www.gov.uk/bats-protection-surveys-and-licences *European Protected Species: Mitigation Licensing- How to get a licence* (NE 2010) *Bat Mitigation Guidelines* (English Nature 2004) *Bat Workers Manual* (JNCC 2004) *BS8596:2015 Surveying for bats in trees and woodland* (BSI, 2015)
	Wildlife and Countryside Act 1981 (as amended)[4] S.9	Intentionally or recklessly[3] obstruct access to any structure or place used for shelter or protection or disturb a bat in such a place.	Licence from NE is required for surveys (scientific purposes) that would involve disturbance of bats or entering a known or suspected roost site.

Species	Legislation	Offences	Notes on licensing procedures and further advice
Birds	Conservation of Habitats and Species (Amendment) Regulations 2012	N/A	Authorities are required to take steps to ensure the preservation, maintenance and re-establishment of a sufficient diversity and area of habitat for wild birds in the United Kingdom, including by means of the upkeep, management and creation of such habitat. This includes activities in relation to town and country planning functions.
	Wildlife and Countryside Act 1981 (as amended)[4] S.1	Intentionally kill, injure or take any wild bird; Intentionally take, damage or destroy the nest of any wild bird while that nest is in use or being built; Intentionally take or destroy the nest or eggs of any wild bird. **Schedule 1 species** Special penalties are liable for these offences involving birds on Schedule 1 (e.g. most birds of prey, kingfisher, barn owl, black redstart, little ringed plover). Intentionally or recklessly[3] disturb a Schedule 1 species while it is building a nest or is in, on or near a nest containing eggs or young; intentionally or recklessly disturb dependent young of such a species.	No licences are available to disturb any birds in regard to development. Licences are available in certain circumstances to damage or destroy nests, but these only apply to the list of licensable activities in the Act and do not cover development. General licences are available in respect of 'pest species' but only for certain very specific purposes e.g. public health, public safety, air safety. https://www.gov.uk/wild-birds-protection-surveys-and-licences https://www.gov.uk/prevent-wild-birds-damaging-your-land-farm-or-business
Great crested newt *European protected species*	Conservation of Habitats and Species Regulations 2017 Reg 41	Deliberately[1] capture, injure or kill a great crested newt; Deliberate disturbance[2] of a great crested newt; Deliberately take or destroy its eggs; Damage or destroy a breeding site or resting place used by a great crested newt.	Licences issued for development by NE. https://www.gov.uk/great-crested-newts-protection-surveys-and-licences *European Protected Species: Mitigation Licensing - How to get a licence* (NE 2010) *Great Crested Newt Mitigation Guidelines* (English Nature 2001)
	Wildlife and Countryside Act 1981 (as amended)[4] S.9	Intentionally or recklessly[3] obstruct access to any structure or place used for shelter or protection or disturb a great crested newt in such a place.	Licences issued for science (survey), education and conservation by NE.
Otter	Conservation of Habitats and Species	Deliberately[1] capture, injure or kill an otter; Deliberate disturbance[2] of otters;	Licences issued for development by NE. https://www.gov.uk/otters-protection-surveys-and-licences

Species	Legislation	Offences	Notes on licensing procedures and further advice
European protected species	Regulations 2017 Reg 41	Damage or destroy a breeding site or resting place used by an otter.	*European Protected Species: Mitigation Licensing- How to get a licence* (NE 2010)
	Wildlife and Countryside Act 1981 (as amended)[4] S.9	Intentionally or recklessly[3] obstruct access to any structure or place used for shelter or protection or disturb an otter in such a place.	No licence is required for survey in England. However, a licence would be required if the survey methodology involved disturbance.
Reptiles (species that are not European protected): **Common lizard** **Grass snake** **Slow worm**	Wildlife and Countryside Act 1981 (as amended)[4] S.9(1) (part); S.9(5)	Intentionally kill or injure any common reptile species.	No licence is required in England. However an assessment for the potential of a site to support reptiles should be undertaken prior to any development works which have potential to affect these animals. https://www.gov.uk/reptiles-protection-surveys-and-licences
Water vole	Wildlife and Countryside Act 1981 (as amended)[4] S.9	Intentionally kill, injure or take water voles; Intentionally or recklessly[3] damage, destroy or obstruct access to any structure or place used for shelter or protection; Disturb a water vole in such a place.	No licence is required for survey in England, unless you are likely to commit an action that is otherwise illegal. There are currently no licensing purposes that explicitly cover development activities or activities associated with the improvement or maintenance of waterways. However when a proposed lawful activity has no opportunity to retain water voles within a development site and their translocation would result in a conservation benefit then a licence from NE may be obtained. *The Water Vole Conservation Handbook* (R. Strachan, T. Moorhouse & M. Gelling, Wildlife Conservation Research Unit (WildCRU), 3rd Edition 2011). https://www.gov.uk/water-voles-protection-surveys-and-licences Water voles and licensing policy -NE Technical Information Note TIN042 2008
Other species			

Species	Legislation	Offences	Notes on licensing procedures and further advice
Rabbits, foxes and other wild mammals **For BAP species and Species of Principal Importance, see below**	Wild Mammals (Protection) Act 1996	Intentionally inflict unnecessary suffering to any wild mammal.	Natural England provides guidance in relation to rabbits (Technical Information note TIN003, Rabbits- management options for preventing damage, July 2007) and foxes (which are also protected under the Wildlife and Countryside Act 1981 from live baits and decoys, see Species Information notes SIN003 (2011), *Urban foxes* and SIN004 (2011) *The red fox in rural areas* as well as other wild mammals. Lawful and humane pest control of these species is permitted.

[1]Deliberate capture or killing is taken to include "accepting the possibility" of such capture or killing

[2]Deliberate disturbance of animals includes in particular any disturbance which is likely a) to impair their ability (i) to survive, to breed or reproduce, or to rear or nurture their young, or (ii) in the case of animals of hibernating or migratory species, to hibernate or migrate; or b) to affect significantly the local distribution or abundance of the species to which they belong.
Lower levels of disturbance not covered by the Conservation of Habitats and Species Regulations 2017 remain an offence under the Wildlife and Countryside Act 1981 although a defence is available where such actions are the incidental result of a lawful activity that could not reasonably be avoided. Thus deliberate disturbance that does not result in either (a) or (b) above would be classed as a lower level of disturbance.

[3]The term 'reckless' is defined by the case of Regina versus Caldwell 1982. The prosecution has to show that a person deliberately took an unacceptable risk, or failed to notice or consider an obvious risk.

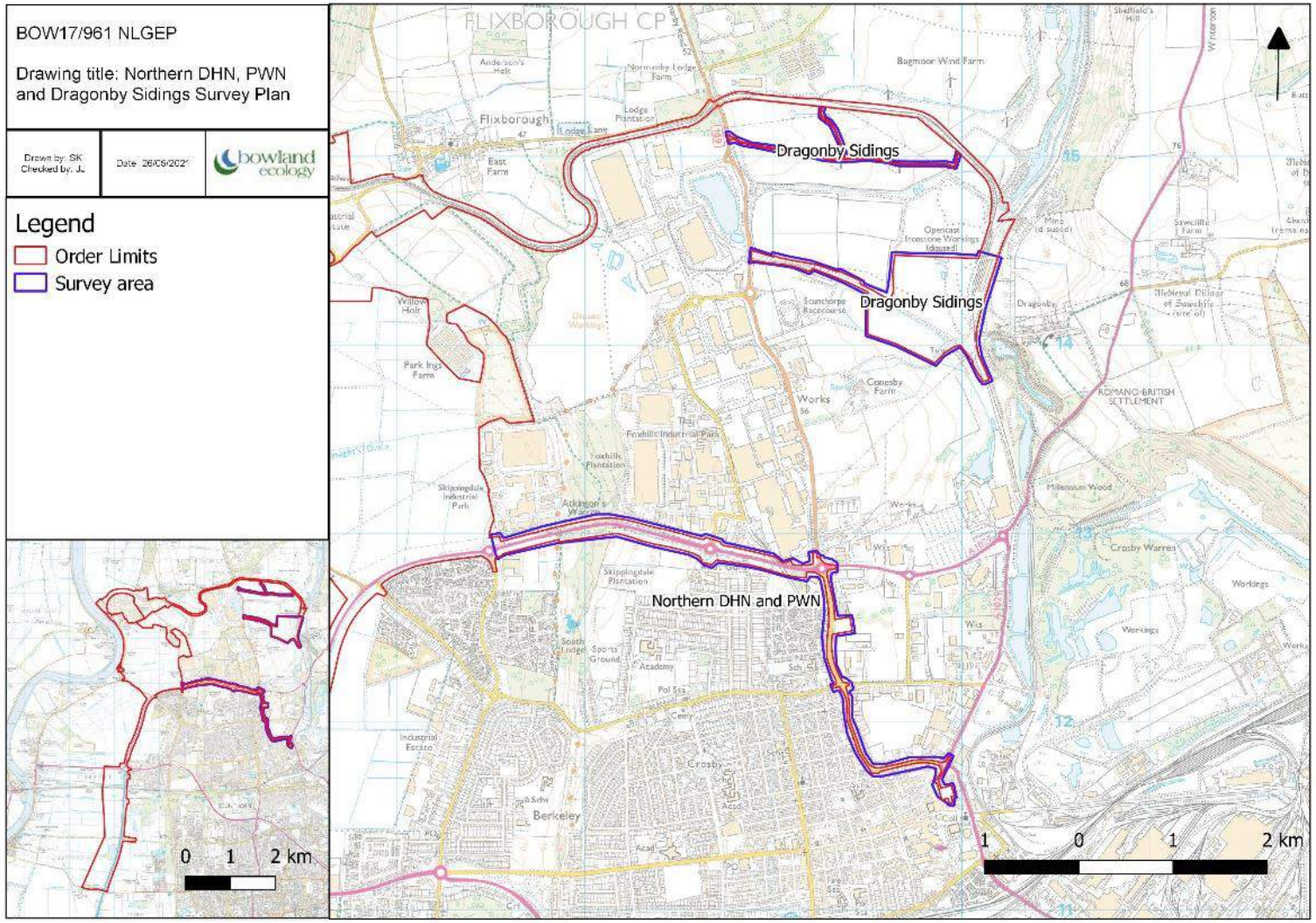
[4] The Wildlife and Countryside Act (1981) has been updated by various amendments, including the Countryside and Rights of Way Act 2000 and the Natural Environment and Rural Communities Act 2006. A full list of amendments can be found at http://jncc.defra.gov.uk/page-1377.

Site Designation	Legislation	Protection	Guidance
Special Area of Conservation (SAC) **Special Protection Area (SPA)** **Wetland of International Importance (Ramsar site)**	Conservation of Habitats and Species Regulations 2017 Conservation of Habitats and Species (Amendment) Regulations 2012 EC Directive on the conservation of natural habitats and of wild fauna and flora (92/42/EEC). EC Directive on the conservation of wild birds (79/409/EEC). Convention on Wetlands of International Importance especially as Waterfowl Habitat 1971 (the Ramsar Convention).	Planning controls are effected through Part 2 of the Conservation of Habitats and Species regulations 2017 (Reg 21) and Part 6 (Regs 61- 67). The legislation for the Site of Special Scientific Interest which will underpin each designation also applies. These sites are given protection through policies in the Local Development Plan.	Formal Appropriate Assessment is required before undertaking, or giving consent, permission or other authorisation for a plan or project which is likely to have a significant effect on such a site. Further guidance can be found in the National Planning Policy Framework and the accompanying joint Circular (ODPM Circular 6/2005 & Defra Circular 01/2005), which is still valid. Consent under S28 is required from NE for actions likely to damage a SSSI. The Conservation of Habitats and Species Regulations (Amendment) 2012 simplifies the Regulations in the case of a European site which is also a SSSI. All applications for carrying out operations on such as site are now made under S28 of the WCA.
Site of Special Scientific Interest (SSSI)	Wildlife and Countryside Act 1981 (as amended)	It is an offence to carry out or permit to be carried out any potentially damaging operation. SSSIs are given protection through policies in the Local Development Plan.	Owners, occupiers, public bodies and statutory undertakers must give notice and obtain the appropriate consent under S.28 before undertaking operations likely to damage a SSSI. S.28G places a duty on all public bodies to further the conservation and enhancement of SSSIs. Further guidance can be found in the National Planning Policy Framework and the accompanying joint Circular (ODPM Circular 6/2005 & Defra Circular 01/2005) England, which is still valid.
Local Nature Reserve (LNR)	National Parks and Access to the Countryside Act 1949 S.21	LNRs are given protection through policies in the Local Development Plan.	LNRs are generally owned and managed by local authorities. Development proposals that would potentially affect a LNR would need to provide a detailed justification for the work, an assessment of likely impacts, together with proposals for mitigation and restoration of habitats lost or damaged. Further guidance can be found in the National Planning Policy Framework and the accompanying joint Circular (ODPM Circular 6/2005 & Defra Circular 01/2005), which is still valid.

Site Designation	Legislation	Protection	Guidance
Local Sites	There is no statutory designation for Local Sites.	Local Sites are given protection through policies in the Local Development Plan.	Development proposals that would potentially affect a Local Site would need to provide a detailed justification for the work, an assessment of likely impacts, together with proposals for mitigation and restoration of habitats lost or damaged. Further guidance can be found in the National Planning Policy Framework and the accompanying joint Circular (ODPM Circular 6/2005 & Defra Circular 01/2005), which is still valid.

Habitats & Species	Legislation	Guidance
Species and Habitats of Principal Importance for the Conservation of Biodiversity	Natural Environment & Rural Communities Act 2006 S.40 (which superseded S.74 of the Countryside & Rights of Way Act 2000).	S.40 of the NERC Act 2006 sets out the duty for public authorities to conserve biodiversity in England. Habitats and species of principal importance for the conservation of biodiversity are identified by the Secretary of State in consultation with NE, are referred to in S.41 of the NERC Act for England. The list of habitats and species was updated in 2008: http://webarchive.nationalarchives.gov.uk/20140605090108/http:/www.naturalengland.org.uk/ourwork/conservation/biodiversity/protectandmanage/habsandspeciesimportance.aspx The habitats and species listed are not necessarily of higher biodiversity value, but they may be in decline. Habitat Action Plans and Species Action Plans are written for them or are in preparation, to guide their conservation. Ecological impact assessments should include an assessment of the likely impacts to these habitats and species.
Hedgerows	The Hedgerow Regulations 1997	Under the regulations, it is against the law to remove or destroy hedgerows that are classified as "important" under the regulations without permission from the local planning authority. The regulations apply if a hedgerow is in or runs alongside agricultural land, common land including town or village greens, land used for forestry or for the breeding or keeping of horses etc, a local nature reserve or Site of Special Scientific Interest. A hedgerow can be classified as 'Important' due to its wildlife and landscape value or due to its heritage value. In general, permission will be required before removing hedges that are at least 20 metres in length, over 30 years old and contain certain species/diversity of plant. The local planning authority will assess the importance of the hedgerow using criteria set out in the regulations. See Defra and Natural England websites for further guidance and information.
Japanese knotweed,	Wildlife and Countryside Act 1981 (as amended) S.14	It is illegal to plant these species or otherwise cause them to grow or spread in the wild. Any contaminated soil or plant material containing Japanese knotweed or giant hogweed is classified as controlled waste and should be disposed of in a suitably licensed landfill site, accompanied by appropriate Waste Transfer documentation, and must comply with section 34 of the Environmental Protection Act 1990. *The Knotweed Code of Practice* (Environment Agency, 2013) *Managing and controlling invasive rhododendron* (Forestry Commission, 2006) *Guidance on Section 14 of the Wildlife and Countryside Act, 1981* (Defra, 2010)

Appendix E – Survey Areas Plan



APPENDIX C AMPHIBIAN SURVEY REPORT

Date: March 2022

North Lincolnshire Green Energy Park

Technical Appendix C - Amphibian Survey Report

November 2021

Control sheet

[redacted]	Unit 8, Second Floor Holmes Mill, Greenacre Street Lancashire, BB7 1EB. 01200 446777 Unit 2 Dye Works, New Lanark, ML11 9DB. 01555 438880
Job number:	BOW17.961
Title:	NLGEP Techincal Appendix C - Amphibian Survey Report
Client:	North Lincolnshire Green Energy Park Ltd
Prepared by:	Sophie King, *Ecologist* Claire Wilson*, Principal Ecologist* Sarah Birtley, *Senior Ecologist*
Checked by:	Dr Ed Mountford, *Associate Principal Ecologist*
Date of Issue:	November 2021
Version:	2
Revisions:	Update plans and text where relevant to changes in the Order Limits
Status:	FINAL

This report is prepared by Bowland Ecology Ltd for the sole and exclusive use of North Lincolnshire Green Energy Park Ltd in response to their particular instructions. No liability is accepted for any costs, claims or losses arising from the use of this report or any part thereof for any purpose other than that for which it was specifically prepared or by any party other than North Lincolnshire Green Energy Park Ltd.

This report has been prepared by an ecological specialist and does not purport to provide legal advice. You may wish to take separate legal advice.

The information which we have prepared and provided is true and has been prepared and provided in accordance with the BS42020:2013 and the Chartered Institute of Ecology and Environmental Management's Code of Professional Conduct. We confirm that the opinions expressed are our true and professional bona fide opinions.

Bowland Ecology is accredited to Quality Guild (QG) standards in respect of our Quality, Environmental and Health and Safety procedures. The QG is an independent externally audited and accredited system that has been developed according to the principles of ISO9001, ISO14001 and OHAS18001.

[redacted]	Signed (QA) [redacted]

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1. Introduction

1.1 Bowland Ecology Ltd was commissioned to undertake surveys of ponds, including Habitat Suitability Index (HSI) surveys, environmental DNA (eDNA) surveys, presence/absence surveys and population surveys in respect of great crested newt (*Triturus cristatus*). Surveys inform the North Lincolnshire Green Energy Park (NLGEP) ('the Project'), a Nationally Significant Infrastructure Project (NSIP) located at Flixborough, North Lincolnshire. For the purposes of this report, the areas within the Project Order Limits are split into the following subsections:

- the Energy Park Land - an area within the Order Limits containing the core elements of the Project (Energy Recovery Facility, CO_2 capture, ash treatment and concrete block manufacturing facility, plastic recycling facility, visitor centre, hydrogen production and re-fuelling station), located north of Ferry Road West (B1216);

- the Railway Reinstatement Land - reinstatement of the existing 6 km Dragonby to Flixborough branch line and construction and operation of a new railhead to the south of Flixborough Wharf, with the primary purpose of facilitating the delivery and export of materials to and from the Energy Park;

- the Northern District Heat and Private Wire Network (DHPWN) Land – running from the southern end of the Energy Park Land, east along the A1077 (Phoenix Parkway) before looping around Normanby Road (Option A) or Bessermer Way (Option B) to the east; and

- the Southern DHPWN Land - running from the southern end of the Energy Park where the B1216 (Ferry Road West) joins, extending south through the agricultural land on the west side of the A1077. Both DHPWN will support the same buried utilities infrastructure; comprising insulated supply and return pipework for heat and cabling to supply electrical power.

1.2 The Energy Park Land, located east of the River Trent, includes areas of the RMS Ports and occupied land within the Flixborough Industrial Estate, within which three bodies of standing water were recorded. Arable farmland is the dominant habitat within the Energy Park Land and features a network of interconnected arable field drains and associated marginal vegetation. This subsection also includes a mosaic of semi-natural habitats which includes dense hawthorn and willow scrub, scattered mature trees, hedgerows, extensive bracken cover, areas of dry swamp habitat dominated by common reed (*Phragmites australis*), a small area of semi-improved acid grassland, tall ruderals, and species-poor semi-improved grassland. Five bodies of standing water are present in this mosaic habitat.

1.3 The Railway Reinstatement Land is a disused mineral railway spur which runs from Flixborough Wharf to Dragonby Rail Sidings. Habitats are dominated by scattered, dense and continuous scrub, with areas of deciduous woodland, grassland, and disturbed ground. Conesby Quarry Local Wildlife Site (LWS) is adjacent to the eastern section of the railway and comprises a disused quarry pit that features a large drainage pond and areas of wetland.

1.4 The Northern DHPWN Land is dominated by hardstanding (roads), alongside adjacent hedgerows, grassland, deciduous woodland, dense and scattered scrub and allotments. The Phoenix Parkway Local Nature Reserve (LNR) and Local Wildlife Site (LWS) and The Atkinson's Warren LNR/LWS are adjacent to the Northern DHPWN Land. To the

east and south, the adjacent habitats include hardstanding, buildings, gardens, ornamental planting and small areas of scrub and tall ruderal vegetation.

1.5 The Southern DHPWN Land is largely dominated by arable farmland, with associated field margins, arable field drains and marginal vegetation. There are small areas of plantation and semi-natural deciduous woodland scattered along the route. Adjacent to the Order Limits, the easement of the M181 features reinforced lateral drains which were recorded as dry ditches at the time of survey.

1.6 The purpose of the surveys was to undertake HSI assessments, eDNA surveys and traditional presence/absence and population assessment survey for great crested newts at ponds and ditches within Application Land and a 0.25 km buffer. The location of the ponds/ditches is shown on the Pond Location Plan in Appendix B. This report includes a description of survey methods and survey results.

2. Methodology

2.1 Surveys of ponds/ditches were undertaken to produce a Habitat Suitability Index (HSI) for great crested newt (GCN) in accordance with Oldham *et. al.* (2000). The HSI methodology is a requirement of the European Protected Species (EPS) licencing procedure to support method statements for licence applications; it is therefore considered appropriate to include this survey methodology in assessing pond suitability.

2.2 The methodology for the amphibian presence/absence survey followed Natural England's Great Crested Newt Mitigation Guidelines (Natural England, 2001). The aim of the survey was to establish presence/probable absence of GCN within the ponds/ditches, and, if present, to provide an estimate of population size of GCN.

2.3 Natural England's GCN licensing method statement template (Form WML-A14-2 (version November 2017) advises that, for developments resulting in permanent or temporary habitat loss at distances over 0.25 km from the nearest pond, careful consideration should be given to whether a survey is appropriate. Although the species may use suitable terrestrial habitat up to 0.5 km from a breeding pond, in this instance a 0.25 km search radius was considered appropriate due to the likely small scale habitat loss in close proximity to pond/ditches within 0.25 km of the Order Limits.

2.4 Local records on and within 5 km of the Order Limits were obtained following a data search with Greater Lincolnshire Nature Partnership (GLNP)[1] in April 2021.

2.5 The GCN field surveys were undertaken by Dr Phil Eades (Natural England Class Licence No: 2015-18581-CLS-CLS), Jack Sykes BSc (Hons) (Natural England Class Licence No. 2015-16859-CLS-CLS), Sophie King MSc, BSc, Catrin Watkin MRes, BSc (Hons), Helena Davies BSc (Hons), Luke Hall BSc (Hons), Jordan Simpson BSc, and Sam Robinson BA. GCN surveys were carried out under direction from Jeremy James (Natural England Class License Number: 2015-17546-CLS-CLS).

2.6 The initial surveys were undertaken on six occasions between May and mid-June 2019. As the Project evolved, additional ponds were surveyed between March and June 2021, with up to six visits completed. A combination of survey techniques was used, including terrestrial searching, egg searches, torch survey (nocturnal) and bottle trapping. Where possible and practical, three or more survey techniques were used to increase the chance of detecting amphibians. Where GCN were not detected after four survey visits, the pond was not taken forward for further survey/population assessment (as recommended in the guidelines; English Nature, 2001). In addition, where the eDNA testing returned a negative result for GCN, the pond/ditch was not taken forward for further survey. The weather conditions at each visit are detailed in Table 1 below:

Table 1. *Survey weather conditions*

Visit	Date	Weather Conditions	Surveyors
1a	06.05.2019/07.05.2019	Cool with light rain and a very light breeze; air temperature 5°C.	Dr Phil Eades
2a	13.05.2019/14.05.2019	Mild and clear with a gentle breeze; air temperature 11°C.	Dr Phil Eades
3a	20.05.2019/21.05.2019	Clear and dry with a light breeze; air temperature 12°C.	Dr Phil Eades
4a	27.05.2019/28.05.2019	Cloudy with light showers and a slight breeze; air temperature 10°C.	Dr Phil Eades

[1] Records from 2000 onwards are included within this report.

5a	03.06.2019/04.06.2019	Clear, mild and calm; air temperature 13°C.	Jack Sykes
6a	10.06.2019/11.06.2019	Dry, cloudy and mild with a moderate breeze; air temperature 12°C.	Jack Sykes
1b	16.03.2021/17.03.2021	Dry, overcast, with a light breeze; air temperature 8°C.	Sophie King Luke Hall
2b	30.03.2021/31.03.2021	Dry, clear, gentle breeze; air temperature 8°C.	Sophie King Catrin Watkins
3b	26.04.2021/27.04.2021	Overcast, light rain and a slight breeze; air temperature 7°C.	Helena Davies Sam Robinson
4b	11.05.2021/12.05.2021	Warm, dry, overcast; air temperature 11°C.	Luke Hall Jordan Simpson
5b	17.05.2021/18.05.2021	Warm, clear, dry with a slight breeze; air temperature 13°C.	Helena Davies Jack Taylor
6b	02.06.2021/03.06.2021	Warm, sunny, dry with a slight breeze; air temperature 15°C.	Sophie King Sam Robinson

2.7 eDNA analysis of water collected from Ponds 8, 17, 20, 21, 22, 26, 27, 33, 34, 35 and Ditch 3 was undertaken to determine presence/absence of GCN. Sampling methods followed those outlined in Biggs et al. (2015). Pond water samples of Pond 8 were taken by Claire Wilson (Natural England Class Licence Number: 2015-17308-CLS-CLS) on the 15th of April 2019 and sent to FERA, a Natural England accredited laboratory for eDNA analysis, to determine the presence/absence of GCN. Pond water samples of ponds 26 and 27 were undertaken by Sophie King MSc, BSc and Fiona Shuttle (Natural England Class License Number: 2020-44346-CLS-CLS) on the 10th of June 2020. Water samples of Ponds 17, 20, 21, 22, 23, 33, 34, 35 and Ditch 3 were undertaken by Helena Davies BSc and Sam Robinson BA under direction from Jeremy James (Natural England Class License Number: 2015-17546-CLS-CLS) on the 14th of April 2021.

2.8 Bottle trapping was employed on most occasions. However, this was not always possible due to the shallow nature of some of the ponds. Survey techniques used for each feature are shown in table 2 below.

Table 2. *Survey techniques*

Pond No.	eDNA	Presence / Absence Survey	GCN Population Assessment Survey	Notes
P1	N/S	N/S	N/S	
P2	N/S	Egg/net search, bottle trapping (20 traps), torch survey.	N/S	Not taken forward for population assessment as no GCN recorded during the first 4 visits.
P3	N/S	Egg/net search, bottle trapping (10 traps), torch survey.	Egg/net search, bottle trapping (10 traps), torch survey.	
P4	N/S	Egg/net search, bottle trapping (30/40 traps), torch survey.	Egg/net search, bottle trapping (30/40 traps), torch survey.	
P5	N/S	Torch, egg and net survey	N/S	Not taken forward for population assessment as no GCN recorded during the first 4 visits.
P6	N/S	Torch, egg and net survey	Dry	Not taken forward for population assessment as pond dried out, despite GCN being recorded as present.
P7	N/S	Bottle trapping (10 traps), torch survey, net survey, and egg search	Bottle trapping (10 traps), torch survey, net	

			survey, and egg search	
P8	Negative	N/S	N/S	Not taken forward for further survey due to negative eDNA result and access restrictions.
P9	N/S	Bottle trapping (10 traps), torch survey, net survey, and egg search	N/S	Not taken forward for population assessment as no GCN recorded during the first 4 visits.
P10	N/S	Bottle trapping (10 traps), torch survey, net survey, and egg search	N/S	Not taken forward for population assessment as no GCN recorded during the first 4 visits.
P11	N/S	Torch, egg and net survey	Dry	Not taken forward for population assessment as pond dried out, despite GCN being recorded.
P12	N/S	N/S		Pond is a slurry pit and so not taken forward for survey.
P13	N/S	N/S	N/S	Pond is densely stocked with fish and so not taken forward for further survey.
P14	N/S	N/S	N/S	A very dense reed bed with only very small area of water which was inaccessible.
P15	N/S	Bottle trapping (10 traps), torch survey, net survey, and egg search	Bottle trapping (10 traps), torch survey, net survey, and egg search	
P16	N/S	Torch, egg and net survey	N/S	Not taken forward for population assessment as no GCN recorded during the first 4 visits.
P17	Positive	N/S	N/S	eDNA sample conducted on one occasion, no further surveys due to health and safety concerns. Conversations with site manger indicate that a breeding population of GCN is present.
P18	N/S	N/S	N/S	Pond inaccessible for survey.
P19	N/S	Bottle trapping (35 traps), torch survey, terrestrial and egg search	Bottle trapping (35 traps), torch survey, terrestrial and egg search	Stocked fishing pond, only 3 visits conducted, no further surveys were undertaken following the return of a negative eDNA results.
P20	Negative	Bottle trapping (30 traps), torch survey, terrestrial and egg search	N/S	Stocked fishing pond, only 3 visits conducted, no further surveys were undertaken following the return of a negative eDNA results.
P21	Negative	Bottle trapping (32 traps), torch survey, terrestrial and egg search	N/S	No further surveys were undertaken following the return of a negative eDNA results.
P22	Positive	Bottle trapping (37 traps), torch survey, terrestrial and egg search	Bottle trapping (37 traps), torch survey, terrestrial and egg search	No further surveys were undertaken following the return of a negative eDNA results.
P23	N/S	N/S	N/S	Dry at time of survey, pond is a damp depression that may provide suitable habitat during wet periods
P24	N/S	N/S	N/S	Dry at time of survey, pond is a damp depression that may provide suitable habitat during wet periods
P25	N/S	N/S	N/S	Dry at time of survey, pond is in a damp depression that may provide suitable habitat during wet periods

P26	Positive	N/S	N/S	Not taken forward for further survey despite GCN presence detected, due to access restrictions.
P27	Negative	N/S	N/S	Not taken forward for further survey following a negative eDNA result
P28	N/S	N/S	N/S	Not taken forward for survey due to access restrictions.
P29	N/S	N/S	N/S	Not taken forward for survey due to access restrictions.
P30	N/S	N/S	N/S	Not taken forward for survey due to access restrictions.
P31	N/S	N/S	N/S	Scoped out of assessment as the pond is located to the east of the M181 which presents a major barrier for commuting GCN/amphibians.
P32	N/S	N/S	N/S	Scoped out of assessment as the pond is located to the east of the M181 which presents a major barrier for commuting GCN/amphibians.
P33	Negative	Bottle trapping (30 traps), torch survey, terrestrial and egg search	N/S	Stocked fishing pond, only 3 visits conducted, no further surveys were undertaken following the return of a negative eDNA results.
P34	Negative	Bottle trapping (25 traps), torch survey, terrestrial and egg search	N/S	Stocked fishing pond, only 3 visits conducted, no further surveys were undertaken following the return of a negative eDNA results.
P35	Negative	Bottle trapping (27 traps), torch survey, terrestrial and egg search	N/S	Large numbers of fish present, only 3 visits conducted, no further surveys were undertaken following the return of a negative eDNA results.
D1	N/S	Bottle trapping (20 traps), torch survey, net survey, and egg search		Not taken forward for population assessment as no GCN recorded during the first 4 visits.
D2	N/S	Bottle trapping (20 traps), torch survey, net survey and egg search	Bottle trapping (20 traps), torch survey, net survey, and egg search	
D3	Negative	N/S	N/S	Not taken forward for further survey following a negative eDNA result

Survey Limitations

2.9 The following limitations were noted during the amphibian surveys;

- Pond 1 was not subject to amphibian presence/absence surveys as the sides of the pond are very steep, deep and covered with a geotextile membrane limiting access to the water's edge;
- Ponds 6 and 7 had confirmed GCN presence, however a population assessment was not possible as the ponds dried out before the survey period was complete;
- Pond 12 was not surveyed as the pond is a slurry pit;
- Pond 13 was not surveyed as it was found to be densely stocked with fish;
- Pond 14 was not surveyed as it is mainly a very dense reed bed with only very small areas of inaccessible open water;
- Pond 17 is a large water body in the Conesby Quarry LWS that has steep and unstable banks, making it unsafe for bottle trapping. eDNA sampling and one torch survey were conducted;
- Pond 19 is located on the steep banks of the Conesby Quarry LWS and was not accessible for survey;
- Ponds 23-25 were dry at the time of survey;

- Pond 26 was subject to eDNA sampling which returned a positive result for GCN. The pond was not taken forward for further population assessment due to access restrictions;
- Ponds 28-30 were not surveyed due to access restrictions;
- Ponds 31 and 32 were scoped for survey following an assessment of impacts. The ponds are located to the east of the M181, a major road which acts as a barrier to commuting amphibians. As the working footprint will be limited to the west of the road, it is highly unlikely that any amphibians present will be directly impacted by the works;
- Pond 36 was not surveyed following a HSI which indicated that the waterbody has poor suitability for GCN. In addition, as the waterbody is located on hardstanding within an Industrial Estate, bottle trapping would not be possible; and
- Unusually cold over-night temperatures during April 2021 meant that bottle trapping was only possible on one occasion during the month. However, three visits were conducted during suitable weather between mid-April and mid-May (as recommended in the guidelines; English Nature, 2001).

2.10 The above limitations of the ponds are not considered to have a significant impact on the overall results, as the surveys were completed within the appropriate timeframe and the remainder of the ponds fully accessible. As such, a comprehensive assessment of the ponds to support amphibians has been undertaken.

3. Results

Desk Study

3.1 The desk study returned 242 records of GCN from within 5 km of the Order Limits. The records include results from the presence/absence eDNA sampling, as well as traditional survey methods; bottle trapping, torching, egg searching, netting and terrestrial searching. A peak count of 236 GCN was returned from a record located at a minimum distance of 2.36 km southeast of the Project.

3.2 The desk study results were analysed in more detail at the small spatial scale of 0.5 km from the Order Limits, as this is generally considered the maximum commuting distance of GCN from a breeding pond (English Nature, 2001). The following records were returned from within 0.5 km of each Order Limit subsection:

- the Energy Park Land returned 11 records of GCN, all of which are in the Phoenix Parkway LNR. A peak count of 44 GCN was recorded in 2018, the closest record is located 0.13 km east of the Order Limits;
- the Railway Reinstatement Land returned 182 records of GCN within 0.5 km. The records were returned from three distinct areas; the Conesby Quarry and associated Dragonby Sidings; the Foxhills Industrial Estate; and immediately south of the railway line in the Bagmoor Wind Farm. A peak count of 126 adult GCN was returned from a survey in the Conesby Quarry LWS;
- the Northern DHPWN Land returned no records of GCN within 0.5 km. The desk study included results of an eDNA test conducted in 2018, 0.17 km east of the Order Limits, which returned a negative result for GCN. A review of aerial satellite imagery and Ordnance survey maps did not identify a pond at this location, suggesting that only a small or transient water body may be present; and
- the Southern DHPWN Land returned no records of GCN from within 0.5 km. The closest records are located 1.4 km northeast of the Southern DHPWN Land, within the Phoenix Parkway LNR.

3.3 Other amphibian species returned by the desk study which were recorded on or within 0.5 km of the Order Limits include smooth newt (*Lissotriton vulgaris*), common toad (*Bufo bufo*), and common frog (*Rana temporaria*).

Field Survey

3.4 There are 36 ponds and three ditches located on/within 0.25 km of the Order Limits. Appendix B shows their location and Appendix C includes photographs of each pond/ditch.

3.5 There are 11 ponds on or within 0.25 km of the Energy Park Land:

- Pond 1 is a large (35 m x 30 m), very deep, surface water drainage pond within the industrial estate. The pond is lined with a geotextile type material with steep banks and no aquatic vegetation. The pond is surrounded by scattered scrub and fencing on the margins;
- Pond 2 is approximately 35 m x 10 m, very deep and is a surface water drainage pond within the industrial estate. It receives water from the adjacent yard and has a large outlet that is likely pumped into Pond 1. The pond has a dense cover of common reed, is relatively turbid with some open water and steep banks of compacted mud and gravel;

- Pond 23 is a small area of wet ground, dominated by sedges. There is pooling water up to 10 cm in depth. The substrate is earth, and the area of standing water has no banks;
- Pond 24 is an area of pooling water situated within an area of dense bracken growth. Approximately 10 m x 10 m with a water depth of up to 20 cm. The water is clear, and the substrate is earth. Aquatic vegetation comprises reedmace (*Typha* sp.), however stands of soft rush (*Juncus effusus)* grow in raised tussocks across the pond. No bank is present;
- Pond 25 is a small area of standing water, comprising a depression in the ground which is dominated by yellow iris (*Iris pseudacorus*). Approximately 6 m x 5 m, with a water depth of under 10 cm;
- Pond 26 is a large pond located partially within the Order Limits, in an area of dense scrub. The pond is approximately 75 m x 15 m, and over 0.5 m deep. The banks are predominantly exposed earth. The pond is turbid with no aquatic vegetation. Willow scrub (*Salix* sp.) provides 100% shaded cover of the pond and there is abundant leaf litter in and around the pond;
- Pond 27 is situated within an area of dense willow scrub. Approximately 6 m x 6 m, circular and shallow, under 10 cm deep, with clear water, an earth substrate, and no defined bank. The pond is fully shaded by a semi mature willow tree. No aquatic vegetation was noted; however grasses are submerged indicating that the pond regularly dries out; and
- Pond 28 is located adjacent to the Order Limits, within a neighbouring property which is a commercial poultry farm. Access was not agreed; however the pond was observed from the adjacent land. The pond was recorded as being, rectangular, approximately 160m^2, with very turbid water. The banks are largely exposed earth with no aquatic vegetation present. Shading is present along 20% of the banks. A HSI was conducted of the pond, however as access was limited, no further amphibian surveys were completed;
- Pond 29 is located next to Pond 28. Access was not agreed for survey; however the pond was observed from a distance as being rectangular, 550m^2 in size, deep with turbid water. Reedmace was noted on the north and east margins however no other aquatic vegetation was present. A HSI was conducted of the pond, however as access was limited, no further amphibian surveys were completed;
- Pond 30 is also located in the commercial poultry farm adjacent to the Order Limits. The pond was not visible from the boundary of the property; however satellite imagery indicates that it is small, approximately 125m^2 with partial shading of the banks by trees and scrub. Due to access limitations no HSI assessment or further amphibian surveys were conducted; and
- Pond 36 is an area of standing water located within the Flixborough Industrial Estate on an area of hardstanding. The topography of the area indicated that this is a natural low point within the Industrial Estate, and water from hardstanding will run into this area. Construction materials including steel, timbers, and piles of aggregates are scattered throughout the area.

3.6 The following 23 ponds/ditches were brought forward for further survey along the Railway Reinstatement Land. A total of 15 ponds and two large ditches are located within 0.25 km; an additional six ponds are located just outside of the 0.25 km buffer:

- Pond 3 is narrow, approximately 50 m x 10 m and surrounded by dense young alder (*Alnus glutinosa*) and bramble (*Rubus fruticosus* agg.) scrub. The pond is mostly open, but with a small area of reedmace (*Typha latifolia*) swamp at the western side;

- Pond 4 is a moat-like pond with a central island; the water body in total is approximately 250 m x 10 m in extent. The pond supports large areas of reedmace and common reed along the margins. Open areas have abundant submerged aquatic vegetation. The pond is situated in an area of mixed scrub and unmanaged grassland. Newt exclusion fencing is located approximately 30 m to the south of the pond on the edge of an adjacent development site;
- Pond 5 is a shallow flash near the corner of an access road, on flat ground. It is a maximum of 10 cm in depth. It supports an abundance of common spike rush (*Eleocharis palustris*) and occasional reedmace;
- Pond 6 is a series of very shallow, clear pools on generally flat, but slightly undulating surface of rutted clay and limestone fragments. The pools are generally a maximum of about 10 cm deep and 2-5 m x 1-2 m in size. Patches of reedmace and common reed are present, alongside common spike rush and sprawling bryophytes;
- Pond 7 is a small pool in an area of dense reed swamp, approximately 7 m x 7 m in extent. Reedmace is dominant and the pond is surrounded by young willow scrub. The water is slightly turbid, but with filamentous algae gradually growing across the surface;
- Pond 8 is a large fishing pond used for private fishing, with numerous jetties present along the margins. The pond is surrounded by mature trees and scrub with no aquatic vegetation present. The banks vary from shallow to steep;
- Pond 9 is approximately 15 m x 15 m in extent, situated on the south-western corner of a small poplar (*Populus* sp.) plantation and within an arable farm; the surrounding fields are managed to grow grass turves. The pond appears quite recently enlarged, with bare earth banks and sandy rocky margins, and low but dense charophyte growth across the central two thirds of the pond, together with occasional reedmace;
- Pond 10 is part of a dense reed bed measuring approximately 40 m x 50 m. It is very shallow, approximately 5-10 cm in depth with a few deeper patches reaching to about 30 cm;
- Pond 11 is similar to Pond 6, with several interconnecting areas of open shallow swamp supporting patches of reedmace, rushes and common spike rush, with no other aquatic vegetation present. The pools are a maximum of 10 cm deep and 5/6 m wide (maximum area 70 m x 20 m);
- Pond 12 is a slurry pit for an industrial chicken farm that is regularly pumped out;
- Pond 13 is a fishpond that is heavily stocked with carp, rudd, tench and perch;
- Pond 14 is a reedbed, approximately 25 m x 10 m in extent and is densely covered with common reed;
- Pond 15 is approximately 25 m x 10 m in extent, and slightly less densely covered with reeds than Pond 14. No aquatic plants other than emergent reeds are present and the banks are covered with dense willow and bramble scrub;
- Pond 16 is a very large water body that stretches to the north (1000 m x 70 m). It is a disused ironstone quarry that has filled with water. Much of it has sheer stone cliffs, the majority is inaccessible because of steep slopes covered with dense gorse (*Ulex* sp.), bramble and hawthorn (*Crataegus monogyna*);
- Pond 17 is located in the basin of a disused quarry pit and comprises a large, deep water body which is approximately 115 m x 85 m. The area is managed by the Lincolnshire County Council and forms Conesby Quarry LWS. It is understood that the water body is drained quarterly as part of the ongoing management of the quarry and that historically, the water body was drained monthly. Conversations with a site manager indicate that the water volume fluctuates rapidly; with the area being dry following drainage, then forming a deep lake in the following months. The substrate and banks are the exposed, bare earth of the quarry pit. No aquatic vegetation was recorded in the

waterbody. Marginal vegetation is limited, with patches of scrub present on the eastern banks. Access to the waterbody is limited as the banks are unstable;

- Pond 18 is also located within the disused quarry pit of the Conesby Quarry LWS, but could not be accessed as it is located on a stepped section of the quarry sides. Surveyors were made aware of the pond by site managers and the pond was viewed from a vantage point to the west. The pond appears to be dominated by common reed and according to conversations with the site management, previous surveys have recorded great crested newt;
- Pond 19 is within the quarry pit of the Conesby Quarry LWS, immediately south of Pond 17. The pond comprises two waterbodies which are adjacent to each other, for the purposes of the survey they are recorded as one pond. Approximately 500m^2 in area, the pond has shallow areas towards to the banks, increasing to a depth of up to 0.5 m. Shallow, sloped earth banks are present along the western section, with steep banks of the quarry pit present along the eastern edge. The eastern bank was not accessible for survey. Willow and bramble scrub shade approximately 50% of the pond edge and water is dominated by common reed;
- Pond 20 is a long, narrow water body which was previously a stocked, fishing lake. The site is now gated off and not maintained as a fishing lake, it is located within the Yorkshire East Gullet LWS. It measures approximately 380 m x 35 m, is very deep, and has a depth of 0.3 m along the bankside. The eastern bank was no accessible for survey, comprising very steep banks which feature dense woodland. The full length of the western bank was accessible. The banks of the pond are steep, which is likely to accommodate fishing. Willow scrub shades the majority of the western bank. Aquatic vegetation includes water mint (*Mentha aquatica*), duckweed (*Lemna minor*) and water lily (*Nymphaea* sp.);
- Pond 21 is a large water body which was a previously a stocked, fishing lake. The pond is also located within the Yorkshire East Gullet LWS. The pond is very deep and measures approximately 400 m x 100 m. At the time of survey, the pond has flooded its banks, with deep water present along the western banks which are sloped, grassland. The eastern banks were not accessible for survey as they are dominated by dense scrub;
- Pond 22 is located in area of disturbed ground, close to the steel works. It measures approximately 50 m x 20 m; the water is shallow along the banks, with deeper areas towards to the centre of the pond. The pond is not shaded, the surrounding vegetation comprising sparse ephemeral and tall ruderal species. Aquatic vegetation includes submerged grasses and occasional water mint. Access was limited as there are steep and unstable piles of earth surrounding the pond along the eastern and southern banks;
- Pond 35, known as the Blue Lagoon and forming part of the Conesby Quarry LNR. This is a very deep, large water body which measures approximately 370 m x 140 m. The waterbody features large areas of open water, with banks which are dominated by common reed. Small areas of willow scrub are present along the bank, providing small areas of shading. There is a public footpath around the perimeter of the waterbody which is heavily used by dog walkers;
- Ditch 1 is largely dry and filled with dense stands of common reed, and approximately 1 m in width. The northern section of the ditch has water flowing from a manhole cover. A short section (10 m) at the far north-western end has ponded where the gradient is very slight. Water clarity is good, however no aquatic vegetation is present; and
- Ditch 2 is approximately 2 m - 4 m wide, supporting dense reedmace and common reed along its margins, alongside grassy herbaceous banks.

3.7 No ponds were recorded within 0.25 km of the Northern DHPWN Land.

3.8 The following ponds and ditches were recorded within 0.25 km of the Southern DHPWN Land:

- Pond 31 is located to the east of the M181 road in a small area of woodland. The pond is circular and approximately 755m^2 in area. The banks are shallow and largely earth. Common reed grows around the margins of the pond, with two small common reed islands in the pond centre. The pond is entirely covered by duckweed, with no other emergent vegetation present. The turbidity of the water was unassessed due to the blanket cover of duckweed. The pond margins are 80% shaded by hawthorn and willow scrub. A HSI survey of the pond was conducted, following an assessment of potential impacts of the Project, ponds to the east of the M181 were not taken forward for further amphibian assessment;
- Pond 32 is large lake located to the east of the M181. Access was not agreed so an initial survey and HSI was not completed. Following an assessment of potential impacts of the Project, ponds to the east of the M181 were not taken forward for further amphibian assessment;
- Pond 33 is a large, commercial fishing lake which is stocked with fish. It measures approximately 200 m x 160 m and is very deep. The water is clear with aquatic vegetation limited to small areas of common reed along the bankside. The banks are 90% shaded by woodland. The banks of the pond are steep, with access limited to the fishing piers;
- Pond 34 is a small pond, approximately 800m^2 in area, which has recently been partially filled in. The pond was previously stocked and used as a commercial fishing lake; however, it is no longer managed for fishing. The banks feature large areas of exposed silt and sections which are dominated by dense scrub. The banks are sloped at a steep gradient; and
- Ditch 3 is a large ditch which runs laterally to the raised embankment of the railway line. It measures approximately 650 m x 20 m and has a deep central area. The banks are exposed earth with no aquatic vegetation present; however, the western section of the ditch is chocked with common reed. The water is shallow and clear, with an earth substrate. The ditch margins are 100% shaded by willow.

3.9 HSI calculations for the ponds/ditches are shown in Table 3 below. Ponds 2, 8, 12, 21, 33, 34 and 36 provide 'poor suitability' for GCN. Pond 1, 20, 27 and 28 and ditches 1 and 3 provide 'below average' suitability for GCN. Ponds 5, 6, 11, 14, 15, 17, 23-26, 31 and 35 provide 'average' suitability for GCN. Ponds 3, 7, 9, 13, 19 and 22 provide 'good' suitability for GCN. Ponds 4, 10, 16 and ditch 2 provide 'excellent' suitability for GCN.

Table 3. *Habitat Suitability Index scores for assessed ponds and ditches*

No.	SI1 - Location	SI2 - Pond area	SI3 - Pond drying	SI4 - Water quality	SI5 - Shade	SI6 - Fowl	SI7 - Fish	SI8 - Ponds	SI9 - Terrestrial habitat	SI10 - Macrophytes	HSI
1	1	0.95	0.9	0.33	1	0.67	0.67	0.4	0.33	0.3	0.59
2	1	1	0.5	0.01	1	1	1	0.4	0.33	0.9	0.48
3	1	1	0.9	0.67	0.2	1	1	1	1	0.6	0.77
4	1	0.9	0.9	1	1	0.67	1	1	1	1	0.94
5	1	0.2	0.1	0.67	1	1	1	1	0.67	0.7	0.60
6	1	0.6	0.1	0.67	1	1	1	0.95	0.67	0.8	0.68

No.	SI1 - Location	SI2 - Pond area	SI3 - Pond drying	SI4 - Water quality	SI5 - Shade	SI6 - Fowl	SI7 - Fish	SI8 - Ponds	SI9 - Terrestrial habitat	SI10 - Macrophytes	HSI
7	1	0.1	1	0.67	1	0.67	1	0.95	1	0.7	0.70
8	1	-	0.9	0.33	0.2	0.67	0.01	0.63	0.67	0.3	0.33
9	1	0.4	1	1	1	0.67	1	0.98	0.67	0.3	0.75
10	1	0.4	0.5	0.67	1	1	1	0.95	1	0.8	0.80
11	1	0.85	0.1	0.67	1	1	1	0.95	1	0.4	0.68
12	1	0.8	0.1	0.01	1	1	1	0.8	0.33	0.3	0.38
13	1	0.9	0.9	0.67	1	0.67	1.01	0.8	0.33	0.8	0.77
14	1	0.2	1	0.33	1	1	1	0.9	1	0.3	0.67
15	1	0.2	1	0.33	1	1	1	0.9	1	0.3	0.67
16	1	0.8	0.9	1	0.4	0.67	1	0.85	1	0.8	0.82
17	1	N/A	0.1	0.67	1	1	1	1	1	0.3	0.65
18	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S
19	1	1	1	1	0.67	1	0.67	1	1	0.8	0.90
20	1	N/A	0.9	1	0.67	0.67	0.01	1	1	0.5	0.50
21	1	N/A	0.9	0.67	0.9	0.67	0.01	1	1	0.4	0.48
22	1	0.95	1	0.67	1	0.67	0.67	1	1	0.4	0.81
23	1	0.2	0.1	0.67	1	1	1	1	1	0.8	0.64
24	1	0.2	0.1	0.67	1	1	1	1	1	0.8	0.64
25	1	0.2	0.1	0.67	1	1	1	1	1	0.8	0.64
26	1	0.9	1	0.33	0.2	0.67	0.67	1	1	0.4	0.64
27	1	0.1	0.9	0.33	0.2	1	1	1	1	0.3	0.53
28	1	0.2	0.5	0.33	1	0.67	0.67	1	0.33	0.3	0.52
29	1	1	0.9	0.33	1	0.67	0.67	1	0.33	0.3	0.65
30	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S
31	1	1	0.9	0.67	0.6	0.67	0.67	0.67	0.67	0.3	0.68
32	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S
33	1	N/A	0.9	1	0.2	0.67	0.01	0.67	0.67	0.3	0.38
34	1	1	0.9	0.33	1	1	0.01	0.67	0.67	0.3	0.46
35	1	N/A	0.9	0.67	1	0.67	0.33	1	0.67	0.3	0.67
36	1	0.8	0.1	0.01	1	1	1	0.5	0.01	0.3	0.26
D1	1	0.1	0.9	0.67	0.2	1	1	0.95	1	0.3	0.57
D2	1	1	0.9	0.67	1	0.67	1	1	0.95	0.8	0.89

No.	SI1 - Location	SI2 - Pond area	SI3 - Pond drying	SI4 - Water quality	SI5 - Shade	SI6 - Fowl	SI7 - Fish	SI8 - Ponds	SI9 - Terrestrial habitat	SI10 - Macrophytes	HSI
D3	1	N/A	1	0.33	0.2	0.67	0.67	0.67	0.33	0.7	0.55

Pond suitability: <0.5 'poor', 0.5 – 0.59 'below average', 0.6 – 0.69 'average', 0.7 – 0.79 'good', >0.8 'excellent'

N/S – Not Surveyed due to access restrictions.

N/A – Not Applicable, for water bodies larger than 2000m^2, this factor was omitted from HSI calculations as recommended in the guidance.

3.10 Detailed amphibian survey results are presented in Appendix A, with a summary of the findings shown in Table 4.

3.11 GCN were recorded in ponds 3, 4, 6, 7, 11, 15, 18, 19 and 22 and ditch 2. A positive eDNA result was returned for ponds 17 and 26, however further population assessment could not be undertaken due to access restrictions. Ponds 3, 4, 18 and 22 were found to hold medium populations of GCN (Natural England, 2001), with peak counts of GCN (24 male, six female) in pond 3 on the 20th of May 2019. The peak count of GCN in pond 4 was 14 (13 male, one female) on the 13th of May 2019. And the peak count of GCN in pond 18 was ten (five male, five female) on the 3rd of June 2021 and ten in pond 22 (seven male, three female) on the 17th of May 2021.

3.12 Ponds 6, 7, 11, 15 and 19 were found to hold small populations of GCN. Pond 6 had a peak count of one female GCN on the 13th May 2019. Pond 7 had a peak count of two male GCN on the 14th May 2019. Pond 11 had a peak count of five GCN (four male, one female) on the 13th May 2019. Ditch 2 had a peak count of one male GCN on the 6th, 13th and 21st May 2019. Pond 19 had a peak count of 10 GCN (five male, five female) recorded on the 3rd June 2021 It should be noted that Ponds 6 and 11 dried out after the third and fourth survey visit, respectively.

3.13 Smooth newts were recorded in ponds 1-15, 19, 22 and ditches 1 and 2 (see Table 4 below). High numbers (>20 individuals) were recorded in ponds 7, 19, 20 and ditch 2. High numbers (>50 individuals) of common toad a Species of Principal Importance (NERC Act, 2006) were recorded in ponds 20, 33 and 35. Small numbers of common toad were recorded in ponds 2-6, 9, 10 and 15 and ditch 2. Common frog were recorded in Ponds 1, 2 and 6. No amphibians were recorded in pond 16 during the surveys.

Table 4. Summary of amphibian surveys

Pond No	**Total number recorded of each species**					
	eDNA survey	**GCN (male)**	**GCN (female)**	**Smooth newt**	**Common frog**	**Common toad**
P2	-	0	0	15	4	1
P3	-	82	37	8	2	2
P4	-	44	11	6	0	4
P5	-	0	0	6	0	1
P6	-	0	1	12	1	1
P7	-	4	0	21	0	0
P8	Negative	-	-	-	-	-
P9	-	0	0	9	0	1
P10	-	0	0	5	0	1
P11	-	4	1	11	0	0
P15	-	12	9	5	0	1
P16	-	0	0	0	0	0

Pond No	Total number recorded of each species					
	eDNA survey	**GCN (male)**	**GCN (female)**	**Smooth newt**	**Common frog**	**Common toad**
P17	Positive	-	-	-	-	-
P18	-	16	19	60	7	1
P19	-	16	19	60	3	1
P20	Negative	11	10	91	11	3
P21	Negative	0	0	0	1	10
P22	Positive	7	3	4	3	0
P26	Positive	-	-	-	-	-
P27	Negative	-	-	-	-	-
P33	Negative	0	0	0	1	77
P34	Negative	0	0	0	7	9
P35	Negative	0	0	0	0	199
Ditch 1	-	0	0	2	0	0
Ditch 2	-	3	0	22	0	3
Ditch 3	Negative	-	-	-	-	-
Total		**176**	**88**	**270**	**37**	**314**

Re-survey

3.14 If no works are undertaken on land within the Order Limits within 12 months of this survey or if any changes to the proposals are/or development timescales are made, a further survey may be necessary (because of the mobility of animals and the potential for colonisation of the land within the Order Limits).

References

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Oldham R.S., Keeble J., Swan M.J.S. & Jeffcote M. (2000). *Evaluating the suitability of habitat for the Great Crested Newt (Triturus cristatus)*. Herpetological Journal 10 (4), 143-155.

Appendix A: Amphibian Survey Results

VISIT 1: Torch Survey data														
Date	06/05/2019	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P9**	**P10**	**P11**	**P15**	**P16**	**D1**	**D2**
Air temp (°C)	5													
% humidity	80													
Weather	Light rain													
Wind (mph)	4													
	Turbidity (H / M / L)	**H**	**L**	**L**	**L**	**L**	**M**	**L**	**M**	**L**	**M**	**L**	**L**	**M**
	Notes								**Reedbed**		**Reedbed**	**Steep sides; not trapped**		
	GCN male	0	7	4	0	0	0	0	0	0	0	0	0	1
	GCN female	0	3	1	0	0	0	0	0	0	0	0	0	0
	Total GCN	**0**	**10**	**5**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**
	Smooth	0	1	2	0	5	2	0	0	6	0	0	1	7
	Palmate	0	0	0	0	0	0	0	0	0	0	0	0	0
	Frog	1	0	0	0	1	0	0	0	0	0	0	0	0
	Toad	1	2	1	0	0	1	0	0	0	0	0	0	2
Bottle-trapping Survey data														
Date	07/05/2019	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P9**	**P10**	**P11**	**P15**	**P16**	**D1**	**D2**
	GCN male	0	0	1	0	0	0	0	0	0	0	0	0	0
	GCN female	0	0	0	0	0	0	0	0	0	1	0	0	0
	Total GCN	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**
	Smooth	1	0	0	0	0	4	0	0	0	0	0	1	5
	Palmate	0	0	0	0	0	0	0	0	0	0	0	0	0
	No of traps	20	10	30	0	0	10	10	10	0	10	0	10	20
Egg search / netting Survey data														
Date		**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P9**	**P10**	**P11**	**P15**	**P16**	**D1**	**D2**
	Eggs GCN	0	0	0	0	0	0	0	0	0	0	0	0	0
	Eggs small newt	0	0	0	0	0	0	0	0	0	0	0	0	0
	Netting GCN male	0	0	0	0	0	0	0	0	0	0	0	0	0
	Netting GCN female	0	0	0	0	0	0	0	0	0	0	0	0	0
	Terrestrial search	0	0	0	0	0	0	0	0	0	0	0	0	0

VISIT 2: Torch Survey data														
Date	13/05/2049	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P9**	**P10**	**P11**	**P15**	**P16**	**D1**	**D2**
Air temp (°C)	11													
% humidity	72													
Weather	Clear, gentle breeze													
Wind (mph)	6													
	Turbidity (H / M / L)	**M**	**L**	**L**	**L**	**L**	**M**	**L**	**L**	**L**	**L**	**L**	**L**	**H**
	Notes												**None**	**Algae**
	GCN male	0	20	11	0	0	1	0	0	4	0	0	0	1
	GCN female	0	2	3	0	1	0	0	0	1	0	0	0	0
	Total GCN	**0**	**22**	**14**	**0**	**1**	**1**	**0**	**0**	**5**	**0**	**0**	**0**	**1**
	Smooth	2	2	1	1	7	0	7	0	5	1	0	0	0
	Palmate	0	0	0	0	0	0	0	0	0	0	0	0	0
	Frog	3	1	0	0	0	0	0	0	0	0	0	0	0
	Toad	0	0	0	0	1	0	0	0	0	0	0	0	1
Bottle-trapping Survey data														
Date	14/05/2019	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P9**	**P10**	**P11**	**P15**	**P16**	**D1**	**D2**
	GCN male	0	7	0	0	0	2	0	0	0	1	0	0	0
	GCN female	0	2	2	0	0	0	0	0	0	0	0	0	0
	Total GCN	**0**	**9**	**2**	**0**	**0**	**2**	**0**	**0**	**0**	**1**	**0**	**0**	**0**
	Smooth	0	0	0	4	0	8	0	0	0	0	0	0	2
	Palmate	0	0	0	0	0	0	0	0	0	0	0	0	0
	No of traps	20	20	40	0	0	10	10	10	0	20	0	10	20
Egg search / netting Survey data														
Date		**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P9**	**P10**	**P11**	**P15**	**P16**	**D1**	**D2**
	Eggs GCN	0	0	0	0	0	0	0	0	0	0	0	0	0
	Eggs small newt	0	0	0	0	0	0	0	0	0	0	0	0	0
	Netting GCN male	0	0	0	0	0	0	0	0	0	0	0	0	0
	Netting GCN female	0	0	0	0	0	0	0	0	0	0	0	0	0

VISIT 3: Torch Survey data														
Date 20/05/2019		**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P9**	**P10**	**P11**	**P15**	**P16**	**D1**	**D2**
Air temp (°C)	12													
% humidity	75													
Weather	Clear and dry													
Wind (mph)	5													
	Turbidity (H / M / L)	**M**	**L**	**L**	**L**	**M**	**H**	**M**	**L**	**L**	**M**	**H**	**M**	**H**
	Notes					**Mostly dry, max 5cm water in a few pools**			**Very shallow now**	**Much drier, c 50% of previous area**		**Thick willow seed on surface**		
	GCN male	0	24	13	0	0	0	0	0	0	2	0	0	0
	GCN female	0	6	0	0	0	0	0	0	0	1	0	0	0
	Total GCN	**0**	**30**	**13**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**0**
	Smooth	6	2	0	1	0	1	6	0	16	1	0	0	0
	Palmate	0	0	0	0	0	0	0	0	0	0	0	0	0
	Frog	0	0	0	0	0	0	0	1	0	0	0	0	0
	Toad	0	0	0	0	0	0	0	0	0	0	0	0	0
Bottle-trapping Survey data														
Date	21/05/2019	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P9**	**P10**	**P11**	**P15**	**P16**	**D1**	**D2**
	GCN male	0	0	2	0	0	0	0	0	0	1	0	0	1
	GCN female	0	4	1	0	0	0	0	0	0	1	0	0	0
	Total GCN	**0**	**4**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**1**
	Smooth	0	0	0	0	0	0	0	5	0	0	0	0	10
	Palmate	0	0	0	0	0	0	0	0	0	0	0	0	0
	No of traps	20	20	40	0	0	10	10	10	0	20	0	10	20
Egg search / netting Survey data														
Date	21/05/2019	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P9**	**P10**	**P11**	**P15**	**P16**	**D1**	**D2**
	Eggs GCN	0	0	0	0	0	0	0	0	0	0	0	0	0
	Eggs small newt	0	0	0	0	0	0	0	0	0	0	0	0	0
	Netting GCN male	0	0	0	0	0	0	0	0	0	0	0	0	0
	Netting GCN female	0	0	0	0	0	0	0	0	0	0	0	0	0

VISIT 4: Torch Survey data														
Date	27/05/2019	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P9**	**P10**	**P11**	**P15**	**P16**	**D1**	**D2**
Air temp (oC)	10				Much drier, max 10cm water in a few places	**Dry**				Much drier, 4 small pools, max 5cm water				
% humidity	80													
Weather	Light showers, cloudy, slight breeze													
Wind (mph)	7													
	Turbidity (H / M / L)	**L**	**L**	**L**	**L**		**M**	**L**	**M**	**L**	**L**	**L**	**M**	**H**
	Notes													
	GCN male	0	3	6	0	0	0	0	0	0	1	0	0	0
	GCN female	0	3	3	0	0	0	0	0	0	0	0	0	0
	Total GCN	**0**	**6**	**9**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**
	Smooth	6	2	1	0	0	0	3	0	0	1	0		4
	Palmate	0	0	0	0	0	0	0	0	0	0	0	0	0
	Frog	0	1	0	0	0	0	0	0	0	0	0	0	0
	Toad	0	0	3	0	0	0	1	0	0	1	0	0	0
Bottle-trapping Survey data														
Date	28/05/209	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P9**	**P10**	**P11**	**P15**	**P16**	**D1**	**D2**
	GCN male	0	1	0	0	0	0	0	0	0	2	0	0	0
	GCN female	0	3	1	0	0	0	0	0	0	1	0	0	0
	Total GCN	**0**	**4**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**0**
	Smooth	0	0	0	0	0	1	0	0	0	1	0	0	2
	Palmate	0	0	0	0	0	0	0	0	0	0	0	0	0
	No of traps	20	20	40	0	0	10	10	10	0	20	0	10	20
Egg search / netting Survey data														
Date	28/05/209	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P9**	**P10**	**P11**	**P15**	**P16**	**D1**	**D2**
	Eggs GCN	0	0	0	0	0	0	0	0	0	0	0	0	0
	Eggs small newt	0	0	0	0	0	0	0	0	0	0	0	0	0
	Netting GCN male	0	0	0	0	0	0	0	0	0	0	0	0	0
	Netting GCN female	0	0	0	0	0	0	0	0	0	0	0	0	0

VISIT 5: Torch Survey data														
Date	03/06/209	**P2**	**P3**	**P4**	**P4**	**P6**	**P7**	**P9**	**P10**	**P11**	**P15**	**P16**	**D1**	**D2**
Air temp (°C)	13					**Dry**				**Nearly dry**				
% humidity	65													
Weather	Clear, mild, calm													
Wind (mph)	7													
	Turbidity (H / M / L)		**M**	**L**			**M**			**L**	**M**			**H**
	Notes			Bank side reeds now tall							Water level much lower now			
	GCN male		8	7		0	1			0	1			0
	GCN female		3	0		0	0			0	0			0
	Total GCN		**11**	**7**		**0**	**1**			**0**	**1**			**0**
	Smooth		1	0		0	2			0	0			2
	Palmate		0	0		0	0			0	0			0
	Frog		0	0		0	0			0	0			0
	Toad		0	0		0	0			0	0			0
Bottle-trapping Survey data														
Date	04/06/2019		**P3**	**P4**	**P5**	**P6**	**P7**	**P9**	**P10**	**P11**	**P15**	**P16**	**D1**	**D2**
	GCN male		4	0		0	0			0	4			0
	GCN female		8	0		0	0			0	4			0
	Total GCN		**12**	**0**		**0**	**0**			**0**	**8**			**0**
	Smooth		0	0		0	3			0	1			0
	Palmate		0	0		0	0			0	0			0
	No of traps		20	40		0	10			0	20			20
Egg search / netting Survey data														
Date			**P3**	**P4**		**P6**	**P7**			**P11**	**P15**			**D2**
	Eggs GCN		0	0		0	0			0	0			0
	Eggs small newt		0	0		0	0			0	0			0
	Netting GCN male		0	0		0	0			0	0			0
	Netting GCN female		0	0		0	0			0	0			0

VISIT 6: Torch Survey data														
Date	10/06/2019	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P9**	**P10**	**P11**	**P15**	**P16**	**D1**	**D2**
Air temp (°C)	12					**Pond Dry**				**Pond Dry**				
% humidity	85													
Weather	Dry, cloudy, mild													
Wind (mph)	15													
	Turbidity (H / M / L)		**L**	**L**			**M**				**M**			**H**
	Notes													
	GCN male		8	0		0	0			0	0			0
	GCN female		2	0		0	0			0	1			0
	Total GCN		**10**	**0**		**0**	**0**			**0**	**1**			**0**
	Smooth		0	1		0	0			0	0			0
	Palmate		0	0		0	0			0	0			0
	Frog		0	0		0	0			0	0			0
	Toad		0	0		0	0			0	0			0
Bottle-trapping Survey data														
Date	11/06/2019		**P3**	**P4**		**P6**	**P7**			**P11**	**P15**			**D2**
	GCN male		0	0		0	0			0	0			0
	GCN female		1	0		0	0			0	0			0
	Total GCN		**1**	**0**		**0**	**0**			**0**	**0**			**0**
	Smooth		0	1		0	0			0	0			0
	Palmate		0	0		0	0			0	0			0
	No of traps		20	40		0	10			0	20			20
Egg search / netting Survey data														
Date			**P3**	**P4**		**P6**	**P7**			**P11**	**P15**			**D2**
	Eggs GCN		0	0		0	0			0	0			0
	Eggs small newt		0	0		0	0			0	0			0
	Netting GCN male		0	0		0	0			0	0			0
	Netting GCN female		0	0		0	0			0	0			0

VISIT 1: Torch Survey data								
Date	16/03/2021	P19	P20	P21	P22	P33	P34	P35
Air temp (°C)	8							
Weather	Dry, overcast							
Wind (BF Scale)	1							
	Turbidity (H / M / L)	L	M	L	L	H	L	L
	Notes	frog spawn	frog spawn					fish present
	GCN male	0	0	0	0	0	0	0
	GCN female	0	0	0	0	0	0	0
	Total GCN	0	0	0	0	0	0	0
	Smooth	0	0	0	0	0	0	0
	Palmate	0	0	0	0	0	0	0
	Frog	1	9	0	0	0	0	0
	Toad	0	0	0	0	0	0	24
Bottle-trapping Survey data								
Date	17/03/2021	P19	P20	P21	P22	P33	P34	P35
	GCN male	0	0	0	0	0	0	0
	GCN female	0	0	0	0	0	0	0
	Total GCN	0	0	0	0	0	0	0
	Smooth	0	0	0	0	0	0	0
	Palmate	0	0	0	0	0	0	0
	No of traps	35	30	32	37	30	25	27
Terrestrial search Survey data								
Date	16/03/2021	P19	P20	P21	P22	P33	P34	P35
	terrestrial GCN male	0	0	0	0	0	0	0
	terrestrial GCN female	0	0	0	0	0	0	0
	Terrestrial search	1 frog	1 frog	0	0	0	0	0

VISIT 2: Torch Survey data								
Date	30/03/2021	P19	P20	P21	P22	P33	P34	P35
Air temp (°C)	8							
Weather	Clear, gentle breeze							
Wind (BF Scale)	F1							
	Turbidity (H / M / L)	L	M	L	L	H	L	L
	Notes			frog spawn				19 fish in bottle traps
	GCN male	0	0	0	0	0	0	0
	GCN female	0	0	0	0	0	0	0
	Total GCN	0	0	0	0	0	0	0
	Smooth	13	0	0	4	0	0	
	Palmate	0	0	0	0	0	0	0
	Frog	0	0	1	3	1	7	0
	Toad	1	3	10	0	68	8	175
Bottle-trapping Survey data								
Date	31/03/2021	P19	P20	P21	P22	P33	P34	P35
	GCN male	0	0	0	0	0	0	0
	GCN female	1	0	0	0	0	0	0
	Total GCN	1	0	0	0	0	0	0
	Smooth	2	0	0	0	0	0	0
	Palmate	0	0	0	0	0	0	0
	No of traps	35	30	32	37	30	25	27
Terrestrial search Survey data								
Date	30/03/2021	P19	P20	P21	P22	P33	P34	P35
	Terrestrial GCN male	0	0	0	0	0	0	0
	Terrestrial GCN female	0	0	0	0	0	0	0
	Terrestrial search	1 frog	0	0	0	9	1	0

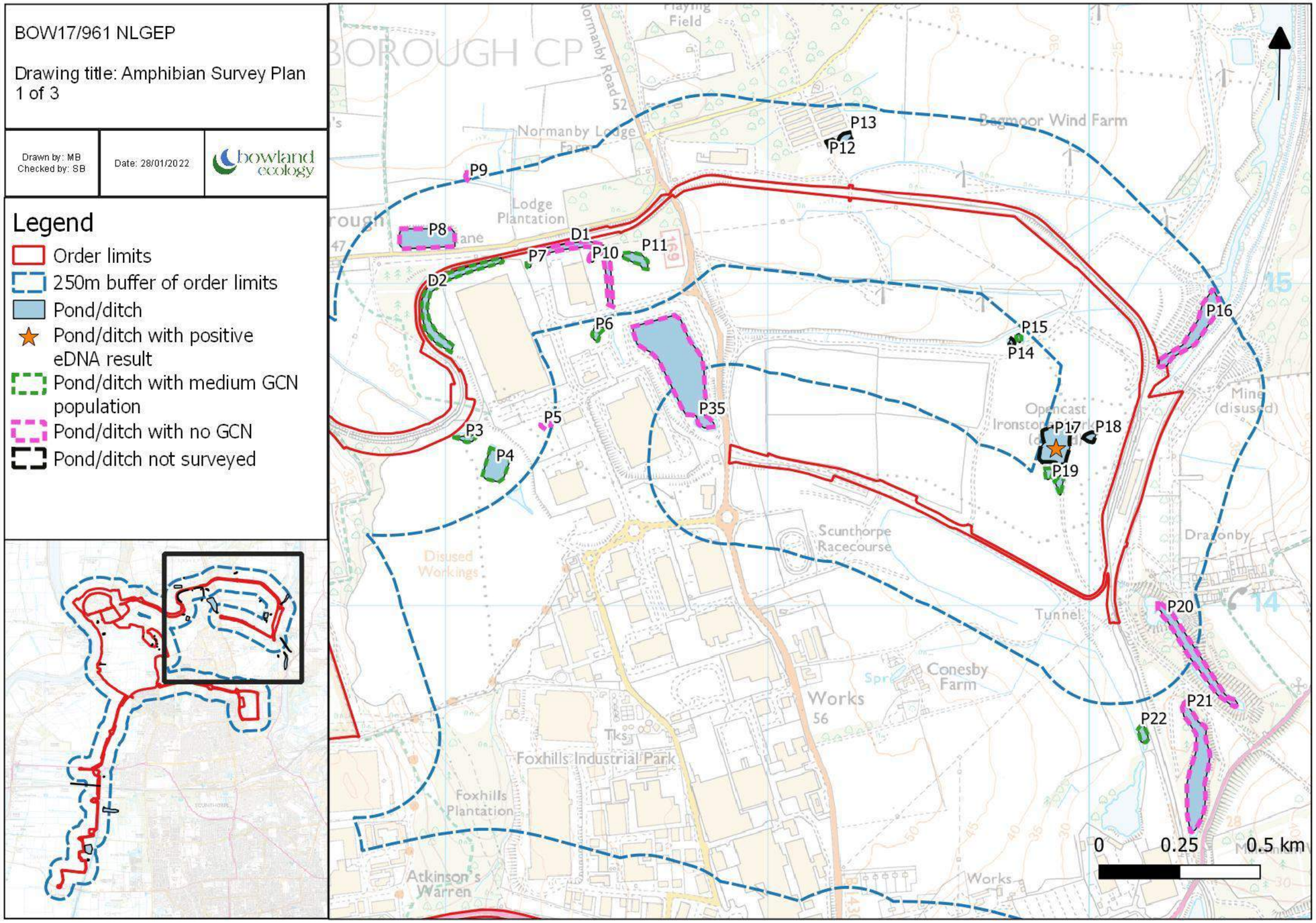
VISIT 3: Torch Survey data								
Date	26/04/2021	P19	P20	P21	P22	P33	P34	P35
Air temp (ºC)	7							
Weather	Overcast, light rain							
Wind (BF Scale)	1							
	Turbidity (H / M / L)	L	M	L	L	L	H	L
	Notes							
	GCN male	1	0	0	0	0	0	0
	GCN female	1	2	0	0	0	0	0
	Total GCN	2	2	0	0	0	0	0
	Smooth	1	2	0	0	0	0	0
	Palmate	0	0	0	0	0	0	0
	Frog	0	0	0	0	0	0	0
	Toad	0	0	0	0	0	0	0
Bottle-trapping Survey data								
Date	27/04/2021	P19	P20	P21	P22	P33	P34	P35
	GCN male	0	2	0	0	0	0	0
	GCN female	0	0	0	0	0	0	0
	Total GCN	0	2	0	0	0	0	0
	Smooth	0	0	0	0	0	0	0
	Palmate	0	0	0	0	0	0	0
	No of traps	35	30	32	37	30	25	27
Terrestrial Survey data								
Date	26/04/2021	P19	P20	P21	P22	P33	P34	P35
	terrestrial GCN male	0	0	0	0	0	0	0
	terrestrial GCN female	0	0	0	0	0	0	0
	Terrestrial search	0	0	0	0	0	0	0

VISIT 4: Torch Survey data								
Date	11/05/2021	P19	P20	P21	P22	P33	P34	P35
Air temp (ºC)	9							
Weather	Dry, overcast							
Wind (BF Scale)	2							
	Turbidity (H / M / L)	L	M					
	Notes			Not surveyed following negative eDNA result	Not surveyed following negative eDNA result	Not surveyed following negative eDNA result	Not surveyed following negative eDNA result	Not surveyed following negative eDNA result
	GCN male	3	0					
	GCN female	3	2					
	Total GCN	6	2					
	Smooth	0	1					
	Palmate	0	0					
	Frog	0	0					
	Toad	0	0					
Bottle-trapping Survey data								
Date	28/05/209	P19	P20	P21	P22	P33	P34	P35
	GCN male	0	2					
	GCN female	4	3					
	Total GCN	4	5					
	Smooth	0	2					
	Palmate	0	0					
	No of traps	35	30					
Egg search Survey data								
Date	28/05/209	P19	P20	P21	P22	P33	P34	P35
	Eggs GCN	0	0					
	Eggs small newt	0	0					
	Folded leaves (unidentified)	5	8					

VISIT 5: Torch Survey data								
Date	17/05/2021	P19	P20	P21	P22	P33	P34	P35
Air temp (ºC)	13							
Weather	Clear, mild, calm							
Wind (BF Scale)	1							
	Turbidity (H / M / L)	L	M					
	Notes			Not surveyed following negative eDNA result	Not surveyed following negative eDNA result	Not surveyed following negative eDNA result	Not surveyed following negative eDNA result	Not surveyed following negative eDNA result
	GCN male	5	7					
	GCN female	4	3					
	Total GCN	9	10					
	Smooth	22	51					
	Palmate	0	0					
	Frog	0	0					
	Toad	0	0					
Bottle-trapping Survey data								
Date	18/05/2021	P19	P20	P21	P22	P33	P34	P35
	GCN male	1	0					
	GCN female	1	0					
	Total GCN	2	0					
	Smooth	0	8					
	Palmate	0	0					
	No of traps	35	30					
Egg search Survey data								
Date	17/05/2021	P19	P20	P21	P22	P33	P34	P35
	Eggs GCN	0	0					
	Eggs small newt	0	2					
	Unidentified folded leaves	0	>100 folded leaves					

VISIT 6: Torch Survey data								
Date	02/06/2021	P19	P20	P21	P22	P33	P34	P35
Air temp (ºC)	15							
Weather	warm, sunny, dry							
Wind (BF Scale)	1							
	Turbidity (H / M / L)	L	M					
	Notes			Not surveyed following negative eDNA result	Not surveyed following negative eDNA result	Not surveyed following negative eDNA result	Not surveyed following negative eDNA result	Not surveyed following negative eDNA result
	GCN male	1	0					
	GCN female	0	0					
	Total GCN	1	0					
	Smooth	8	24					
	Palmate	0	0					
	Frog	2	1					
	Toad	0	0					
Bottle-trapping Survey data								
Date	03/06/2021	P19	P20	P21	P22	P33	P34	P35
	GCN male	5	0					
	GCN female	5	0					
	Total GCN	10	0					
	Smooth	14	6					
	Palmate	0	0					
	No of traps	35	30					
Egg search Survey data								
Date	02/06/2021	P19	P20	P21	P22	P33	P34	P35
	Eggs GCN	0	0					
	Eggs small newt	0	0					
	Unidentified folded leaves	>20						

Appendix B: Pond and Ditch Location Plans



BOW17/961 NLGEP

Drawing title: Amphibian Survey Plan 2 of 3

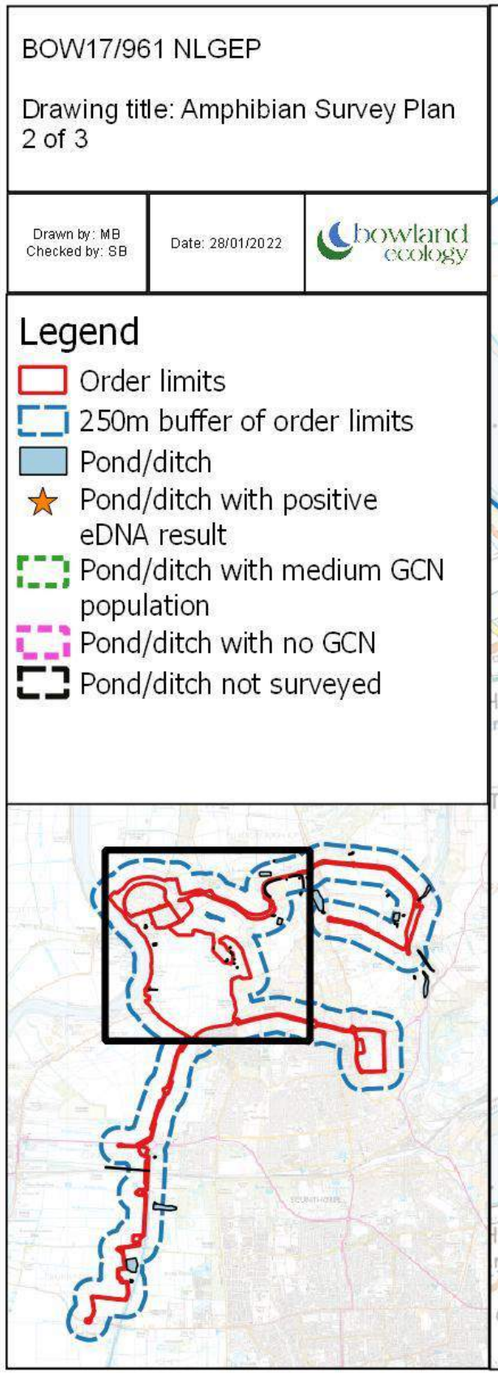
Drawn by: MB
Checked by: SB

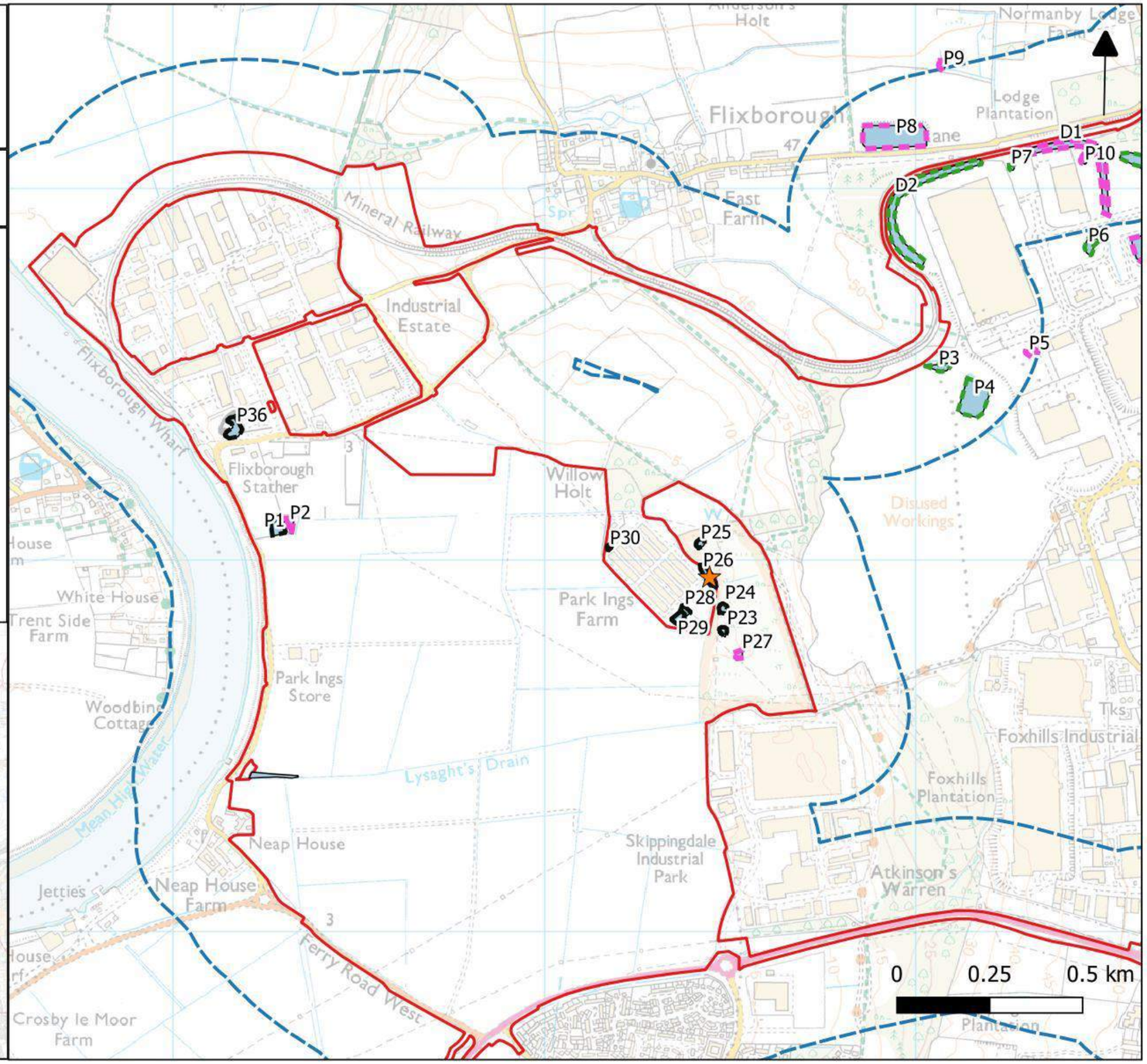
Date: 28/01/2022

bowland ecology

Legend

- Order limits
- 250m buffer of order limits
- Pond/ditch
- Pond/ditch with positive eDNA result
- Pond/ditch with medium GCN population
- Pond/ditch with no GCN
- Pond/ditch not surveyed





BOW17/961 NLGEP

Drawing title: Amphibian Survey Plan 3 of 3

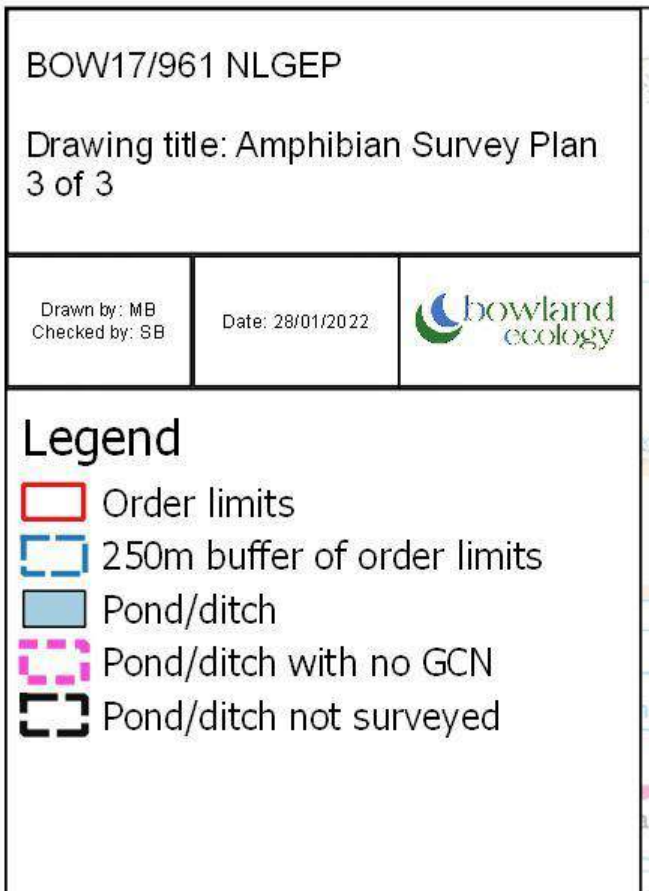
Drawn by: MB
Checked by: SB

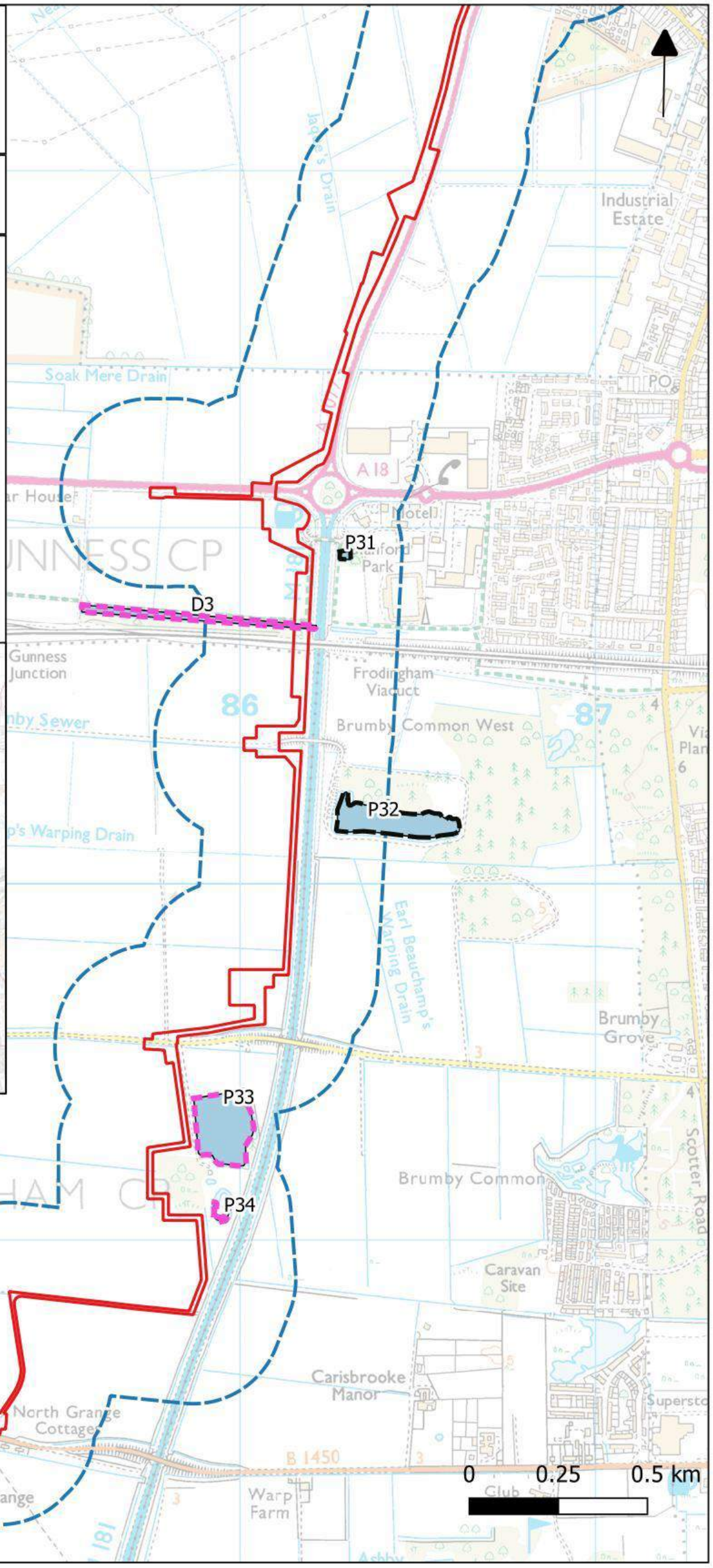
Date: 28/01/2022

bowland ecology

Legend

- Order limits
- 250m buffer of order limits
- Pond/ditch
- Pond/ditch with no GCN
- Pond/ditch not surveyed





Appendix C: Pond and Ditch Photographs

<table>
<tr><td>Pond 1
  </td><td>Pond 2
  </td></tr>
<tr><td>Pond 3 – no photograph</td><td>Pond 4 – no photograph</td></tr>
<tr><td>Pond 5 - No photograph</td><td>Pond 6
  </td></tr>
<tr><td>Pond 7
  </td><td>Pond 8
  </td></tr>
<tr><td>Pond 9 - No photograph</td><td>Pond 10 - No photograph</td></tr>
<tr><td></td><td>Pond 12 – No photograph</td></tr>
</table>

Pond 11

Pond 13 - No photograph

Pond 14 - No photograph

Pond 15 - No photograph

Pond 16

Pond 17

Pond 18

Pond 19

Pond 20

<table>
<tr><td>Pond 21
  </td><td>Pond 22
  </td></tr>
<tr><td>Pond 23
  </td><td>Pond 24
  </td></tr>
<tr><td>Pond 25
  </td><td>Pond 26
  </td></tr>
<tr><td>Pond 27
  </td><td>Pond 28 – no photograph</td></tr>
<tr><td>Pond 29 – no photograph</td><td>Pond 30 – no photograph</td></tr>
<tr><td>Pond 31</td><td>Pond 32 – no photograph</td></tr>
</table>

Pond 33

Pond 34

Pond 35

Pond 36

Ditch 1

Ditch 2

Ditch 3 	

APPENDIX D OTTER AND WATER VOLE SURVEY REPORT

Date: March 2022

North Lincolnshire Green Energy Park

Technical Appendix D: Otter & Water Vole Survey Report

November 2021

Control sheet

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Job number:	BOW17.961
Title:	North Lincolnshire Green Energy Park Technical Appendix D: Otter & Water Vole Survey Report
Client:	North Lincolnshire Green Energy Park Ltd
Prepared by:	Sophie King, *Ecologist* Claire Wilson*, Principal Ecologist*
Checked by:	Jeremy James, *Principal Ecologist* Dr Ed Mountford, *Associate Principal Ecologist*
Date of Issue:	November 2021
Version:	2
Revisions:	Update plans and text where relevant to changes in the Order Limits
Status:	FINAL

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This report has been prepared by an ecological specialist and does not purport to provide legal advice. You may wish to take separate legal advice.

The information which we have prepared and provided is true, and has been prepared and provided in accordance with the BS42020:2013 and the Chartered Institute of Ecology and Environmental Management's Code of Professional Conduct. We confirm that the opinions expressed are our true and professional bona fide opinions.

Bowland Ecology is accredited to Quality Guild (QG) standards in respect of our Quality, Environmental and Health and Safety procedures. The QG is an independent externally audited and accredited system that has been developed according to the principles of ISO9001, ISO14001 and OHAS18001.

Signed (Author) [redacted]	Signed (QA) [redacted]

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1. Introduction

1.1 Bowland Ecology Ltd was commissioned to undertake otter (*Lutra lutra*) and water vole (*Arvicola amphibius*) surveys of watercourses to inform the North Lincolnshire Green Energy Park ('the Project'), a Nationally Significant Infrastructure Project (NSIP) located at Flixborough, North Lincolnshire. For the purposes of this report, the areas within the Project Order Limits are split into the following subsections:

- the Energy Park Land - an area within the Order Limits containing the core elements of the Project (Energy Recovery Facility, CO_2 capture, ash treatment and concrete block manufacturing facility, plastic recycling facility, visitor centre, hydrogen production and re-fuelling station), located north of Ferry Road West (B1216);

- the Railway Reinstatement Land - reinstatement of the existing 6 km Dragonby to Flixborough branch line and construction and operation of a new railhead to the south of Flixborough Wharf, with the primary purpose of facilitating the delivery and export of materials to and from the Energy Park;

- the Northern District Heat and Private Wire Network (DHPWN) Land – running from the southern end of the Energy Park Land, east along the A1077 (Phoenix Parkway) before looping around Normanby Road (Option A) or Bessermer Way (Option B) to the east; and

- the Southern DHPWN Land - running from the southern end of the Energy Park where the B1216 (Ferry Road West) joins, extending south through the agricultural land on the west side of the A1077. Both DHPWN will support the same buried utilities infrastructure; comprising insulated supply and return pipework for heat and cabling to supply electrical power.

1.2 The Energy Park Land includes areas of the RMS Ports and occupied land within the Flixborough industrial estate. Arable farmland is the dominant habitat within the Energy Park Land and features a network of interconnected arable field drains and associated marginal vegetation. This subsection also includes a mosaic of semi-natural habitats which includes dense hawthorn and willow scrub, scattered mature trees, hedgerows, extensive bracken cover, areas of dry swamp habitat dominated by common reed (*Phragmites australis*), ponds, a small area of semi-improved acid grassland, tall ruderals, and species-poor semi-improved grassland. The River Trent and associated marginal vegetation are located to the west of the Energy Park Land, outside of the Order Limits.

1.3 The Railway Reinstatement Land is a disused mineral railway spur which runs from the Flixborough wharf to Dragonby Rail Sidings. Habitats are dominated by scattered, dense and continuous scrub, with areas of deciduous woodland, grassland, and disturbed ground.

1.4 The Northern DHPWN Land is dominated by hardstanding (roads), alongside adjacent hedgerows, grassland, deciduous woodland, dense and scattered scrub and allotments. The Phoenix Parkway Local Nature Reserve (LNR) and Local Wildlife Site (LWS) and The Atkinson's Warren LNR/LWS are adjacent to the Northern DHPWN Land. To the east and south, the adjacent habitats include hardstanding, buildings, gardens, ornamental planting and small areas of scrub and tall ruderal vegetation.

1.5 The Southern DHPWN Land is largely dominated by arable farmland, with associated field margins, arable field drains and marginal vegetation. There are small areas of

plantation and semi-natural deciduous woodland scattered along the route. Adjacent to the Order Limits, the easement of the M181 features reinforced lateral drains which were recorded as dry ditches at the time of survey.

1.6 The purpose of the surveys was to investigate the potential presence of otter and water vole. This report includes a description of assessment methods and describes survey results and associated plans/figures. Otter and water vole survey forms are located at Appendix A. Plans showing locations of the ditches and field signs are provided within Appendix B.

2. Methodology

Desk study

2.1 Local records on and within 5 km of the Order Limits were obtained following a data search with Greater Lincolnshire Nature Partnership (GLNP). Records from 2000 onwards are included in this report. Suitable habitats for otter and water vole were assessed following the extended Phase 1 habitat surveys of the Order Limits.

Otter survey

2.2 The method for the otter field survey followed a modified method of that described in Chanin (2003). During the survey the following evidence was searched for: spraints, footprints, holts, couches, feeding remains, lay-ups and sightings of otter.

2.3 The otter survey was conducted within the ditches located within the Order Limits, where access was possible (see Appendix B for survey locations). Surveyors waded in an upstream direction within the channel where it was shallow and along the water's edge where the depth permitted safe wading.

2.4 An intensive search of all likely locations of the ditch banks was undertaken to locate signs of otter presence. During the survey, inspections were made of any thick streamside vegetation, culverts, outfalls, and pipe entrances to determine any use by otter, particularly for resting and denning purposes.

2.5 Any potential resting sites were examined for traces of otter use or occupancy by other species. Signs particularly searched for included hair samples, scratch marks, bedding, wear of entrance and spraints. The identification of otter holts depends on the amount of corroborating evidence found in or near each feature. The probability of occupancy of a feature suitable for sheltering otters was also assessed by the general presence of otters in the vicinity. The presence of any field signs were recorded on the plans in Appendix A.

2.6 Where animals are rare or infrequent, experience is essential to determine their whereabouts and to what extent field signs constitute regular use or to distinguish signs of otter from other riparian mammals such as American mink (*Neovision vison*). The absence of field signs would not necessarily constitute the absence of otter, merely that they were not present at the time of the survey.

Water vole survey

2.7 The method for the water vole field survey followed that of Strachan, Moorhouse and Gelling (2016) The Water Vole Conservation Handbook 3rd Edition, and Dean, Strachan, Gow and Andrews (2016) The Water Vole Mitigation Guidelines.

2.8 During the surveys, the following evidence of water voles was searched for: sounds of water voles entering the water (a distinctive 'plopping' noise), burrow entrances, feeding stations, latrines or droppings, waterside paths, runs in vegetation and footprints. Signs of brown rat (*Rattus norvegicus*), bank vole (*Clethrionomys glareolus*) and field vole (*Microtus agrestis*) were also searched for, as these can easily be confused with those of water vole. The surveys were undertaken within the optimal survey period following the accepted guidelines and within the optimal survey period (March to October).

2.9 An assessment of habitat suitability and water vole activity was conducted based on the published guidance (Dean *et al.,*2016). Where water vole signs were detected, a population density assessment was conducted using the Table 1.

Table 1. *Water vole population density according to Dean et al., 2016.*

Relative population density	Approximate number of latrines per 100m of bankside habitat	
	Early survey (mid-April to end of June)	Late survey (July to September)
High	10 of more	20 of more
Medium	3-9	6-19
Low	≤2 (or none, but with other confirmatory field signs)	≤5 (or none, but with other confirmatory field signs).

2.10 The surveys were undertaken by Dr. Phil Eades PhD, BSc (Hons), MCIEEM, Eve Loxham Mbiol Sci (Hons) GradCIEEEM, Sophie King MSc, BSc and Fiona Shuttle BSc (Hons). Plans showing which ditches were surveyed are presented in Appendix D. As the Project has evolved, the surveys have been undertaken between 2019 and 2020, across different subsections within the Order Limits. Table 2 presents the weather conditions and dates of the survey visits.

Table 2. *Survey weather conditions*

Date	Surveyor	Weather conditions
13/05/2019	PE	Warm, 18°C, with a light breeze, Beaufort Scale 1-2, dry, with 20% cloud cover.
14/05/2019	PE	Warm, 19°C, with a light breeze, Beaufort Scale 1, dry, with 10% cloud cover.
10/06/2020	SK, FS	Mild, 12°C, with a light breeze, Beaufort Scale 1, occasional scattered showers and 70% cloud cover.
11/06/2020	SK, FS	Mild, 14°C, with a light breeze, Beaufort Scale 2, occasional scattered showers and 70% cloud cover.
08/09/2020	SK, EL	Warm, 18°C, with a light breeze, Beaufort Scale 1, dry, with 40% cloud cover.
09/09/2020	SK. EL	Warm, 22°C, with a light breeze, Beaufort Scale 2, dry, with 20% cloud cover.

Trail camera survey

2.11 In addition, trail cameras were strategically placed at 17 locations along ditches within the Energy Park Land between the period of June and September 2020. The locations of trail cameras are presented in Appendix D. The data from the trail cameras was analysed by Sophie King MSc, BSc for images of otter, water vole and other protected species.

Survey limitations

2.12 Ditches 1, 2, 4, 5, 29-32, and 35-40 were only subject to one survey visit:

- in the case of Ditches 1, 2, 4, 5, 39 and 40 only the early survey (April to the end of June) was conducted, this was considered sufficient considering the level of impact anticipated by the Project. In addition, water vole was confirmed as active in Ditches 4 and 5, and Ditches 1 and 40 were assessed as suboptimal for water

vole due to the absence of open water, further negating the requirement for the second survey; and

- ditches 29-32 and 35-40 were only subject to the late survey (July to the end of September), as this area of was added to the Project later, missing the early survey season for water vole. This is not considered a major constraint to the study, as it is understood that impacts to ditches with potential for water vole will be limited. In addition, all watercourses will be subject to pre-commencement surveys for otter and water vole.

2.13 The depth of the banks and density of marginal and aquatic vegetation prevented a detailed search of all banks above water level for evidence of otter and water vole. This is not considered a constraint to the study as;

- the survey was supplemented using trail cameras;
- all areas which were assessed as having potential for otter holts were fully accessible;
- evidence of water vole and otter was found across the Order Limits; and
- a precautionary approach regarding evaluating the potential for otter and water vole has been taken.

3. Results and Evaluation

Desk study

3.1 19 records of otter were returned by the desk study. The closest is from approximately 0.5 km south of the Railway Reinstatement Land, comprising a dead otter along the road. Six records are from 0.6-0.7 km north west of the Flixborough Industrial Estate, on the western banks of the River Trent. There are no records of holts; all records comprised either field observations, dead otters along roads, tracks/trails or spraint.

3.2 A total of 628 water vole records were returned by the desk study from within 5 km of the Order Limits. Most of the records include an eight-digit national grid reference, confirming that they are highly active in the local area. The closest record is of water vole burrows 0.1 km east of the Southern DHPWN Land.

4. Habitat assessment

4.1 The River Trent provides a foraging and commuting route for otter and the marginal vegetation along the banks of the river has potential to provide suitable lay-up sites. The wet ditches within the arable fields, in particular the larger ditches provide potential foraging and commuting habitat for otter. Potential lay-up sites include the marginal vegetation of the ditches, scattered scrub located along the ditches, and areas of long, set-aside grassland adjacent to ditches.

4.2 The wet ditches provide suitable habitat for water vole. The long vegetation along the banks and aquatic vegetation within the channels provides favourable foraging and refuge habitat for water vole. The profile of the banks is steep and suitable for the creation of burrows. In addition, the ditches are interconnected over a large area, allowing for commuting.

Trail camera survey

4.3 The trail camera survey returned no evidence of water vole or otter. An American mink was recorded at NGR: SE 86491 13859, in Ditch 13. Other species recorded by the trail cameras include small vole species, brown rat, roe deer (*Capreolus capreolus*), linnet (*Linaria cannabina*), sedge warbler (*Acrocephalus schoenobaenus*), reed bunting (*Emberiza schoeniclus*), mallard (*Anas platyrhynchos*), grey heron (*Ardea cinerea*), wood pigeon (*Columba palumbus*) and invertebrates.

Otter survey

4.4 Evidence of otter during the field surveys comprised:

- a set of otter prints, along the banks of the River Trent at NGR SE 85856 14504, immediately adjacent to the ship dock at Flixborough Wharf (see Plates 1 and 2, and Appendix B for location); and
- an otter seen laying up in the long grass next to a ditch within the Energy Park Land, at NGR: SE 87363 13558 (see Appendix B for location).

Plate 1: otter prints

Plate 2: otter prints

Water vole survey

4.5 Results of the water vole field survey are presented in Table 3 and described in more detail below. The location of Ditches 4, 5, 8, 11 and 18 that had signs of water vole activity recorded is shown in Appendix B.

Table 3. *Water vole survey results*

Ditch No.	Early Survey (April to end of June)	Late Survey (July to end of September)	Notes
1	No evidence	Not surveyed	Assessed as sub-optimal for water vole due to absence of open water.
2	No evidence	Not surveyed	
3	Not surveyed	Not surveyed	Assessed as sub-optimal for water vole due to lack of connectivity with other watercourses, dense woodland shading, and limited herbaceous marginal vegetation
4	1 water vole latrine, occasional water vole burrows, runs and feeding stations	Not surveyed	Assessed as low water vole activity in accordance with Dean *et al*. (2016) (see Table 1).
5	7 water vole latrines, abundant burrows, runs and feeding stations.	Not surveyed	Assessed as medium water vole activity in accordance with Dean *et al*. (2016) (see Table 1).
6	No evidence	No evidence	
7	No evidence	No evidence	
8	No evidence	1 feeding station	Feeding remains likely of water vole, no corroborating evidence.
9	No evidence	No evidence	
10	No evidence	No evidence	
11	No evidence	> 20 footprints	Footprints identified as water vole observed on a mud bank of the ditch NGR: SE 87277 13541. No

			other corroborating evidence, therefore, cannot be confirmed as water vole.
12	No evidence	No evidence	
13	No evidence	No evidence	
14	No evidence	No evidence	
15	No evidence	No evidence	
16	No evidence	No evidence	
17	No evidence	No evidence	
18	No evidence	3 burrows, 1 latrine, feeding remains	Confirmed water vole, assessed as low activity in accordance with Dean *et al*. (2016) (see Table 1).
19	No evidence	No evidence	
20	No evidence	No evidence	
21	No evidence	No evidence	
22	No evidence	No evidence	
23	No evidence	No evidence	
24	No evidence	No evidence	Assessed as sub-optimal for water vole due to absence of open water
25	No evidence	No evidence	
26	No evidence	No evidence	
27	No evidence	No evidence	
28	Not surveyed	Not surveyed	Assessed as sub-optimal for water vole due to absence of open water
29	Not surveyed	No evidence	
30	Not surveyed	No evidence	
31	Not surveyed	No evidence	
32	Not surveyed	No evidence	
33	Not surveyed	Not surveyed	Assessed as sub-optimal for water vole due to absence of open water
34	Not surveyed	Not surveyed	Assessed as sub-optimal for water vole due to absence of open water
35	Not surveyed	No evidence	
36	Not surveyed	No evidence	
37	Not surveyed	No evidence	
38	Not surveyed	No evidence	
39	No evidence	Not surveyed	
40	No evidence	Not surveyed	Assessed as sub-optimal for water vole due to absence of open water

Energy Park Land

4.6 The Energy Park Land is dominated by arable farmland with a network of interconnected arable field drains, the majority of which connect to the Lysaght's Drain, a large drain which traverses the Energy Park Land from east to west. Most drains have steep sides, with banks at an angle of 45°, between 1 and 5 m in height. The channel widths vary, with minor drains having a width of 0.5 m, and major drains having a width of up to 4 m. The drains are typically bounded by wide field margins and occasionally managed with evidence of dredging and vegetation removal present. Due to the management regime, the drains varied in character from: having limited marginal vegetation and abundant open water; to being densely vegetated by common reed (*Phragmites australis*), other aquatic vegetation and having long, dense marginal cover of grasses and herbaceous plants. In total, there are 21 wet ditches within the Energy Park Land (Ditches 6 to 27)

which were assessed as offering potentially suitable foraging, commuting and nesting/burrowing habitat for water vole. Full descriptions are included in Appendix C.

4.7 Results from the water vole surveys and trail cameras found no evidence of water vole on most of the ditches. However, evidence of water vole was recorded in three ditches (see also photographs in Table 4):

- Ditch 11 had more than 20 footprints of water vole on an exposed silt bar at the most eastern end of the ditch (NGR: SE 87277 13541). No corroborating evidence of water vole was observed. It should be noted that given their similarity to brown rat, footprints are relatively poor indicators of water vole presence and cannot be solely relied upon as an evidence of water vole;
- Ditch 18 had three burrows and a single latrine on the western bank which were identified as water vole (NGR: SE 86304 13391); and
- Ditch 8 had the feeding remains of water vole recorded on the banks of the ditch (NGR: SE 87115 14128).

Table 4. *Water vole field signs in the Energy Park Land*

Ditch No.	Water vole evidence
8	 Plate 3: feeding station
11	 Plate 4: water vole burrow  Plate 5: water vole latrine
18	 Plate 6: water vole footprints

Railway Reinstatement Land

4.8 Six ditches with the potential to support water vole were recorded on or within 0.1 km of the Railway Reinstatement Land. These ditches consisted of two to the south of the railway, within the grounds of an industrial estate (Ditch 1 and 2); and four arable field drains (Ditch 4, 5, 39 and 40) to the north of Flixborough Wharf set in the arable farmland, including the Burton and Flixborough Arable Drain. Of these, Ditches 5 and 40 are located partially within the Order Limits. Full descriptions are included in Appendix C.

4.9 The results of the water vole survey found no evidence of water vole and limited potential for water vole in the ditches to the south of the railway line (Ditch 1 and 2). Evidence of water vole in the ditches to the north of Flixborough Wharf was extensive, including burrows, latrines, feeding stations and runs. In addition, the surveyor had conversations with a contractor who was dredging the field drains, which indicated that water vole are regularly seen in this area. In summary, the following evidence of water vole was recorded:

- Ditch 5, seven water vole latrines, abundant water vole burrows, runs and feeding stations recorded. Overall, medium activity of water vole was recorded;
- Ditch 4, one water vole latrine, occasional water vole burrows, runs and feeding stations. The more western end of the ditch was assessed as the most suitable for water vole, due to the eastern end having a greater flow speed. Overall, low water vole activity in the ditch.

Table 5. *Water vole field signs in the Railway Reinstatement Land*

Ditch No.	Water vole evidence
4	 Plate 7: latrine and feeding station
5	 Plate 8: water vole burrow burrow  Plate 9: water vole burrow  Plate 10: water vole

Plate 22: water vole burrow

Plate 12 water vole larine

The Northern DHPWN Land

4.10 No watercourses or features with potential to support water vole were recorded within the survey area for the Northern DHPWN Land.

The Southern DHPWN Land

4.11 Dry ditches run parallel to the Southern DHPWN Land, comprising Ditch 28 located along the eastern side of the A1077 and M181 roads and Ditch 34 located to the west of the M181 road. Both ditches are similar in character. They are man-made drainage systems, with steep banks which are up to 2 m in height and some areas where the banks are reinforced with concrete. The channels vary in width from 1.5-2 m. The channels are dry for most of the length of the ditch, with wet areas where they connect to adjacent arable field drains. The channels frequently support dense stands of common reed and reedmace, with extensive areas of dense and scattered scrub cover. Species recorded in the scrub include hawthorn (*Crataegus monogyna*), willow, bramble (*Rubus fruticosus agg.*) and rose (*Rosa sp.*). Non-aquatic vegetation was frequently recorded in the channels, indicating that they rarely feature open water. Dominant species included great willowherb, nettle, rosebay willowherb, hedge bindweed, as well as grasses and other tall ruderal species. Overall, Ditches 28 and 34 were assessed as providing sub-optimal water vole habitat, due to the absence of open water. There is potential for commuting and foraging otter to traverse the ditches, however it is highly unlikely that, in their current condition, water vole would excavate burrows in Ditch 28 or 34. As such, Ditches 28 and 34 were not subject to water vole survey.

4.12 A total of eight wet ditches were recorded within the Southern DHPWN Land, comprising: Ditch 3 which is described below; and Ditches 29-32 and 36-38, which are described in this paragraph as they are similar in character. All of the ditches are arable field drains, set in the extensive arable farmland to the east and west of the Southern DHPWN route, most of which are culverted beneath the M181 road and connect to either or both Ditch 28 and 34 (described in paragraph 3.10). The ditches vary in size, with recorded channel widths between 1 and 2 m, water depths from less than 0.5 m to more than 0.5 m, typically steep banks of a height between 1 and 3 m. Common reed, reedmace and yellow iris (*Iris pseudacorus*) were frequently recorded in the emergent vegetation. Marginal vegetation along the banks was frequently dominated by tall herbaceous plants and grasses. Overall, the ditches were assessed as providing suitable habitat for burrowing, foraging and commuting water vole. It is understood that access and construction will be undertaken to the west of the A107 and M181 roads, as such only ditches to the west of the roads were surveyed for water vole (Ditches 29, 30, 32). During the surveys, no evidence of water vole was observed along the ditches. However, as this species is present in the wider area, there is potential for water vole to colonise these ditches in the future.

4.13 Ditch 3 is a long, wide feature located in the easement of the railway embankment, running parallel to the railway line. The ditch is set in an area of mature, dense, willow

scrub and is heavily shaded on all banks. It measures approximately 650 m x 20 m, with a deep central area. The banks are exposed earth with no aquatic vegetation present in the channel; however, the western section of the ditch is dense with common reed. The water is shallow and clear, with an earth substrate. The ditch is not connected to any other water ways. Overall, the ditch was assessed as providing sub-optimal habitat for water vole due to the heavy shading, woodland setting and absence of marginal vegetation which is favoured by water vole. In addition, there are abundant ditches which provide more favourable conditions for water vole in the surrounding area, making it unlikely that water vole would dig burrows along the ditch. There is potential for water vole to commute along the ditch, however as there is a lack of connectivity to other, more suitable water vole habitat, the potential for this to occur is considered unlikely.

Water Vole Summary

4.14 A summary of the findings from the water vole surveys is presented in Table 6.

Table 6. *Summary of water vole surveys*

Order Limits subsection	Habitat assessment	No. of ditches surveyed	Summary of water vole survey	Overall assessment
Energy Park Land	21 ditches assessed as suitable for water vole	21	Evidence of water vole in three ditches (D8, 11 and 18), comprising three burrows, 1 latrine, 1 feeding station and footprints.	**Low water vole activity in this area**, with D18 the only confirmed site with water vole burrows.
Railway Reinstatement Land	5 ditches assessed as suitable for water vole, 1 as unsuitable	6	Evidence of water vole in D4 and 5 which are located to the north of Flixborough Wharf, comprising multiple burrows, latrines and feeding stations, as well as anecdotal evidence.	Ditches to the north of Flixborough Wharf (D4, 5, 29 and 40) have **medium levels of confirmed water vole activity**. Water vole absent from D1 and 2.
Northern DHPWN Land	No ditches suitable for water vole	0	N/A	**No suitable water vole habitat** along route.
Southern DHPWN Land	7 ditches assessed as suitable for water vole	7	No evidence of water vole activity.	**Low likelihood of water vole presence**, however there is potential for water vole to colonise the area

References

Chanin P (2003). *Monitoring the Otter Lutra lutra.* Conserving Natura 2000, Rivers Monitoring Series No. 10, English Nature, Peterborough.

Dean, M., Strachan, R., Gow, D. and Andrews, R. (2016). *The Water Vole Mitigation Handbook (The Mammal Society Mitigation Guidance Series).* Eds Fiona Mathews and Paul Chanin. The Mammal Society, London

Strachan, R., Moorhouse, T., & Gelling, M. (2011). Water Vole Conservation Handbook, Third Edition, WildCRU, University of Oxford.

Appendix A: Otter and Water Vole Survey Forms

WATER VOLE SURVEY FORM

BACKGROUND INFORMATION

Site name/river: Burton & Flixborough Drain (River Trent)

PIL number: DITCHES 3 – 8 *Ditch numbers updated to D4,5,39 and 40

Surveyors: PHIL EADES Date: 13 – 14 May 2019

HABITAT INFORMATION (mark features on map)

Survey distance: 1400 m

Habitat:
- [x] Ditch
- [ ] Dyke
- [ ] Gravel Pit
- [ ] Pond
- [ ] Lowland lake
- [ ] Upland Loch
- [ ] Reservoir
- [ ] Running water
- [ ] Marsh/bog
- [ ] Canal

Shore/bank
- [ ] Boulders
- [ ] Stones
- [ ] Gravel
- [ ] Sand
- [ ] Silt
- [x] Earth
- [ ] Rock cliffs
- [ ] Earth cliffs
- [ ] Poached
- [ ] Reinforced

Bordering land use
- [ ] Upland grass
- [ ] Perm/temp grass
- [ ] Mixed Broadleaf woodland
- [ ] Conifer wood
- [ ] Peat bog
- [x] Arable crop
- [ ] Salt marsh
- [ ] Urban/industrial
- [ ] Park/Garden
- [ ] Heath
- [ ] Fen
- [ ] Cattle/grazing
- [ ] Bank fenced?

Vegetation (DAFORN)
- N Bankside trees
- N Bushes
- D Herbs
- A Submerged weed
- O Reeds/sedges
- D Tall grass
- R Short grass

Human Disturbance: Frequent - dog walkers

Bank profile
- [ ] Flat <10°
- [ ] Shallow <45°
- [x] Steep >45°
- [ ] Vertical/undercut

Water Depth
- [x] <0.5m
- [ ] 0.5-1m
- [ ] 1-2m
- [ ] >2m

Watercourse Width
- [ ] 5-10m
- [ ] 1m
- [ ] 10-20m
- [x] 1-2m
- [ ] 20-40m
- [ ] 2-5m
- [ ] >40m

Current
- [ ] Slow
- [ ] Rapid
- [x] Sluggish
- [ ] Fast
- [ ] Static

WILDLIFE INFORMATION

Water vole
- [x] Sightings (count)
- 9 Latrines (count)
- c.60 Burrows (count)
- [x] Footpath
- [x] Pathway in vegetation
- [x] Feeding remains
- [x] Cropped grass around tunnel entrance.

Rat none
- [ ] Sightings
- [ ] Droppings
- [ ] Footprints/runs

Otter none
- [ ] Sightings
- [ ] Droppings
- [ ] Footprints/runs

Mink none
- [ ] Sightings
- [ ] Droppings
- [ ] Footprints/runs

Other Wildlife:
- [ ] Kingfisher
- [ ] Heron
- [ ] Coot
- [ ] Waterfowl
- [ ] Moorhen
- [ ] Dipper

none

Identified plants from feeding remains: Grasses

SKETCH OF SITE – water vole activity indicated (if any)

KEY TO SYMBOLS
(mark route surveyed and direction of flow, cross-section)

Mature trees; Over-hanging branches; Fallen tree; Exposed roots; Pollarded tree P; Sapling; Scrub; Hedgerow; Fence; Reed/sedge bed; Flood bank; Artificial bank; Earth cliff

See additional maps

ADJACENT LAND USE CODES
- Broadleaved wood BW
- Conifer plantation CP
- Moorland/ Heath MH
- Rough Pasture RP
- Wetland WL
- Improved grass IG
- Tilled land (crop) TL
- Suburban/urban devel. (inc gardens) URB

OTHER FEATURES
- Roadbridge
- Footbridge
- Weir
- Culvert
- Ford
- Outfall
- Dredgings/spoil
- Silt bars
- Islands
- Mark position & size

ADDITIONAL COMMENTS:
Farmer stated that water voles are frequently seen, and when clearing the ditch, wv often jump out & the scooped up silt!

1

1 pitch 11

WATER VOLE SURVEY FORM

BACKGROUND INFORMATION

Site name/river: Ditch 8

PIL number:

Surveyors: SOPHIE KING, EVE LOXHAM Date: 09/09/2020

HABITAT INFORMATION (mark features on map)

Survey distance

m

Habitat:
- [x] Ditch
- [ ] Dyke
- [ ] Gravel Pit
- [ ] Pond
- [ ] Lowland lake
- [ ] Upland Loch
- [ ] Reservoir
- [ ] Running water
- [ ] Marsh/bog
- [ ] Canal

Shore/bank
- [ ] Boulders
- [ ] Stones
- [ ] Gravel
- [ ] Sand
- [ ] Silt
- [x] Earth
- [ ] Rock cliffs
- [ ] Earth cliffs
- [ ] Poached
- [ ] Reinforced

Bordering land use
- [ ] Upland grass
- [ ] Perm/temp grass
- [ ] Mixed Broadleaf woodland
- [ ] Conifer wood
- [ ] Peat bog
- [x] Arable crop
- [ ] Salt marsh
- [ ] Urban/industrial
- [ ] Park/Garden
- [ ] Heath
- [ ] Fen
- [ ] Cattle/grazing
- [ ] Bank fenced?

Vegetation (DAFORN)
- N Bankside trees
- N Bushes
- F Herbs
- F Submerged weed
- D Reeds/sedges
- A Tall grass
- O Short grass

Human Disturbance:

Bank profile
- [ ] Flat <10°
- [ ] Shallow <45°
- [x] Steep >45°
- [ ] Vertical/undercut

Water Depth
- [x] <0.5m
- [ ] 0.5-1m
- [ ] 1-2m
- [ ] >2m

Watercourse Width
- [ ] 5-10m
- [x] 1m
- [ ] 10-20m
- [ ] 1-2m
- [ ] 20-40m
- [ ] 2-5m
- [ ] >40m

Current
- [ ] Slow
- [ ] Rapid
- [ ] Sluggish
- [x] Fast
- [x] Static

WILDLIFE INFORMATION

Water vole
- [ ] Sightings (count)
- [ ] Latrines (count)
- [ ] Burrows (count)
- [ ] Footpath
- [ ] Pathway in vegetation
- [x] Feeding remains
- [ ] Cropped grass around tunnel entrance.

Rat
- [ ] Sightings
- [ ] Droppings
- [ ] Footprints/runs

Otter
- [ ] Sightings
- [ ] Droppings
- [ ] Footprints/runs

Mink
- [ ] Sightings
- [ ] Droppings
- [ ] Footprints/runs

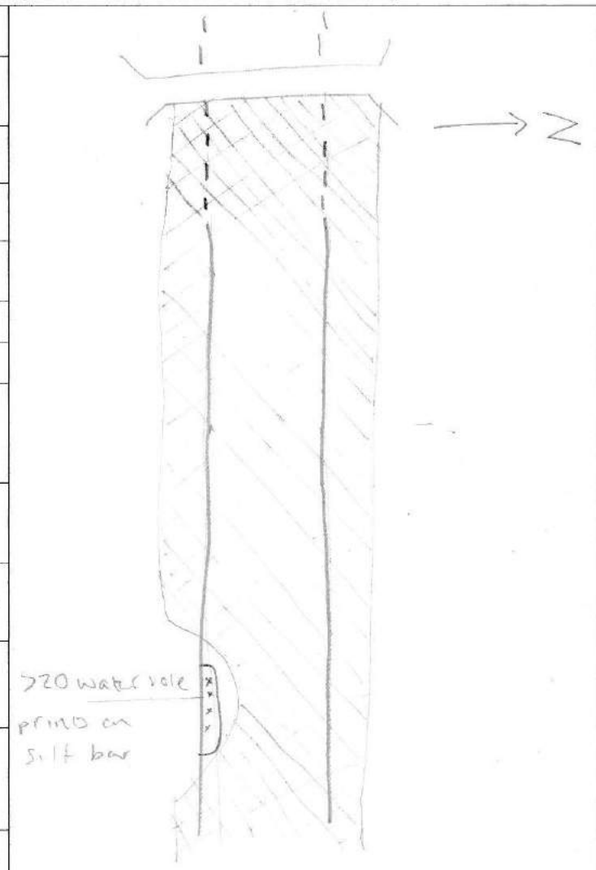
Other Wildlife:
- [ ] Kingfisher
- [ ] Heron
- [ ] Coot
- [ ] Waterfowl
- [ ] Moorhen
- [ ] Dipper

Identified plants from feeding remains:

SKETCH OF SITE – water vole activity indicated (if any)

KEY TO SYMBOLS
(mark route surveyed and direction of flow, cross-section)

- Mature trees
- Over-hanging branches
- Fallen tree
- Exposed roots
- Pollarded tree P
- Sapling
- Scrub
- Hedgerow
- Fence
- Reed/sedge bed
- Flood bank
- Artificial bank
- Earth cliff



ADJACENT LAND USE CODES
- Broadleaved wood BW
- Conifer plantation CP
- Moorland/ Heath MH
- Rough Pasture RP
- Wetland WL
- Improved grass IG
- Tilled land (crop) TL
- Suburban/urban devel. (inc gardens) URB

OTHER FEATURES
- Roadbridge
- Footbridge
- Weir
- Culvert
- Ford
- Outfall
- Dredgings/spoil
- Silt bars
- Islands Mark position & size

ADDITIONAL COMMENTS:

Pond II

WATER VOLE SURVEY FORM

BACKGROUND INFORMATION

Site name/river: Ditch II (far eastern section)

PIL number: –

Surveyors: SOPHIE KING, EVE LOXHAM Date: 09/09/2020

HABITAT INFORMATION (mark features on map)

Survey distance: m

Habitat:
- [x] Ditch
- [ ] Dyke
- [ ] Gravel Pit
- [ ] Pond
- [ ] Lowland lake
- [ ] Upland Loch
- [ ] Reservoir
- [ ] Running water
- [ ] Marsh/bog
- [ ] Canal

Shore/bank
- [ ] Boulders
- [ ] Stones
- [ ] Gravel
- [ ] Sand
- [ ] Silt
- [x] Earth
- [ ] Rock cliffs
- [ ] Earth cliffs
- [ ] Poached
- [ ] Reinforced

Bordering land use
- [ ] Upland grass
- [ ] Perm/temp grass
- [ ] Mixed Broadleaf woodland
- [ ] Conifer wood
- [ ] Peat bog
- [x] Arable crop
- [ ] Salt marsh
- [ ] Urban/industrial
- [ ] Park/Garden
- [ ] Heath
- [ ] Fen
- [ ] Cattle/grazing
- [ ] Bank fenced?

Vegetation (DAFORN)
- [N] Bankside trees
- [R] Bushes
- [A] Herbs
- [O] Submerged weed
- [D] Reeds/sedges
- [A] Tall grass
- [O] Short grass

Human Disturbance:

Bank profile
- [ ] Flat <10°
- [ ] Shallow <45°
- [x] Steep >45°
- [ ] Vertical/undercut

Water Depth
- [x] <0.5m
- [ ] 0.5-1m
- [ ] 1-2m
- [ ] >2m

Watercourse Width
- [ ] 5-10m
- [ ] 1m
- [ ] 10-20m
- [ ] 1-2m
- [ ] 20-40m
- [x] 2-5m
- [ ] >40m

Current
- [ ] Slow
- [ ] Rapid
- [x] Sluggish
- [ ] Fast
- [ ] Static

WILDLIFE INFORMATION

Water vole
- [ ] Sightings (count)
- [ ] Latrines (count)
- [ ] Burrows (count)
- [ ] Footpath
- [ ] Pathway in vegetation
- [ ] Feeding remains
- [ ] Cropped grass around tunnel entrance.

720 footprints

Rat
- [ ] Sightings
- [ ] Droppings
- [ ] Footprints/runs

Otter
- [ ] Sightings
- [ ] Droppings
- [ ] Footprints/runs

Mink
- [ ] Sightings
- [ ] Droppings
- [ ] Footprints/runs

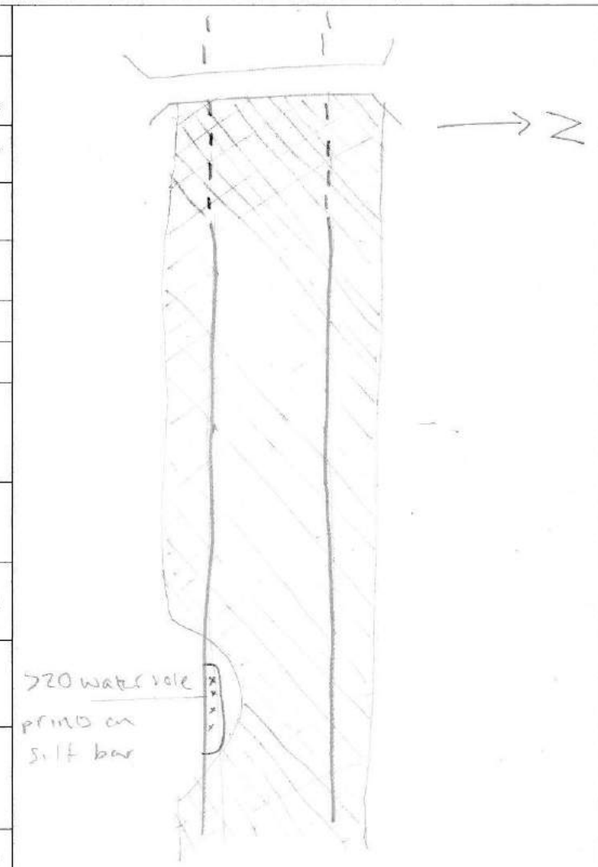
Other Wildlife:
- [ ] Kingfisher
- [ ] Heron
- [ ] Coot
- [x] Waterfowl
- [ ] Moorhen
- [ ] Dipper

Identified plants from feeding remains:

SKETCH OF SITE – water vole activity indicated (if any)

KEY TO SYMBOLS
(mark route surveyed and direction of flow, cross-section)

- Mature trees
- Over-hanging branches
- Fallen tree
- Exposed roots
- Pollarded tree P
- Sapling
- Scrub
- Hedgerow
- Fence
- Reed/sedge bed
- Flood bank
- Artificial bank
- Earth cliff



ADJACENT LAND USE CODES
- Broadleaved wood BW
- Conifer plantation CP
- Moorland/ Heath MH
- Rough Pasture RP
- Wetland WL
- Improved grass IG
- Tilled land (crop) TL
- Suburban/urban devel. (inc gardens) URB

OTHER FEATURES
- Roadbridge
- Footbridge
- Weir
- Culvert
- Ford
- Outfall
- Dredgings/spoil
- Silt bars
- Islands Mark position & size

ADDITIONAL COMMENTS:

WATER VOLE SURVEY FORM

BACKGROUND INFORMATION

Site name/river: Ditch 18

PIL number:

Surveyors: SOPHIE KING, EVE LOXHAM Date: 08/09/2020

HABITAT INFORMATION (mark features on map)

Survey distance: 10 m

Habitat:
- [x] Ditch
- [ ] Dyke
- [ ] Gravel Pit
- [ ] Pond
- [ ] Lowland lake
- [ ] Upland Loch
- [ ] Reservoir
- [ ] Running water
- [ ] Marsh/bog
- [ ] Canal

Shore/bank
- [ ] Boulders
- [ ] Stones
- [ ] Gravel
- [ ] Sand
- [ ] Silt
- [x] Earth
- [ ] Rock cliffs
- [ ] Earth cliffs
- [ ] Poached
- [ ] Reinforced

Bordering land use
- [ ] Upland grass
- [ ] Perm/temp grass
- [ ] Mixed Broadleaf woodland
- [ ] Conifer wood
- [ ] Peat bog
- [x] Arable crop
- [ ] Salt marsh
- [ ] Urban/industrial
- [ ] Park/Garden
- [ ] Heath
- [ ] Fen
- [ ] Cattle/grazing
- [ ] Bank fenced?

Vegetation (DAFORN)
- [ ] N Bankside trees
- [ ] D Bushes
- [ ] H Herbs
- [ ] S Submerged weed
- [ ] R Reeds/sedges
- [ ] A Tall grass
- [ ] F Short grass

Human Disturbance:

Bank profile
- [ ] Flat <10°
- [x] Shallow <45°
- [ ] Steep >45°
- [ ] Vertical/undercut

Water Depth
- [ ] <0.5m
- [x] 0.5-1m
- [ ] 1-2m
- [ ] >2m

Watercourse Width
- [ ] 5-10m
- [ ] 1m
- [ ] 10-20m
- [ ] 1-2m
- [ ] 20-40m
- [x] 2-5m
- [ ] >40m

Current
- [ ] Slow
- [ ] Rapid
- [ ] Sluggish
- [ ] Fast
- [ ] Static

WILDLIFE INFORMATION

Water vole
- [ ] Sightings (count)
- [1] Latrines (count)
- [3] Burrows (count)
- [ ] Footpath
- [x] Pathway in vegetation
- [ ] Feeding remains
- [ ] Cropped grass around tunnel entrance.

Rat
- [ ] Sightings
- [ ] Droppings
- [ ] Footprints/runs

Otter
- [ ] Sightings
- [ ] Droppings
- [ ] Footprints/runs

Mink
- [ ] Sightings
- [ ] Droppings
- [ ] Footprints/runs

Other Wildlife:
- [ ] Kingfisher
- [ ] Heron
- [ ] Coot
- [x] Waterfowl
- [ ] Moorhen
- [ ] Dipper

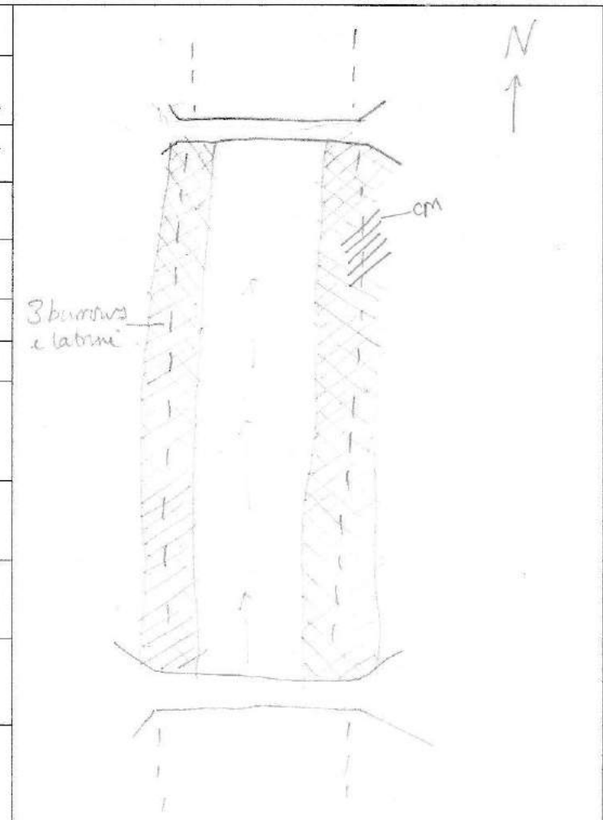
Identified plants from feeding remains:

SKETCH OF SITE – water vole activity indicated (if any)

KEY TO SYMBOLS (mark route surveyed and direction of flow, cross-section)

D18

Mature trees; Over-hanging branches; Fallen tree; Exposed roots; Pollarded tree P; Sapling; Scrub; Hedgerow; Fence; Reed/sedge bed; Flood bank; Artificial bank; Earth cliff



ADJACENT LAND USE CODES

Broadleaved wood	BW
Conifer plantation	CP
Moorland/ Heath	MH
Rough Pasture	RP
Wetland	WL
Improved grass	IG
Tilled land (crop)	TL
Suburban/urban devel. (inc gardens)	URB

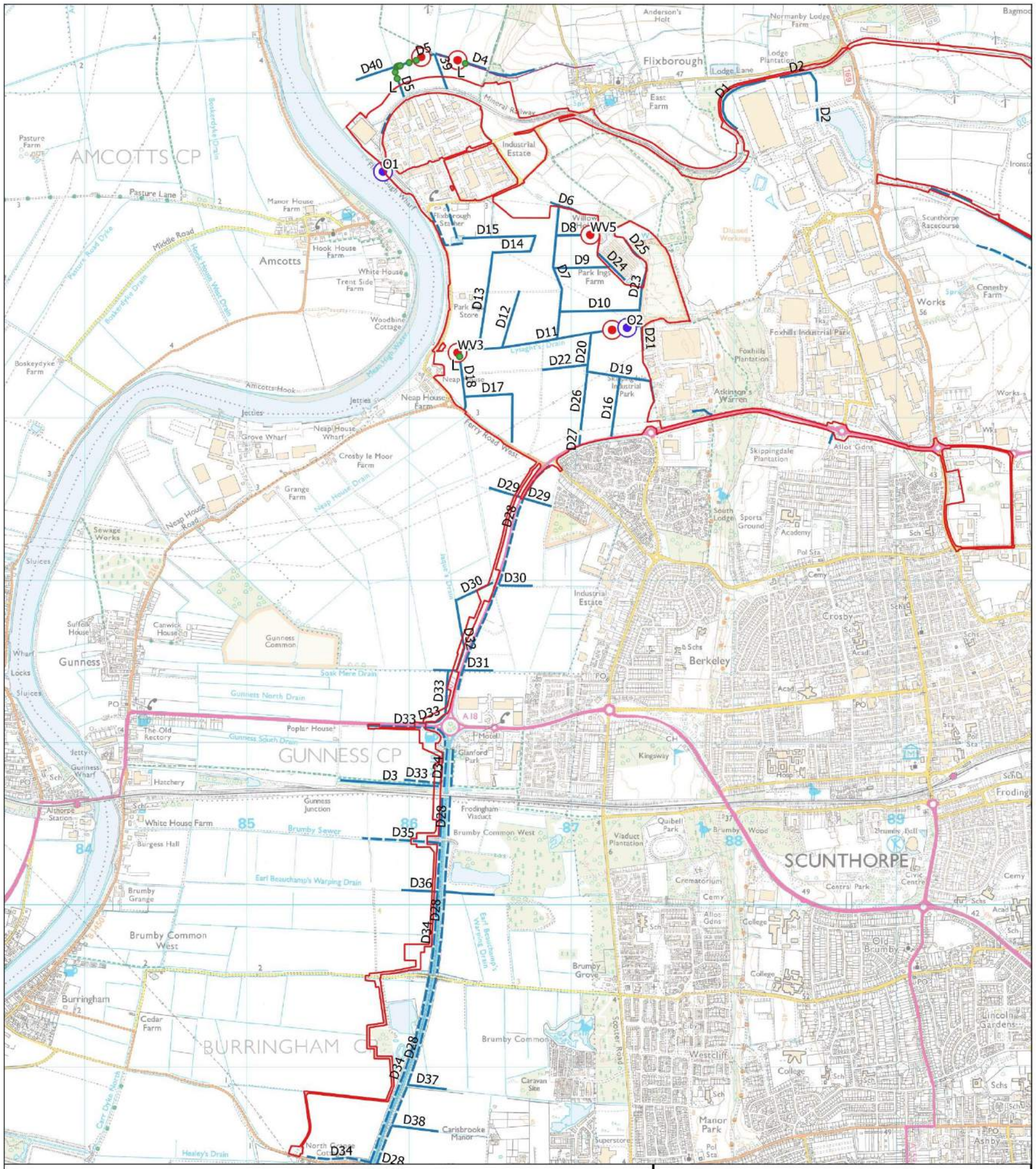
OTHER FEATURES

Roadbridge; Footbridge; Weir; Culvert; Ford; Outfall; Dredgings/spoil; Silt bars; Islands Mark position & size

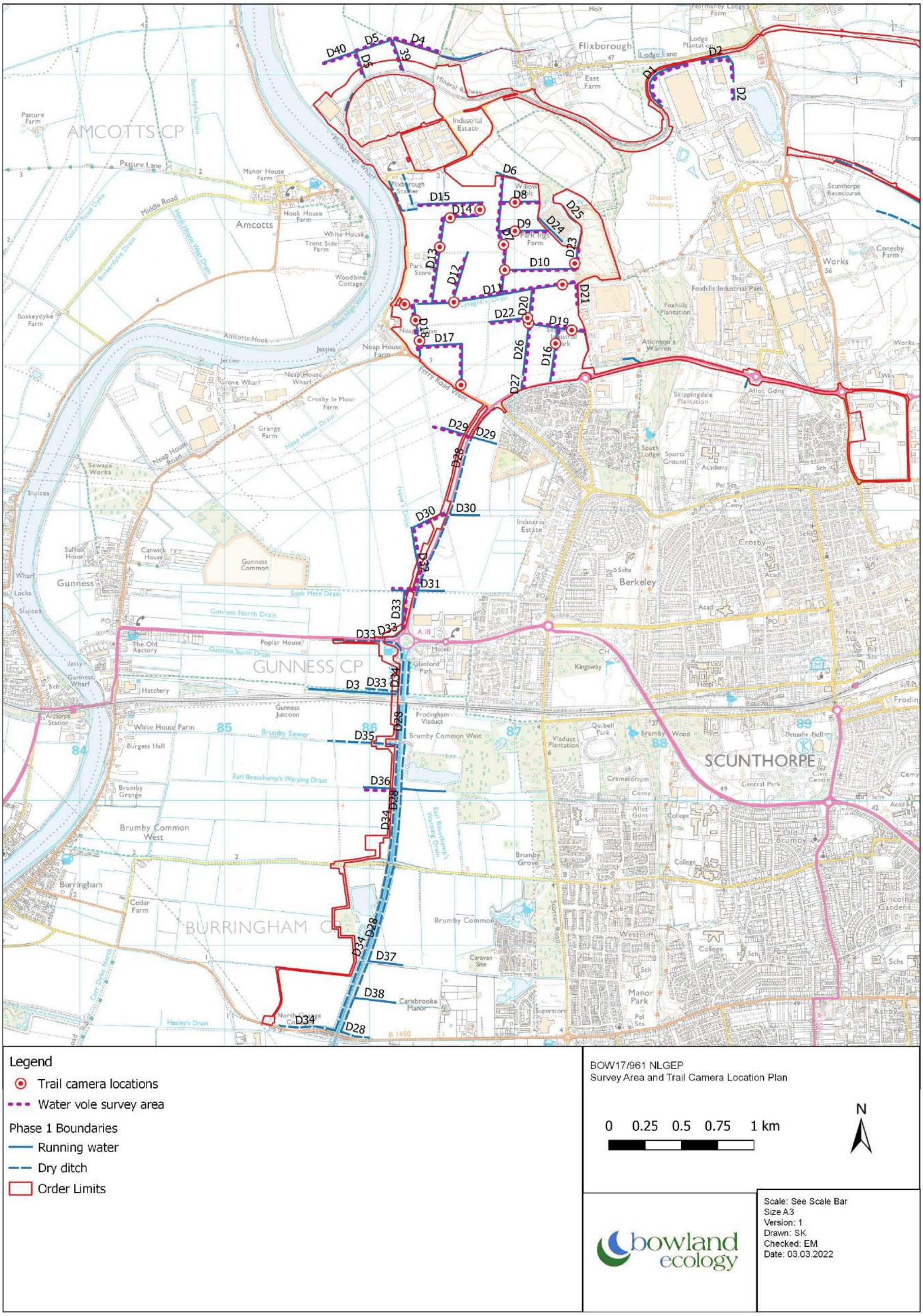
ADDITIONAL COMMENTS:

4m in width, shallow along banks but over 1m deep in centre. Banks are gently sloped at water edge and up to 5m in height. Small mammal runs along western bank, three burrows and a latrine identified as water vole present on the western bank

Appendix B: Survey Plan



Appendix C: Survey Area and Trail Camera Location Plan



Appendix D: Watercourse Target Notes and Photographs

D1	Ditch 1 (central NGR: SE 88459 15154) is located to the south of the Railway Reinstatement Land, in the grounds of an industrial estate. Much of the southern part of Ditch 1 was completely dry and dense common reed (*Phragmites australis*) growth. The northern section of the ditch had water flowing from a manhole cover and was heavily shaded by willow (*Salix* sp.) scrub, with little or no bankside herbaceous vegetation, and no aquatic plants present. Not suitable for water voles, and no signs were observed.	
D3	Ditch 2 (central NGR: SE 87923 14977), is also located in the industrial estate to the south of the Railway Reinstatement Land. The ditch is 2-4 m wide, supporting much reedmace (*Typha* sp.) and dense common reed along its margins, with grassy herbaceous banks. Dense algae forming at the surface and becoming thicker throughout the season. The ditch offers suitable habitat for water vole, no evidence of water vole was observed.	
D3	A large ditch which runs laterally to the raised embankment of the railway line. Approximately 650 m x 20 m, with a deep central area. The banks are exposed earth with no aquatic vegetation present; however the western section of the ditch is dense with common reed. The water is shallow and clear, with an earth substrate. The ditch margins are 100% shaded by willow.	
D4	Ditch 4 is fed by a vigorous spring at the south-eastern end. The banks are 2 m deep and the channel is 1.5 m in width, with a water depth of 0.6 m. Grasses and tall herbs dominate the banks. The channel connects to the Burton and Flixborough Drain (ditch 5) and the western end. At the upstream (south-eastern) end the water is shallow and the bed is rocky, with flowing water about 10 cm deep, grass-covered steep banks, and no signs of water vole. A short distance downstream the gradient becomes less, the water flows more gently, and the bed substrate is earth. Occasional water vole runs, burrows and feeding stations are present in the downstream section of the ditch. Overall, there is low water vole activity in the ditch, with greater activity observed in ditch 5.	
D5	The Burton and Flixborough Drain, is a broad drain, approximately 2 m deep, with a channel width of 6 m between the bank tops, and a channel width of 2 m at the water level. There are large areas of open water and the ditch has steep grass and tall herb covered banks. The water is 20-30 cm deep, with abundant aquatic plants, dominated by pond water starwort (*Callitriche stagnalis*), with occasional emergent grasses and water crowfoot (*Ranunculus aquatilis*). There are abundant signs of water voles, with many burrows at, below and above the water line. Abundant runs and piles of chopped grass were recorded. Occasional small latrines and scattered droppings	

	were present, mostly comprising small piles of 5-10 droppings per latrine. Overall, there is medium water vole activity in the ditch	
D6	Wet ditch in an arable field which connects to D7. The water is still therefore the direction of flow was not determined. The ditch is 0.5 wide and under 0.5 deep, the eastern section of the ditch was dry at the time of survey. The substrate is silt and the water is turbid. The banks are at a 45° angle and heavily vegetated by grasses on the south banks, species present include false oat-grass, Yorkshire fog, creeping bent and perennial ryegrass. The north bank is dominated by tall ruderal vegetation including nettle and rosebay willowherb. Common reed is present in the western section of the channel, the shallower eastern section has grasses growing in the channel.	
D7	Wet ditch with slow moving water which flows from north to south, connected to D6, D8, D9, D10 and D11. The ditch has a width of 1 m and is under 0.5 m deep. The substrate is silt with clear water. The banks are 45° steep and vegetated by false oatgrass (*Arrhenatherum elatius*), common hogweed (*Heracleum sphondylium*), nettle (*Urtica dioica*), cow parsley (*Anthriscus sylvestris*) and occasional bramble (*Rubus fruticosus* agg.). The northern stretch is dominated by common reed, fools-water-cress (*Heloscadium nodiflorum*) and water starwort (*Callitriche palustris*), alongside areas of dense common duckweed cover. The southern stretch has been subject to recent dredging therefore there is no in channel vegetation.	
D8	Wet ditch in arable field which connects with D7. The water is shallow and the width of 1 m. The banks 2 m in height, at a 45° angle and vegetated with nettle, rosebay willowherb (*Chamerion angustifolium*), Yorkshire fog (*Holcus lanatus*), cocksfoot (*Dactylis glomerata*), teasel (*Dipsacus fullonum*), fools-water-cress, rush (*Juncus* sp.) and cow parsley. The ditch is dense with common reed in the eastern section, becoming more open to the west. Emergent vegetation present includes fools-water-cress and water starwort. Assessed as having high potential for water vole.	N/A
D9	Wet ditch with slow moving water, flowing east to west, connecting to D7. Approximately 1 m wide and under 0.5 m deep. The substrate is silt and the water is clear. The earth banks are steep, at 30°, and vegetated by false oat-grass, perennial ryegrass (*Lolium perenne*), cocksfoot, nettle, marsh thistle (*Cirsium palustre*), cow parsley and common hogweed. Emergent vegetation is dominated by common reed, alongside frequent reedmace and occasional rush.	
D10	Wet ditch in arable fields connected to D7. The water is still with no direction of flow. Approximately 1 m wide, with a silt substrate and turbid water. The banks are steep at a 45° angle, and 2 m high. The banks are dominated by common reed, other species present comprise cocksfoot, Yorkshire fog, nettle, cow parsley, fools-water-cress and cleavers (*Galium aparine*). No emergent vegetation is present, potentially due to recent dredging.	N/A

D11	The main wet ditch on within the Order Limits, flowing from east to west and draining at the western boundary of the Order Limits where it creates a wide, deep standing body of open water. D11 connects to D13, D12, D7, D18 D20 and D21.The flow varies from low – moderate throughout the channel, alongside varying in width; from 1.5 to 5 m wide, and varying in depth; from under 0.5 m to over 0.5 m deep. The substrate is silt with some areas of stone and gravel. The water is turbid throughout. The banks at the eastern section are very steep, up to an 80° angle, and up to 4 m in height. The banks at the western section feature reinforced metal sheeting on the southern bank. The banks are vegetated by false oat-grass, nettle, teasel (*Dipsacus fullonum*), common reed, bramble, common hogweed and cow parsley. There is dense bramble scrub with scattered hawthorn (*Crataegus monogyna*) scrub present at the western section. The majority of the ditch features no emergent vegetation, most likely due to dredging, however the eastern section of the ditch had not been subject to dredging at the time of survey and was dense with common reed, with occasional water mint present.	
D12	Wet ditch in arable fields which connects to D11. The water was still therefore no direction of flow was determined. The substrate is silt and the water is turbid. Approximately 1 m wide and under 0.5 deep, with some areas drying. The banks are steep at a 45° angle, marginal vegetation recorded comprises false oat grass, perennial ryegrass, marsh thistle, common hogweed, cow parsley, cleavers and nettle. Dense with common reed throughout the channel length. Small mammal tracks and burrows are present along the banks.	
D13	Wet ditch in arable field which connects to D11 and D14. Approximately 0.5-1 m wide and 10 cm deep with a silty substrate. The banks are 1.5 m high and steep at an angle of 45 and vegetated by cocksfoot, Yorkshire fog, broad-leaved dock (*Rumex obtusifolius*), nettle, bramble and common reed. Emergent vegetation includes common reed, water starwort and fools-water-cress.	N/A
D14	Wet ditch in arable field, adjacent to area of set aside land. The water is still with no direction of flow. There is a stilt substrate. The ditch connects with D13 and D15, and is approximately 1 m wide. The banks are steep, at a 45° angle and up to 1 m in height. In channel the ditch is dense with common reed, the bankside vegetation includes cocksfoot, Yorkshire fog and nettle.	N/A
D15	Narrow, wet ditch which connects with D14. Situated in arable field, adjacent to an area of set aside land. The substrate is silt and the water is still. Under 0.5 m wide and under 0.5 m deep, the ditch has steep banks which are sloped at a 60° angle, and up to 1 m in height. Marginal vegetation includes false oat-grass, common reed, nettle, common hogweed and cow parsley. In channel, common reed is abundant.	
D16	Wet ditch in arable fields which connects to D19. A culvert is present at the south, under the road. Turbid with a silt	N/A

	substrate and slow flowing from south to north. Shallow, with a width of 0.5 m and steep, high banks; 45° and up to 2 m in height. The banks are vegetated with short and long grasses, some areas of erosion are present, species noted comprise Yorkshire fog, cocksfoot, cow parsley, cleavers and nettle. No emergent vegetation was noted.	
D17	Wet ditch in arable fields which connects to D18. Shallow, 5-10 cm deep with a slow flow. The substrate is silt and an oily sheen is present on the eastern section of the ditch. The banks are steep, at a 45° angle, up to 3 m in height, have been recently cut and are dominated by grasses; cocksfoot, Yorkshire fog and common reed. Occasional bramble, common hogweed and bent grass (*Agrostis* sp.) are also present. Small amounts of fools-water-cress were noted in channel. Three badger setts are present along the ditch, alongside multiple small mammal burrows.	N/A
D18	Wet ditch in arable fields flowing south to north, connecting to D11 and D17. The ditch is culverted beneath the road to the south. The substrate is silt and the water is turbid. The dich is up to 3 m wide in areas and over 0.5 m deep. The banks are steep, approximately 45° and high, up to 4 m in height. The majority of the banks are vegetated, with some areas of erosion leaving exposed earth. The eastern bank has areas of dense bramble scrub, bracken (*Pteridium aquilinum*) growth, scattered hawthorn scrub and tall ruderal vegetation. The western bank is dominated by short and long grasses. Species present comprise perennial ryegrass, false oat-grass, common hogweed, yarrow (*Achillea millefolium*), nettle, bramble and bracken. There is limited emergent vegetation due to recent dredging. The dredged silt and vegetation is piled on the west bank, species present in the dredged vegetation include common weed, brooklime (*Veronica beccabunga*) and fools-water-cress. Multiple small mammal tracks and burrows are present and an active badger sett was noted on the east bank of the ditch.	
D19	Wet ditch in arable fields, adjacent to industrial park. A culvert is present at the east within the industrial estate. The substrate is silt and the water is turbid with a slow flow from east to west. Up to 1 m wide and 10 cm deep, with high, steep banks; 3 m in height at a 45° angle. The banks have been recently cut and comprise grasses and tall ruderal vegetation. Species noted include cocksfoot, Yorkshire fog, nettle, dock, common reed, bramble, red fescue (*Festuca rubra*) and cow parsley. The eastern section of the ditch is narrower with stony banks.	N/A
D20	Wet ditch in arable fields which connects with D11, D19, D22 and D26. Approximately 2 m wide, under 0.5 m deep. The substrate is silt, the water is clear and flows from south to north. The banks are steep, at a 60° angle, up to 3 m in height and vegetated by short and long grasses, cow parsley, nettles, cranesbill (*Geranium* sp.), the eastern bank is vegetated by common reed and areas of bramble scrub. No emergent or submerged vegetation are present as the ditch has been recently dredged. Vegetation and silt have	

	been deposited on the eastern bank, common reed and water mint were noted in the deposits.	
D21	A small section of shallow wet ditch situated on an arable field boundary, immediately adjacent to an industrial park and within an area of dense willow scrub. The banks are bare earth, the substrate is silt and there is abundant leaf litter in the channel. Assessed as having negligible potential for water vole.	N/A
D22	Narrow, wet ditch in arable fields. The water is turbid and still with no direction of flow. Approximately 0.5 m wides and under 0.5 m deep, with a silt substrate. The banks are steep, 45°, and vegetated by short and long grasses. Species present comprise nettle, hogweed, cow parsley, common reed, creeping thistle (*Cirsium arvense*), perennial ryegrass, Yorkshire fog and false oat-grass. In channel, the ditch is dominated by common reed with occasional fools-water-cress and water mint (*Mentha aquatica*).	
D23	Wet ditch situated on an arable field boundary adjacent to area of dense will scrub and bracken. The substrate is silt, there is no water visible. Very shallow and dense with reedmace, sedges, common reed and bracken. The banks are steep, 45°, up to 2 m in height and vegetated by short and long grasses. The ditch connects to a pond.	N/A
D24	Dry ditch with a hawthorn hedgerow planted on the eastern bank. The substrate is earth and the ditch appears to have been dry for some time, no aquatic vegetation is present. The banks are steep at a 45° angle, and up to 1 m in height. Predominantly bare earth, the banks are vegetated by false oat grass, ground ivy and nettle.	N/A
D25	Wet ditch which connect to a pond. The water is shallow (approximately 15 cm deep), with no flow and an earth substrate. In channel the ditch is dense with common reed, making very little water visible. The banks are at a 30° angle, 1 m in height and vegetated by common reed, perennial ryegrass, nettle, broad-leaved dock, yarrow and common hogweed.	N/A
D26	Wet ditch situated between arable fields and connecting to D19, D20 and D22, culverted at both the north and south. The water is shallow, under 10 cm deep, with a slow to still flow from south to north. The channel width is variable, from 0.5 m to 1.5 wide, on a silt substrate with occasional pebbles present. In channel vegetation comprises dominant common reed, frequent fools-water-cress, alongside occasional brooklime, water-starwort and water-crowfoot (*Ranunculus aquatilis*). The banks are earth, steep at a 45° angle and up to 2 m in height. Bankside species recorded comprise common reed, nettle, cow parsley, creeping thistle, false oat-grass, ground ivy (*Glechoma hederacea*) and common hogweed.	
D27	Short section of wet ditch approximately 20 m long, situated in arable fields, connecting to D31 by a culvert at the north, as well as a culvert under the road at the south. The water is shallow, under 20 cm in depth, with a slow, almost still flow from south to north. The water is clear and the substrate is silt. Emergent vegetation comprise dominant fools-water-cress and occasional common reed. The banks are earth,	N/A

	steep, approximately 45° and up to 2 m in height. Marginal vegetation comprises common reed, false oat-grass, common hogweed, ground ivy, rosebay willowherb and nettle.	
D28	A dry ditch which runs to the east and parallel of the A1077 and M11. Connected to wet ditches comprising D28, D29, D30, D31, D36, D37 and D38. The channel is 1.5 – 2 m in width. The banks vary in gradient between 30° and 60°. The banks and substrate are earth, the ground is wet underfoot. Emergent vegetation is dominated by common reed, with occasional reedmace also recorded. Hawthorn, willow, bramble, great willowherb (*Epilobium hirsutum*) and hedge bindweed (*Calystegia sepium*) were frequently recorded in the channel, suggesting that the ditch regularly dries out. Marginal vegetation in the northern section comprises tall ruderal vegetation, scattered scrub and occasional dense scrub. Species recorded include Yorkshire fog, false oat grass, great willowherb, wormwood (*Artemisia absinthium*), broad-leaved dock, hedge bindweed, nettle, yarrow, hemlock (*Conium maculatum*), hawthorn and willow.	
D29	A wet ditch which connects to D28 and culverts beneath the A1077. The ditch has shallow water, which is under 0.5 m deep, with no flow and silt substrate. The channel is 1 m in width, with steep, 45°, earth banks. The emergent vegetation is dominated by common reed. Marginal vegetation recorded includes Yorkshire fog, common hogweed, common reed, cleavers and great willowherb.	
D30	A wet ditch which connects to D28 and culverts beneath the A1077. To the east of the road the ditch has shallow water, which is under 0.5 m deep. To the west of the road, the water depth is over 0.5 m and the channel is 1.5 m in width, with banks up to 4 m in height. The substrate of the ditch is silt and the water is still, with no direction of flow. The channel is 1 m wide, with steep, 45° earth banks. The channel is dominated by common reed. Marginal vegetation includes common reed, Yorkshire fog, cocksfoot, broad-leaved dock, cleavers, common hogweed, white campion (*Silene latifolia*), common poppy (*Papaver rhoeas*), nettle, common ragwort (*Senecio jacobaea*) and great willowherb.	
D31	Wet ditch which connects to D28 and has a large cement culvert beneath the A1077 road. Approximately 1.5 m wide, with a water depth of greater than 0.5 m. The earth banks are steep and up to 3 m in height. The substrate is silt, the water is still with no direction of flow. Emergent vegetation comprises common reed and yellow iris. Marginal vegetation includes cocksfoot, Yorkshire fog, false oat-grass, broad-leaved dock, common poppy, common ragwort, white campion, nettle, yarrow, creeping thistle, spear thistle (*Cirsium vulgare*), great willowherb, herb-Robert (*Geranium robertianum*), ribwort plantain (*Plantago lanceolata*), black medic (*Medicago lupulina*) and meadow cranesbill (*Geranium pratense*).	

D32	Large wet ditch which connects to D31. The channel is up to 2 m in width, with a water depth of more than 0.5 m. The water is clear and still, with no direction of flow. The banks are steep and up to 4 m in height. Vegetation recorded in channel comprises yellow iris and common reed. The banks are grassy, with Yorkshire fog, cocksfoot, yarrow, poppy, common ragwort, white campion, bramble, and common hogweed recorded in the marginal vegetation.	
D32	A wet ditch which connects to D31. The water is approximately 0.5 m deep, still, with no direction of flow. The channel is 1.5 in width and the substrate is suit. Common reed dominated the channel, with occasional reedmace and yellow iris also recorded. The earth banks are steep and deep cut, up to 3 m in height. Marginal vegetation comprises Yorkshire fog, cocksfoot, common reed, broad-leaved dock, nettle, common ragwort, common poppy, great willowherb and white campion.	
D33	Dry ditch in arable field, adjacent to public footpath, located in an area of dense hawthorn scrub. The ditch is approximately 1 m in width, with steep earth banks and an earth substrate. The channel is dominated by common reed. Marginal vegetation includes Yorkshire fog, cocksfoot, great willowherb, common reed, creeping thistle, bramble and nettle.	
D34	A dry ditch runs parallel to the west side of the heat network, located to the west of the M181 road. The ditch has a channel which is approximately 1.5 m wide. Steep earth banks, which are up to 2 m in height. In some areas the banks are reinforced with concrete. In channel vegetation is dominated by common reed, with reedmace and yellow iris also recorded. Hawthorn, willow, bramble, great willowherb and nettle were frequently recorded in the channel, suggesting that the ditch regularly dries out. The ditch is located in a continuous strip of scrub. Marginal vegetation includes hawthorn, bramble, rose (*Rosa* sp.), willow, cocksfoot, false oat-grass, spear thistle, rosebay willowherb, great willowherb, bracken, hemlock and white campion.	
D35	Dry ditch which connects to D34. Approximately 1 m wide, with steep earth banks which are up to 2 m in height. The channel is dominated by common reed, with common ragwort, creeping thistle and nettle also recorded in the channel. The banks support cocksfoot, ragwort and common reed, suggesting that the ditch regularly dries out. Marginal vegetation comprises nettle, creeping thistle, cow parsley, common vetch (*Vicia sativa*), hedge bindweed, bramble, great willowherb. The vegetation on the north bank is cut to under 20 cm, whereas the vegetation on the south bank has a sward length of over 1 m.	

D36	A wet ditch which connects to D28 and D34 and is culverted beneath the M181 road. The channel is 2 m wide, and the water has a depth of greater than 0.5 m. The water is still and turbid, with no direction of flow. The banks are earth and steep, at a 45° angle. The substrate is silt. The channel is dominated by common reed. Marginal vegetation recorded comprises cocksfoot, bracken, hemlock, common hogweed, creeping thistle and common poppy.	
D37	A wet ditch which connects with D28. The channel is 1.5 m wide, with steep earth banks that are deep cut and up to 2 m in height. The substrate is silt. The ditch has a water depth of approximately 0.5 m. The channel is dense with common reed. Marginal vegetation includes Yorkshire fog, cocksfoot, false oat-grass common ragwort, poppy, common hogweed and nettle.	
D38	A wet ditch which connects to D28. Approximately 1 m in width, with a water depth of under 0.5 m. The water is still, with no direction of flow. The banks are earth and steep. Common reed is abundant in the channel. Marginal vegetation comprises cocksfoot, false oat-grass, common ragwort, common poppy, common hogweed and nettle.	
D39	Ditch 39 has a channel which is1.5m deep, with a 60cm wide water filled base, and a water depth of 5-10cm. The banks are steep, at a 45° gradient. Tall grasses and herbaceous plants dominate the banks. During the water vole survey, no evidence of water vole was recorded. Abundant signs of small voles, including small vole halls, runs, droppings and little piles of chopped grass were observed.	
D40	Ditch 40 is a small heavily overgrown arable field drain. The channel is 0.5 m wide and 0.5 m deep. The ditch is completely dry and filled with grasses. No evidence of water vole was recorded during the survey. The ditch is considered sub-optimal for water vole due to the absence of open water, however foraging and commuting water vole from the adjacent ditches may traverse the area.	

APPENDIX E ORNITHOLOGY SURVEYS

Date: March 2022

North Lincolnshire Green Energy Park

Technical Appendix E: Ornithological Surveys

May 2022

Control sheet

 [redacted]	Unit 8, Second Floor Holmes Mill, Greenacre Street Lancashire, BB7 1EB. 01200 446777 Unit 2 Dye Works, New Lanark, ML11 9DB. 01555 438880
Job number:	BOW17/961
Title:	NLGEP Technical Appendix E: Ornithological Surveys
Client:	North Lincolnshire Green Energy Park Ltd
Prepared by:	Sophie King, *Ecologist* Mark Breaks, *Ecologist* Claire Wilson, *Senior Ecologist*
Checked by:	Jeremy James, *Director & Principal Ecologist* Dr Ed Mountford, *Associate Principal Ecologist* Sarah Birtley, *Senior Ecologist*
Date of Issue:	May 2022
Version:	4
Revisions:	Addition of further survey information (breeding and migratory surveys 2021 - 2022)
Status:	Final

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This report has been prepared by an ecological specialist and does not purport to provide legal advice. You may wish to take separate legal advice.

The information which we have prepared and provided is true, and has been prepared and provided in accordance with the BS42020:2013 and the Chartered Institute of Ecology and Environmental Management's Code of Professional Conduct. We confirm that the opinions expressed are our true and professional bona fide opinions.

Bowland Ecology is accredited to Quality Guild (QG) standards in respect of our Quality, Environmental and Health and Safety procedures. The QG is an independent externally audited and accredited system that has been developed according to the principles of ISO9001, ISO14001 and OHAS18001.

Signed (Author) [redacted]	Signed (QA) [redacted]

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1. Introduction

1.1 Bowland Ecology Ltd was commissioned to undertake an ornithological assessment to inform the North Lincolnshire Green Energy Park (NLGEP) ('the Project'), a Nationally Significant Infrastructure Project (NSIP) located at Flixborough, North Lincolnshire. For the purposes of this report, the areas within the Project Order Limits are split into the following subsections:

- the Energy Park Land - an area within the Order Limits containing the core elements of the Project (Energy Recovery Facility, CO_2 capture, ash treatment and concrete block manufacturing facility, plastic recycling facility, visitor centre, hydrogen production and re-fuelling station), located north of Ferry Road West (B1216);

- the Railway Reinstatement Land - reinstatement of the existing 6 km Dragonby to Flixborough branch line and construction and operation of a new railhead to the south of Flixborough Wharf, with the primary purpose of facilitating the delivery and export of materials to and from the Energy Park;

- the Northern District Heat and Private Wire Network (DHPWN) Land – running from the southern end of the Energy Park Land, east along the A1077 (Phoenix Parkway) before looping around Normanby Road (Option A) or Bessermer Way (Option B) to the east; and

- the Southern DHPWN Land - running from the southern end of the Energy Park where the B1216 (Ferry Road West) joins, extending south through the agricultural land on the west side of the A1077. Both DHPWN will support the same buried utilities infrastructure; comprising insulated supply and return pipework for heat and cabling to supply electrical power.

1.2 The Energy Park Land, located east of the River Trent, includes areas of the RMS Ports and occupied land within the Flixborough Industrial Estate, within which three bodies of standing water were recorded. Arable farmland is the dominant habitat within the Energy Park Land and features a network of interconnected arable field drains and associated marginal vegetation. This subsection also includes a mosaic of semi-natural habitats which includes dense hawthorn and willow scrub, scattered mature trees, hedgerows, extensive bracken cover, areas of dry swamp habitat dominated by common reed (*Phragmites australis*), a small area of semi-improved acid grassland, tall ruderals, and species-poor semi-improved grassland. Five bodies of standing water are present in this mosaic habitat.

1.3 The Railway Reinstatement Land is a disused mineral railway spur running from the Flixborough Wharf to Dragonby Rail Sidings. Habitats are dominated by scattered, dense and continuous scrub, with areas of deciduous woodland, grassland and disturbed ground.

1.4 The Northern DHPWN Land is dominated by hardstanding (roads), alongside adjacent hedgerows, grassland, deciduous woodland, dense and scattered scrub and allotments. The Phoenix Parkway Local Nature Reserve (LNR) and Local Wildlife Site (LWS) and The Atkinson's Warren LNR/LWS are adjacent to the Northern DHPWN Land. To the east and south, the adjacent habitats include hardstanding, buildings, gardens, ornamental planting and small areas of scrub and tall ruderal vegetation.

1.5 The Southern DHPWN Land is largely dominated by arable farmland, with associated field margins, arable field drains and marginal vegetation. There are small areas of plantation and semi-natural deciduous woodland scattered adjacent to the Order Limits. The easement of the M181 features reinforced lateral drains which were recorded as dry ditches at the time of survey. The easement area is dominated by scrub, marginal and tall ruderal vegetation for the length of the M181.

1.6 The Project lies 5.8 km south (at the closest point) of the Humber Estuary Special Protection Area (SPA). As such, the Project has the potential to negatively impact qualifying bird species for which the SPA is designated. Therefore, the potential for the Project area to be utilised by associated wintering, passage and breeding birds will be assessed. The SPA comprises extensive areas of wetland and coastal habitats. The inner estuary supports reedbed habitats, with areas of mature and developing saltmarsh adjoined by grazing marsh in the middle and outer estuary. On the north Lincolnshire coast, the saltmarsh is adjoined by low sand dunes with marshy slacks and brackish pools. The estuary supports important numbers of waterbirds (especially geese, ducks and waders) during the migration periods and over winter. Qualifying features of the SPA (which are set out in full in Appendix I include:

- the SPA qualifies under Article 4.1 of the EU Birds Directive as it supports populations of the following Annex I species; bittern *(Botaurus stellaris*), marsh harrier (*Circus aeruginosus*), avocet (*Recurvirostra avosetta*), little tern (*Sterna albifrons*), avocet (*Recurvirostra avosetta*), hen harrier (*Circus cyaneus*), golden plover (*Pluvialis apricaria*), bar-tailed godwit (*Limosa lapponica*) and ruff (*Botaurus stellaris*); and
- the SPA also qualifies under Article 4.2 of the EU Birds Directive in that it supports an internationally important assemblage of waterfowl of over 150,000 waterbirds. The SPA is also used by a variety of Annex I species that are not listed as qualifying species as numbers recorded within the site are less than 1% of the Great Britain population. These include non-breeding merlin (*Falco columbarius*), peregrine (*F. peregrinus*), short-eared owl (*Asio flammeus*), and breeding common tern (*Sterna hirundo*) and kingfisher (*Alcedo atthis*).

1.7 As the Project has evolved, the following surveys have been commissioned to provide baseline information on the numbers and distribution of wintering and breeding birds within the Order Limits (see Figure 1):

- **wintering bird surveys undertaken between November 2018 and March 2019.** These cover areas adjacent to the Flixborough Wharf and River Trent, falling within the Energy Park Land and the Railway Reinstatement Land (see Appendix E);
- **wintering bird surveys undertaken between November 2019 and April 2020.** These cover the entire Energy Park Land and the western section of the Railway Reinstatement Land and adjacent arable fields (see Appendix F);
- **breeding bird surveys undertaken between April 2019 and June 2019.** These capture the Railway Reinstatement Land (see Appendix G);
- **breeding bird surveys undertaken in June 2020 and April to June 2021.** These cover the entire Energy Park Land and the western section of the Railway Reinstatement Land and adjacent arable fields (see Appendix H); and
- **migratory and wintering bird surveys undertaken in August 2021 to April 2022.** These surveys cover the entire Energy Park Land and the western section of the Railway Reinstatement Land and adjacent arable fields (see Appendix L).

1.8 This report includes a description of assessment methods, describes the survey results, and sets out associated plans/figures.

2. Methodology

Desk Study and Habitat Assessment

2.1 Local records on and within 5 km of the Project were obtained following a data search with Greater Lincolnshire Nature Partnership (GLNP). Records from 2000 onwards are included in this report. Suitable habitats for breeding, migratory and wintering were assessed based the extended Phase 1 habitat surveys of land within the Order Limits.

Wintering Bird Surveys

2.2 The 2018/2019 wintering bird surveys were undertaken on the 30th November 2018 by Louise Redgrave MA (Oxon), MSc, MCIEEM, CEcol, CEnv, and the 18th December 2018, 22nd January, 14th February and 1st March 2019 by Mark Breaks BSc (Hons). A modified wintering bird survey was conducted in line with the specifications detailed by the British Trust for Ornithology (BTO) (Gilbert *et al.* 1998). This method is a 'scaled down' version of the Wetland Bird Survey (WeBS) combined with Low Tide Counts. Surveys involved the ornithologist walking the survey area boundary twice (see Figure 1 for survey area) and recording and mapping all bird species (peak counts) present within the survey area and in the surrounding areas, with particular focus on the River Trent, located to the west of the Order Limits, and the arable fields to the north. Additional vantage point counts were undertaken from the B1392 and adjacent riverbank to the north and east of the village of Amcotts, to the west of the Project. Surveys were completed at various stages of the tidal cycle and took between two to three hours in duration.

2.3 The 2019/2020 wintering bird surveys were undertaken on the 3th November 2019, 16th and 17th December 2019, 14th and 15th January 2020, 19th and 20th February 2020, and the 17th and 18th March 2020 by Sophie King MSc, BSc. A modified wintering bird survey was conducted with reference to good practice guidance survey methodology, i.e. the BTO Wintering Farmland Bird Survey methodology (Gillings et al., 2008) and generic wintering bird monitoring methods detailed in Bird Monitoring Methods (Gilbert et al., 1998). Five survey visits were undertaken between November and mid-March. Surveys were undertaken between dawn and dusk (approximately 8am and 5pm depending on daylight hours). The survey area for the wintering bird surveys is shown in Figure 2. Following the initial November 2019 wintering bird survey, the survey area was extended as the Project evolved.

2.4 During all surveys, visits were planned to avoid adverse weather conditions, such as heavy rain and strong wind, as this can reduce bird activity (Gilbert et al., 1998). Surveys were spread evenly throughout the winter season. Bird species and their abundance were recorded as well as any additional information on behaviour. Observations were aided by the use of binoculars. Registrations of birds (sight or sound) were marked onto bird survey plans (see Appendix E and F) using standard BTO species codes. Care was taken during the surveys to avoid double counting species/flocks by only recording birds in forward sightlines.

2.5 Weather conditions and Flixborough Wharf tide times during the surveys are detailed in Table 1 below.

Table 1: Weather conditions and tide times during wintering bird surveys

Date (Time)	Survey Area	Weather	High Tide (HT)Low Tide (LT)
30 Nov 2018 (10:45-13:20)	Figure 1	Dry, sunny (3/8 cloud) and gentle breeze (F3 SW), temperature of approximately 8°C.	HT – 12:40 LT – 07:49
18 Dec 2018 (11:30-14:20)	Figure 1	Light rain showers, cloudy (8/8 cloud) and moderate breeze (F4 SSW), temperature of approximately 9°C.	HT – 15:30 LT – 10:24
22 Jan 2019 (10:45-13:00)	Figure 1	Dry, sunny (3/8 cloud) and calm (F1 W), temperature of approximately 5°C.	HT – 07:50 LT – 15:56
14 Feb 2019 (08:50-11:00)	Figure 1	Dry, sunny (1/8 cloud) and calm (F1/2 S), temperature of approximately 9°C.	HT – 13:26 LT – 08:35
1 Mar 2019 (11:00-13:30)	Figure 1	Dry, cloudy (8/8 cloud) and calm (F1 SW), temperature of approximately 7°C.	HT – 15:13 LT – 10:33
13 Nov 2019 (08:30-15:00)	Figure 2	Dry, sunny (1/8 cloud) and calm (F1 SW), temperature of approximately 6°C.	N/A
16 Dec 2019 (09:15-14:50)	Figure 2	Dry, sunny (2/8 cloud) and calm (wind F1 S), temperature of approximately 6°C.	N/A
17 Dec 2019 (09:15-14:45)	Figure 2	Dry, overcast (8/8 cloud) and calm (F1 SW), temperature of approximately 4°C.	N/A
14 Jan 2020 (08:52-14:00)	Figure 2	Dry with occasional rain, overcast (3/8 cloud), strong wind (F2-F3 SE), temperature of approximately 4°C.	N/A
15 Jan 2020 (09:12-15:00)	Figure 2	Dry, overcast (8/8 cloud), calm (F1 SW), temperature of approximately 6°C.	N/A
19 Feb 2020 (11:00 – 15:00)	Figure 2	Dry, overcast (8/8 cloud), calm (F2 SW), temperature of approximately 7°C.	N/A
20 Feb 2020 (09:00-14:00)	Figure 2	Light rain, overcast (8/8 cloud), moderate breeze (F3 SW), temperature of approximately 8°C.	N/A

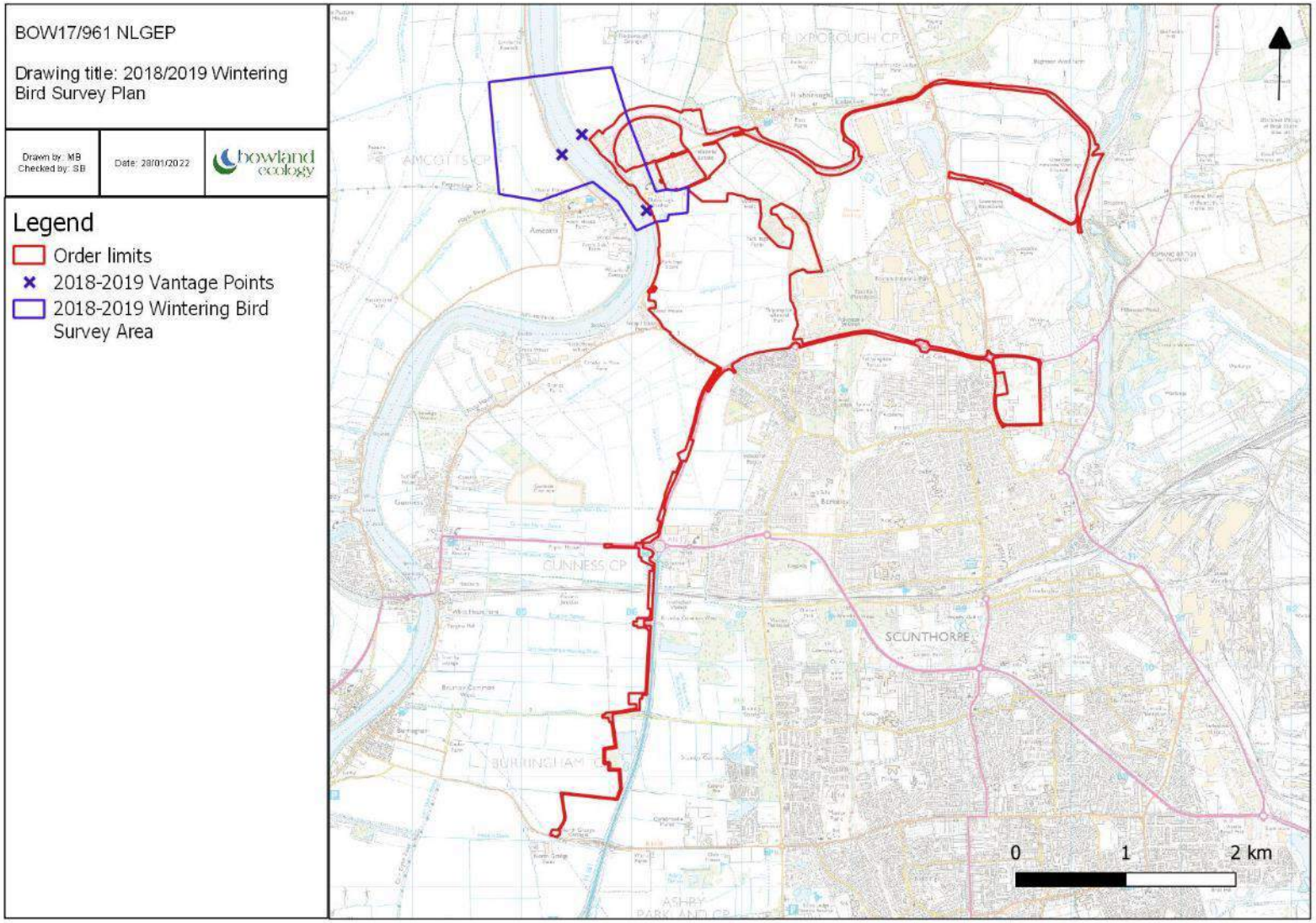

Figure 1. Survey area for the 2018/2019 wintering bird surveys.

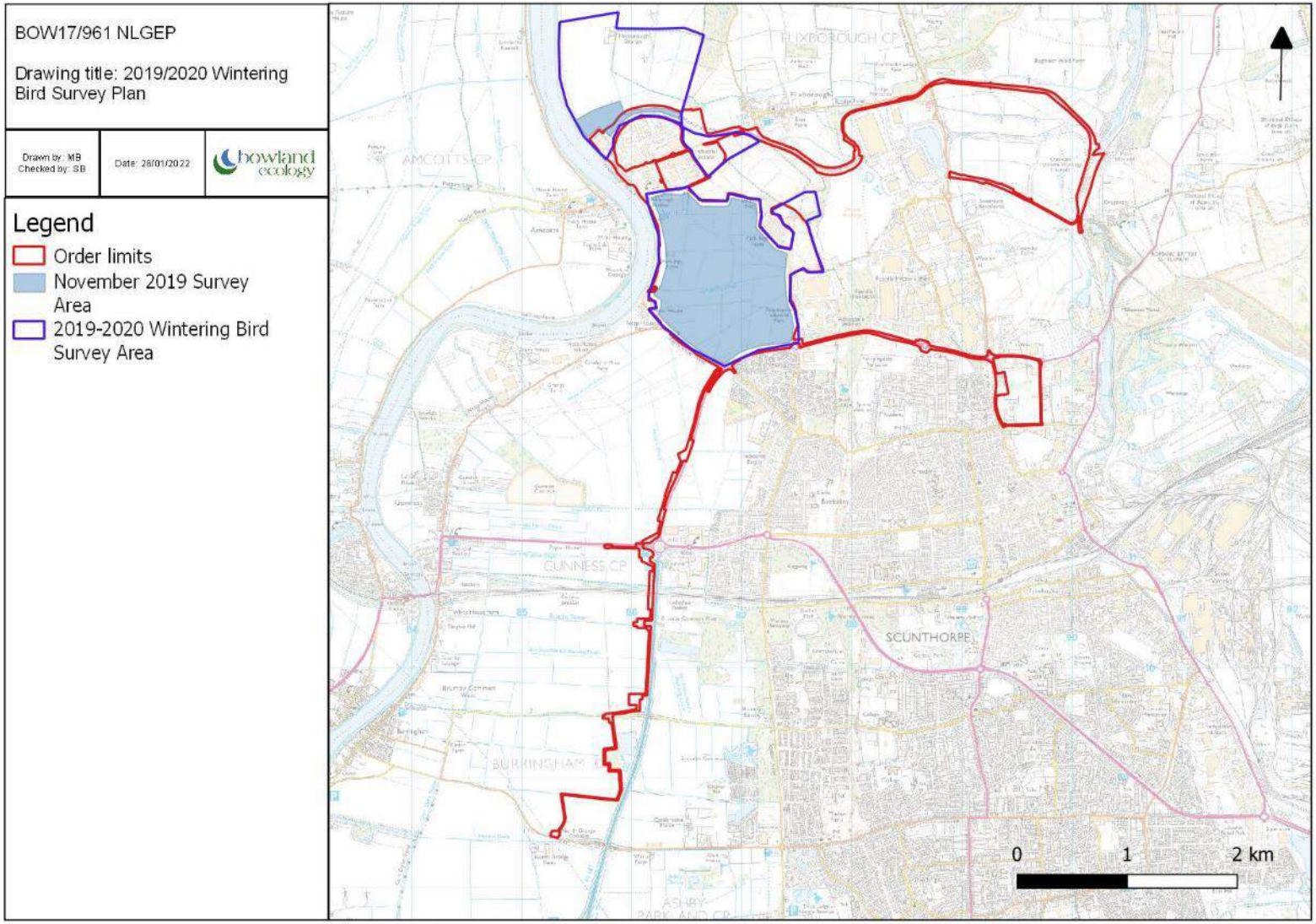

Figure 2. Survey area for the 2019/2020 wintering bird surveys.

Breeding Bird Surveys

2.6 The 2019 breeding bird surveys of the Railway Reinstatement Land comprised three visits which were undertaken on the 12th April 2019, 22nd and 23rd May 2019, and the 19th and 20th June 2019 by Sophie King MSc, BSc and Chris Piner BSc (Hons). The survey area is shown in Figure 3; see Appendix G for survey plans.

2.7 The 2020/2021 breeding bird surveys of the Energy Park Land and arable fields to the north and east of Flixborough Wharf comprised one visits in June 2020 and two visits in April, May and June 2021, a total of four breeding bird visits during the 2021 survey period. Surveys were conducted on the 18-19th June 2020, 12-13th April 2021, 11-12th May 2021 and the 18 & 30th of June 2021 by Sophie King MSc, BSc, and Brian Hedley MSc CEnv MCIEEM. The survey area is shown in Figure 4; see Appendix H for survey plans.

2.8 A modified breeding bird survey was conducted in line with the specifications detailed by the British Trust for Ornithology (Gilbert et al. 1998). This methodology follows that stated by Gilbert et al. (1998) for the Breeding Bird Survey (BBS) where a transect is walked through the survey area and were designed to capture key habitats and features of the Project. Mapping methodology comprised plotting the identity and activity of birds recorded within the survey area in line with the Common Bird Census (CBC) approach defined in Gilbert et al. (1998). During the surveys, all birds showing signs of 'confirmed' or 'probable' breeding within the Order Limits are mapped showing their location, along with 'possible' breeders and other birds that showed no signs of breeding being recorded.

2.9 The survey frequency comprised three survey visits undertaken between April and June 2019 and four survey visits were undertaken between April and June 2021. Surveys were undertaken between dawn (an hour after dawn to avoid peak bird activity) and midday (to avoid lower activity levels thereafter), and visits were planned to avoid adverse weather conditions, such as heavy rain and strong wind, as this can reduce bird activity. In order to reduce survey bias, the transect starting point and the direction walked varied between visits.

2.10 On each of the survey visits, the following details were recorded:

- bird numbers, species, age and sex; and
- bird behaviour (e.g., singing, feeding), paying particular attention to evidence of breeding (see Appendix J).

2.11 Weather conditions during the breeding bird surveys are detailed in Table 2 below.

Table 2: Weather conditions and tide times during breeding bird surveys

Date (Time)	Survey Area	Weather
12 Apr 2019 (08:10-10:10)	Figure 3	Dry, sunny (1/8 cloud) and gentle breeze (F2-3 N), temperature of approximately 5°C.
22 May 2019 (6:55-09:40)	Figure 3	Light rain, overcast (6/8 cloud) no wind (F0 SW), temperature of approximately 8°C.
23 May 2019 (10:45-13:00)	Figure 3	Dry, overcast (7/8 cloud) and no wind (F0 WSW), temperature of approximately 11°C.
19 Jun 2019 (06:00-10:30)	Figure 3	Light rain, overcast (8/8 cloud) and calm (F1 WNW), temperature of approximately 13°C.
20 Jun 2019 (06:20-09:00)	Figure 3	Dry, sunny (2/8 cloud) and calm (F1 SW), temperature of approximately 9°C.
18 Jun 2020 (06:10-11:00)	Figure 4	Warm, overcast (4/8 cloud), light breeze (F1 N), temperature of approximately 16°C.
19 Jun 2020 (06:00-10:45)	Figure 4	Warm, overcast (5/8 cloud), light breeze (F1 W), temperature of approximately 14°C.
12 Apr 2021 (06:15-11:00)	Figure 4	Frosty at start, sunny, dry, -2 to 5ºC, F1-2 NW wind

13 Apr 2021 (06:20-10:00)	Figure 4	Frosty at start, sunny, dry, -1 to 4ºC, F1-2 NW wind
11 May 2021 (05.35-09.35)	Figure 4	Sunny, dry, 7 to 9ºC, F2-3 S wind
12 May 2021 (05:35-09.15)	Figure 4	Partly overcast, partly sunny, dry, 7 to 10ºC, F1-2 S wind
18 June 2021 (06:30-10:30)	Figure 4	Light rain, overcast, 17ºC, F1 S wind
30 June 2021 (06:00-10:00)	Figure 4	Light rain, overcast, 13ºC, F1 S wind

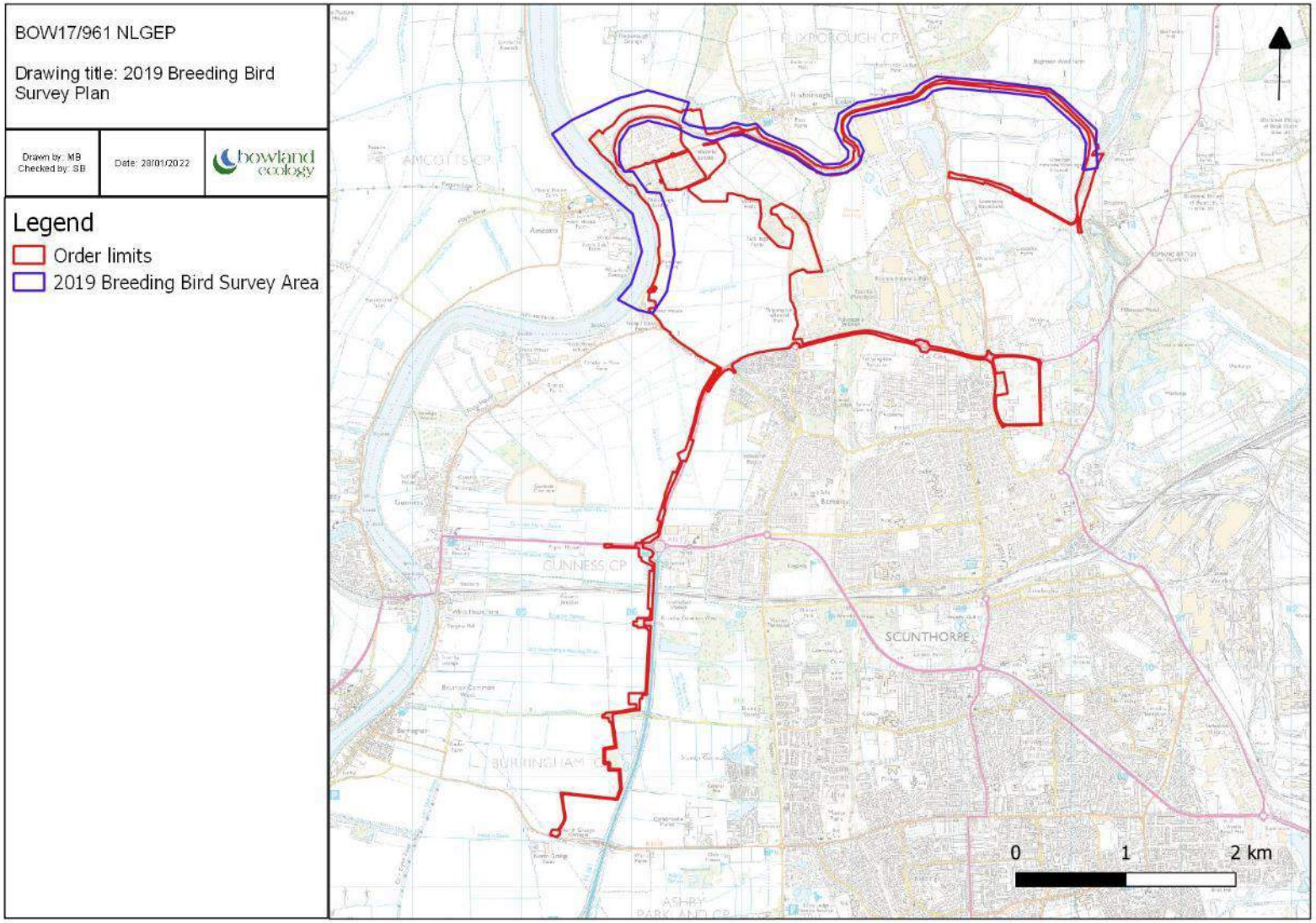

Figure 3. Survey area for the 2019 breeding bird surveys.

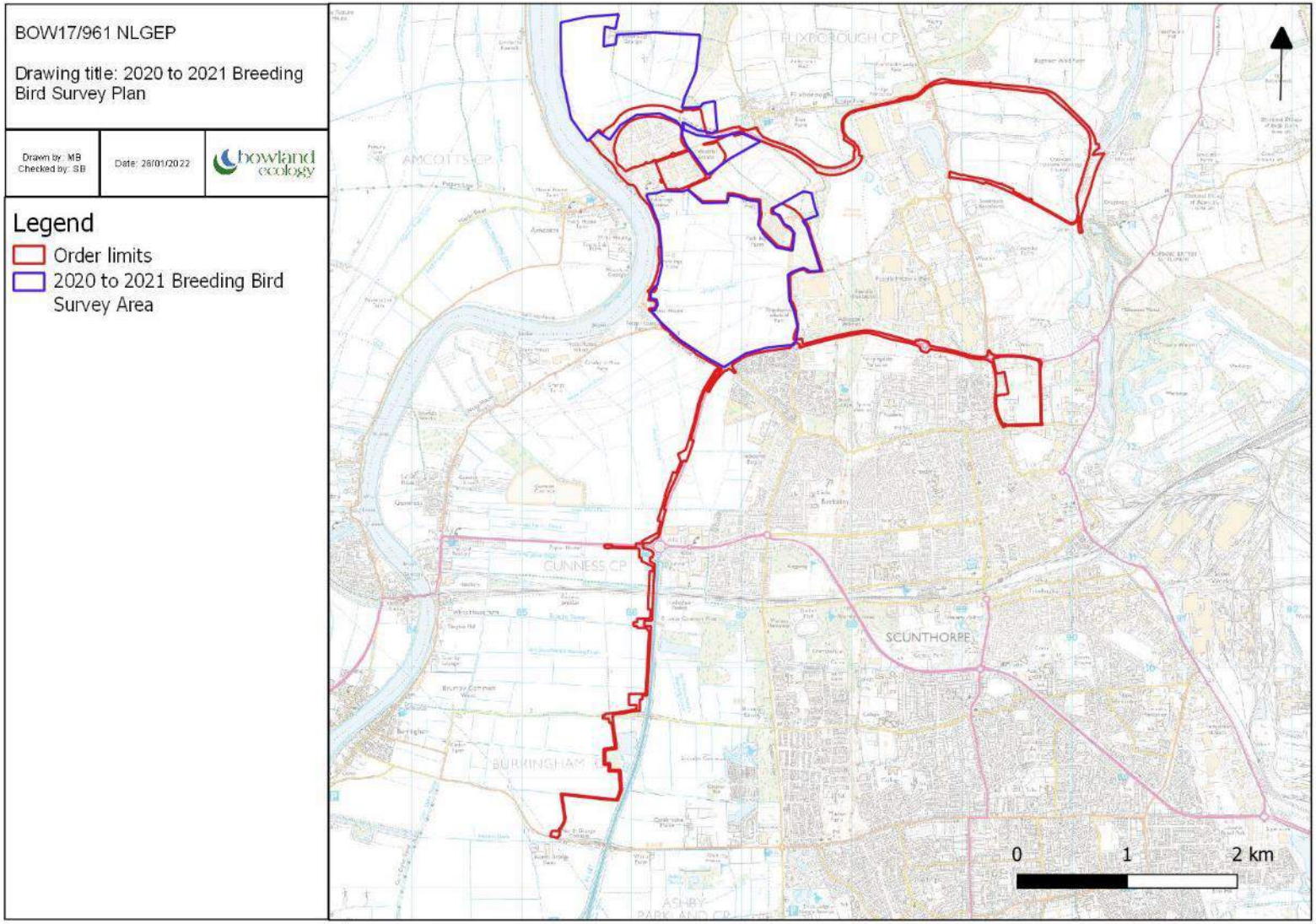

Figure 4. Survey area for the 2020-2021 breeding bird surveys.

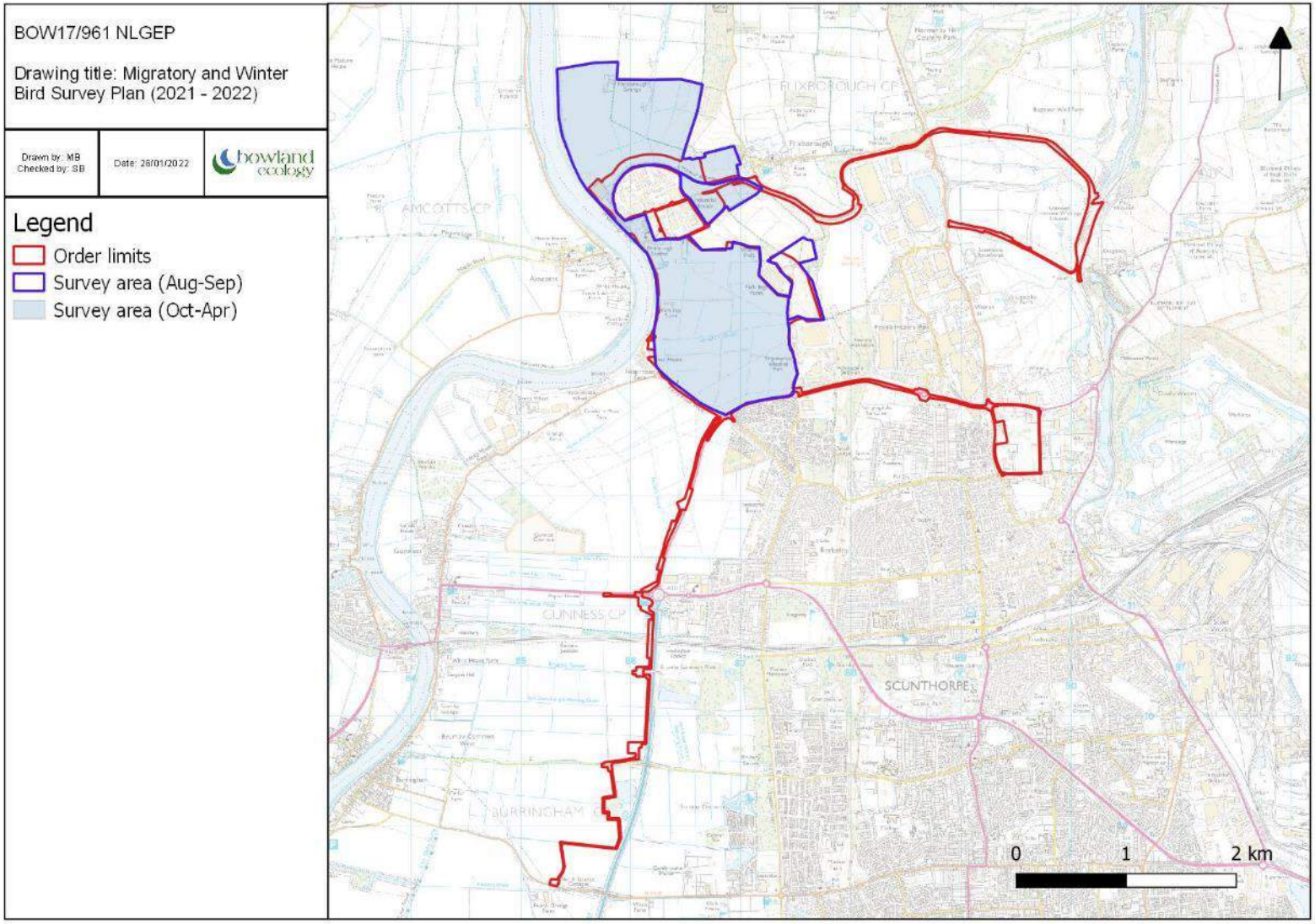

Figure 5. Survey area for the 2021-22 migratory and wintering bird surveys.

Migratory and Wintering Bird Surveys

2.12 The 2021 to 2022 migratory and wintering bird surveys of the Energy Park Land and arable fields to the north and east of Flixborough Industrial Estate comprised: weekly visits between week commencing 23rd August and the end of November 2021; monthly visits during December, January and February 2022; and weekly visits during March and April 2022. Surveys were conducted by Brian Hedley MSc CEnv MCIEEM, Mark Breaks BSc Hons and Joanna Day, survey details are shown in Table 3 below and the survey area is shown in Figure 5 above.

2.13 A modified migratory bird survey was conducted, with surveys carried out in accordance with current good practice guidance survey methodology, i.e. the BTO Wintering Farmland Bird Survey methodology (Gillings et al., 2008) and generic wintering bird monitoring methods detailed in Bird Monitoring Methods (Gilbert et al., 1998). Survey visits were undertaken between dawn and dusk, with visits planned to avoid adverse weather conditions, such as heavy rain and strong wind, as this can reduce bird activity (Gilbert et al. 1998). The survey involved surveyors walking transect routes which were designed to capture key habitats and features of the Project. In order to reduce survey bias, the transect starting point and the direction walked varied between visits. Surveyors recorded all birds heard or seen with the aid of binoculars. Registrations, which are records of individual birds were recorded on field maps using BTO codes. Care was taken to avoid double counting. Longer periods of observations were made in areas of high bird activity.

2.14 On each of the survey visits, the following details were recorded:

- bird numbers, species and bird behaviour of SPA qualifying species (e.g., roosting, feeding, flying over).

2.15 Weather conditions during the migratory and wintering bird surveys are detailed in Table 3 below

Table 3: Weather conditions and tide times during migratory and wintering bird surveys

Visit	Date	Times (sunrise, high tide)	Weather conditions
1	26.08.2021 27.08.2021	07:00 – 11:45 (06:00, 10:20) 07:00 – 11:30 (06:01, 10:51)	Overcast, dry, 13-15ºC, F3-4 NW wind Overcast, drizzle near end of survey, 12-15ºC, F3-4 NW wind
2	01.09.2021 02.09.2021	07:10 – 11:35 (06:12, 15:03) 07:15 – 11:15 (06:13, 16:30)	Overcast, occasional drizzle, 13-15ºC, F2-3 N wind Overcast, dry, 14-16ºC, F3 NE wind
3	09.09.2021 10.09.2021	08:45 – 12:25 (06:27, 09:23) 08:00 – 11:00 (06:28, 09:59)	Sunny spells, dry, 18ºC, F1 SE wind Sunny spells, dry, 18ºC, F1 SW wind
4	13.09.2021 14.09.2021	07:35 – 12:05 (06:32, 12:01) 07:35 – 11:35 (06:34, 13:01)	Overcast, dry, 13-16ºC, F2-3 E wind Overcast, occasional drizzle, 14-15 ºC, F3 NE wind
5	20.09.2021 21.09.2021	11:15 – 14:45 (06:46, 07:22) 08:30 – 11:40 (06:48, 08:04)	Sunny, dry, 17ºC, F2 NW wind Sunny, dry, 12ºC, F1 S wind
6	29.09.2021 30.09.2021	07:35 – 12:10 (07:00, 12:47) 07:35 – 11:30 (07:02, 14:23)	Sunny, dry, 9-13ºC, F3-4 W wind Overcast, light rain, 9-12ºC, F4 S wind
7	06.10.2021 07.10.2021	12:25 – 16:00 (07:14, 07:33) 08:30 – 12:00 (07:16, 08:15)	Overcast, dry, 14ºC, F2 NW wind Sunny spells, dry, 17ºC, F2 SW wind
8	11.10.2021 12.10.2021	07:45 – 11:45 (07:22, 10:59) 07:45 – 11:10 (07:24, 11:49)	Sunny, dry, 9-13ºC, F3 W wind Overcast, occ. light rain, 11-12ºC, F3 NW wind
9	19.10.2021 20.10.2021	07:45 – 11:30 (07:37, 06:55) 07:45 – 11:15 (07:39, 07:36)	Overcast, frequent light rain, 9-13ºC, F3-4 S wind Overcast, occ. light rain, 13ºC, F2-3 SW wind
10	28.10.2021	12:30 – 16:30 (07:56, 12:16)	Sunny spells, dry, 16ºC, F3 S wind
11	04.11.2021 05.11.2021	07:30 – 10:35 (07:09, 06:00) 07:20 – 11:20 (07:11, 06:45)	Sunny spells, dry, 6-7ºC, F3-5 NW wind Sunny, dry, 1-5ºC, F3-4 W wind
12	10.11.2021	08:30 – 13:15 (07:24, 10:44)	Sunny spells, occasional light rain in first hour, 10ºC, F1 SW wind

13	16.11.2021 17.11.2021	08:05 – 11:20 (07:32, 04:38) 07:40 – 11:40 (07:33, 05:24)	Overcast, dry, 8-10ºC, F2-3 SW wind Sunny, dry, 7-9ºC, F2-3 SW wind
14	24.11.2021 25.11.2021	08:05 – 11:05 (07:46, 09:36) 08:10 – 12:00 (07:47, 10:12)	Overcast, dry, 5-80ºC, F3 SW wind Sunny, dry, 2-5ºC, F3-4 NW wind
15	15.12.2021 16.12.2021	08:25 – 12:10 (08:13, 03:57) 08:20 – 11:25 (08:14, 04:50)	Sunny spells, dry, 7-10ºC, F2-3 SW wind Sunny spells, dry, 6-9ºC, F2 SW wind
16	21.01.2022	08:30 – 13:00 (08:03, 09:14)	Sunny, dry, 0-5ºC, F0-1 W wind
17	15.02.2022	08:10 – 12:10 (07:20, 06:27)	Cloudy, dry, 5-7ºC, F3-4 SW wind
18	02.03.2022	10:10 – 14:30 (06:46, 07:10)	Cloudy, light drizzle, 7-6ºC, F2 SE wind
19	09.03.2022 10.03.2022	13:00 - 14:50 (06:32, 10:53) 08:50 – 11:45 (06:29, 11:31)	Sunny, dry, 17ºC, F3 wind Sunny, dry, 10ºC, F3 wind
20	17.03.2022 18.03.2022	13:30 – 15:20 (06:12, 18:48) 10:10 – 13:40 (06:10, 07:20)	Sunny, dry, 10ºC, F2 wind Sunny, dry, 14ºC, F1 wind
21	24.03.2022 25.03.2022	14:10 – 16:35 (05:55, 10:51) 10:10 – 12:10 (05:53, 11:43)	Sunny, dry, 19ºC, F1 wind Sunny, dry, 8ºC, F1 wind
22	28.03.2022 29.03.2022	07:35 – 10:55 (06:43, 05:02) 07:25 – 11:05 (06:41, 06:15)	Overcast, dry, 7-9ºC, F1-2 SW wind Overcast, dry, 5-7ºC, F2 E wind
23	08.04.2022	08:00 – 13:00 (06:19, 11:47)	Sunny, dry, 8ºC, F1 wind
24	13.04.2022	08:00 – 13:30 (06:07, 05:45)	Overcast, dry, 10-16ºC, F1 wind
25	21.04.2022	07:15 – 11:20 (05:49, 10:52)	Sunny, dry, 7-15ºC, F2 E wind
26	27.04.2022 28.04.2022	06:20 – 09:40 (05:37, 05:56) 06:20 – 10:00 (05:35, 06:43)	Overcast, dry, 5-8ºC, F2 N wind Overcast, dry, 6-9ºC, F2 NE wind

3. Results

Desk Study

3.1 More than 5000 records of birds listed as non-native, protected or priority by the GLNP were returned by the 5 km search radius. A summary of species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), Section 41 (S41) of the Natural Environment and Rural Communities (NERC) Act 2006 (i.e. Species of Principal Importance, SPI), and the Birds of Conservation Concern 4 (BoCC4) red or amber lists (Eaton *et al.* 2015) is presented in Table 4.

Table 4: Desk study results

Common Name	Taxon Name	No. of records	Sch1	S41	Red list	Amber list
Arctic Skua	*Stercorarius parasiticus*	1			x	
Avocet	*Recurvirostra avosetta*	4	x			x
Barn Owl	*Tyto alba*	109	x			
Barnacle Goose	*Branta leucopsis*	5				x
Bearded Tit	*Panurus biarmicus*	3	x			
Bewick's Swan	*Cygnus columbianus*	2	x			x
Bittern	*Botaurus stellaris*	2	x	x		x
Black Redstart	*Phoenicurus ochruros*	8	x		x	
Black Tern	*Chlidonias niger*	2	x			
Black-necked Grebe	*Podiceps nigricollis*	2	x			x
Black-tailed Godwit	*Limosa limosa*	5	x	x	x	
Brambling	*Fringilla montifringilla*	36	x			
Bullfinch	*Pyrrhula pyrrhula*	129		x		x
Cetti's Warbler	*Cettia cetti*	11	x			
Common Scoter	*Melanitta nigra*	4	x	x	x	
Corn Bunting	*Emberiza calandra*	70		x	x	
Corncrake	*Crex crex*	1	x		x	
Cuckoo	*Cuculus canorus*	78		x	x	
Curlew	*Numenius arquata*	54		x	x	
Dark-bellied Brent Goose	*Branta bernicla subsp. bernicla*	1		x		x
Dotterel	*Charadrius morinellus*	3	x		x	
European Greater White-fronted Goose	*Anser albifrons subsp. albifrons*	10		x		
Fieldfare	*Turdus pilaris*	104	x		x	
Firecrest	*Regulus ignicapilla*	2	x			
Gadwall	*Anas strepera*	23				x
Garganey	*Anas querquedula*	2	x			x
Goldeneye	*Bucephala clangula*	28	x			x
Goshawk	*Accipiter gentilis*	1	x			

Grasshopper Warbler	*Locustella naevia*	28		x	x	
Great Northern Diver	*Gavia immer*	19	x			x
Green Sandpiper	*Tringa ochropus*	44	x			x
Greenshank	*Tringa nebularia*	17	x			x
Grey Partridge	*Perdix perdix*	239		x	x	
Greylag Goose	*Anser anser*	102				x
Hawfinch	*Coccothraustes coccothraustes*	6		x	x	
Hen Harrier	*Circus cyaneus*	18	x	x	x	
Hobby	*Falco subbuteo*	64	x			
Honey-buzzard	*Pernis apivorus*	4	x			x
House Sparrow	*Passer domesticus*	533		x	x	
Kingfisher	*Alcedo atthis*	58	x			x
Lapland Bunting	*Calcarius lapponicus*	1	x			x
Lapwing	*Vanellus vanellus*	270		x	x	
Lesser Redpoll	*Acanthis cabaret*	35		x	x	
Light-bellied Brent Goose	*Branta bernicla subsp. hrota*	1				x
Linnet	*Linaria cannabina*	194		x	x	
Little Gull	*Hydrocoloeus minutus*	3	x			
Little Ringed Plover	*Charadrius dubius*	47	x			
Little Tern	*Sternula albifrons*	1	x			x
Long-tailed Duck	*Clangula hyemalis*	2	x		x	
Marsh Harrier	*Circus aeruginosus*	116	x			x
Merlin	*Falco columbarius*	25	x	x		
Montagu's Harrier	*Circus pygargus*	2	x			x
Mute Swan	*Cygnus olor*	104				x
Nightjar	*Caprimulgus europaeus*	16		x		x
Osprey	*Pandion haliaetus*	39	x			x
Peregrine	*Falco peregrinus*	96	x			
Pink-footed Goose	*Anser brachyrhynchus*	71				x
Pintail	*Anas acuta*	7	x			x
Pochard	*Aythya ferina*	28			x	
Quail	*Coturnix coturnix*	12	x			x
Red Kite	*Milvus milvus*	14	x			
Redshank	*Tringa totanus*	114				x
Red-throated Diver	*Gavia stellata*	1	x			
Redwing	*Turdus iliacus*	115	x		x	
Reed Bunting	*Emberiza schoeniclus*	192		x		x
Ring Ouzel	*Turdus torquatus*	36		x	x	

Ruff	*Calidris pugnax*	21	1		1	
Scaup	*Aythya marila*	2	x	x	x	
Skylark	*Alauda arvensis*	163		x	x	
Snipe	*Gallinago gallinago*	85				x
Snow Bunting	*Plectrophenax nivalis*	2	x			x
Snowy Owl	*Bubo scandiacus*	1	x			
Song Thrush	*Turdus philomelos*	179		x	x	
Spoonbill	*Platalea leucorodia*	1	x			x
Spotted Flycatcher	*Muscicapa striata*	62		x	x	
Starling	*Sturnus vulgaris*	496		x	x	
Swift	*Apus apus*	187				x
Temminck's Stint	*Calidris temminckii*	3	x			
Tree Pipit	*Anthus trivialis*	4		x	x	
Tree Sparrow	*Passer montanus*	253		x	x	
Whimbrel	*Numenius phaeopus*	21	x		x	
White-fronted Goose	*Anser albifrons*	10			x	
White-tailed Eagle	*Haliaeetus albicilla*	1	x			
Whooper Swan	*Cygnus cygnus*	30	x			x
Wigeon	*Anas penelope*	44				x
Wood Sandpiper	*Tringa glareola*	1	x			x
Wood Warbler	*Phylloscopus sibilatrix*	1		x	x	
Woodlark	*Lullula arborea*	96	x			
Yellow Wagtail	*Motacilla flava*	154		x	x	
Yellowhammer	*Emberiza citrinella*	239	x	x	x	

3.2 The desk study identified six designated sites of international importance for nature conservation within 15 km of the Project Order Limits (see below). These occur in two sperate blocks, i.e. the Humber Estuary Ramsar Site/SAC/SPA and the Thorne and Hatfield Moors SAC/SPA. The Humber Estuary Ramsar Site and SAC partially border the Order Limits along the River Trent. Only the Humber Estuary Ramsar Site, Humber Estuary SPA, and Thorne and Hatfield Moors SPA support qualifying bird populations that feature on the list of designated site features.

The Humber Estuary Ramsar Site – includes the tidal River Trent which is located immediately adjacent to the Project. Designated for its international importance for wetland birds, as an example of a near-natural estuary habitat, breeding colony of grey seals (*Halichoerus grypus*), and as an important migration route for both river lamprey (*Lampetra fluviatilis*) and sea lamprey (*Petromyzon marinus*).

The Humber Estuary Special Area of Conservation (SAC) – includes the section of the River Trent located adjacent to the Order Limits. The Annex I habitats which the SAC contains are the primary reason for designation and include estuaries, mudflats, and sandflats. Annex I habitats which are a qualifying feature, but not a primary reason for selection include; Sandbanks which are slightly covered by sea water all the time; costal lagoons; *Salicornia* and other annuals colonizing mud and sand; Atlantic salt meadows

(*Glauco-Puccinellietalia maritmae);* embryonic shifting dunes; white dunes; grey dunes; and dunes with *Hippophae rhamnoides*. There are no Annex II species which are a primary reason for designation. Annex II species which are a non-primary reason for designation include sea lamprey, river lamprey and grey seal.

The Humber Estuary Special Protection Area (SPA) – located 5.8 km north of the Order Limits, comprises extensive wetland and coastal habitats including reedbeds, mature and developing saltmarsh, sand dunes, marshy slacks, and brackish pools. The SPA supports important numbers of waterbirds (especially geese, ducks, and waders) during the migration periods and in winter. In summer, it supports important breeding populations of bittern (*Botaurus stellaris*), marsh harrier (*Circus aeruginosus*), avocet (*Recurvirostra avosetta*) and little tern (*Sterna albifrons*).

Thorne Moor SAC – located 9.7 km west of the Order Limits. Annex I features which are the primary reason for designation comprise degraded raised bogs still capable of natural regeneration. There are no other Annex I or Annex II qualifying features.

Thorne and Hatfield Moors SPA – comprising land within the Thorne Moor SAC and Hatfield Moor SAC, the closest of which is 9.7 km west of the Order Limits and is a site of international, ornithological importance. The site qualifies under article 4.1 of the Directive (79/409/EEC) as it is regularly used by 1% or more of the Great Britain population of nightjar (*Caprimulgus europaeus*).

Hatfield Moor SAC – located 12.4 km south-west of the Order Limits. Annex I features which are the primary reason for designation, comprise degraded raised bogs still capable of natural regeneration. There are no other Annex I or Annex II qualifying features.

3.3 A total of 13 designated wildlife sites were identified within 2 km of the Order Limits. In addition to the Humber Estuary Ramsar Site and SAC, these included three Sites of Special Scientific Interest (SSSI) and seven Local Nature Reserves (LNR). The full list is included in Table 5, which features sites in descending order of importance and then distance. A review of the reasons for designations found that the Humber Estuary SSSI (part of the Humber Estuary Ramsar site, SAC and SPA), is designated for nationally important assemblages of breeding birds. No other SSSI or LNR within 2 km of the Project feature birds species as primary reason for designation.

Table 5: Designated wildlife sites within 2 km

Designation Type and Name	Location in relation to Order Limits	Description of Designated Site
SAC The Humber Estuary	Adjacent	Large estuary complex designated for its estuary and coastal habitats including intertidal mudflats, sand flats, saltmarsh, reed beds and dunes, as well as populations of sea lamprey, river lamprey and grey seal.
Ramsar Site The Humber Estuary	Adjacent	Large estuary complex which supports internationally important populations of breeding, wintering and passage birds, estuary habitats and plant species. Qualifying species: Bittern, marsh harrier, avocet, little tern, dark-bellied brent goose, wigeon, teal, pochard, scaup, goldeneye, hen harrier, oystercatcher, ringed plover, golden plover, grey plover, lapwing, sanderling, curlew, turnstone, ruff, whimbrel and greenshank.
SSSI The Humber Estuary	Adjacent	Large estuary complex designated for its important estuary and coastal habitats and supports colonies of breeding grey seals, river lamprey and sea lamprey in addition to supporting nationally important assemblages of breeding birds.

		Wintering and passage qualifying species: bittern, dark-bellied brent goose, shelduck, wigeon, teal, pochard, scaup, goldeneye, oystercatcher, avocet, ringed plover, golden plover, grey plover, lapwing, knot, sanderling, dunlin, black-tailed godwit, bar-tailed godwit, curlew, redshank, turnstone, ruff, whimbrel and greenshank. **Breeding bird assemblage**: nationally important numbers; bittern, marsh harrier, avocet and bearded tit. Contributing to assemblage; little grebe, great crested grebe, mute swan, shelduck, gadwall, shoveler, pochard, tufted duck, water rail, little ringed plover, snipe, redshank, common tern, cuckoo, kingfisher, yellow wagtail, grasshopper warbler, sedge warbler, reed warbler and reed bunting.
SSSI Conesby (York shire East) Quarry	Partially within / adjacent	Geological designation for exposure of Frodingham Ironstone. Supports rich bivalve population.
SSSI Risby Warren	1 km east	Designated for its extensive heathland, grassland, and dune formations with associated important plant communities.
LNR Phoenix Parkway	Partially within / adjacent	Two contiguous LNRs which are made up of structurally diverse, species-rich sandy dry habitats including semi-natural woodland, scattered and dense scrub, with unimproved and semi-improved acid grassland in the northern end of the site.
LNR Phoenix	Partially within / adjacent	Contiguous with the Phoenix Parkway LNR and similar in habitat structure. The main habitats comprise neutral semi-improved grassland, unimproved acid grassland, brownfield mosaic and standing water. Additional habitats include woodland, scrub, bracken, bare ground, ant hills, lichens, and seasonally wet ground.
LNR Atkinson's Warren	Partially within / adjacent	32.8 ha of sloping rough grassland and woodland with some scrub. Tree species include birch and oak with additional plantings of Scots pine (*Pinus sylvestris*) and sycamore (*Acer pseudoplatanus*).
LNR Conesby Quarr y	Adjacent	Restored area of Conesby Quarry which is managed as acid grassland and includes the Normanby Road lake "Blue Lagoon" and the surrounding grassland. The area supports several priority species including skylark (*Alauda arvensis*), lapwing (*Vanellus vanellus*) and grayling butterfly (*Hipparchia Semele*).
LNR Sawcliffe	0.5 km south-east	Land-filled former sand quarry comprising recently planted woodland and neutral grassland. A track running north-west to south-east consists of diverse flora typical of sandy soils.
LNR Brumby Wood	1.4 km east	Woodland divided into three blocks by two roads. Supports a substantial amount of semi-natural woodland with neutral grassland and small areas of scrub. There are several veteran trees.
LNR Frodingham	1.5 km south-west	Rectangular area comprising semi-natural woodland, scrub, grassland (unimproved and damp grassland), marsh and fen.
LNR Silica Lodge	1.5 km south-east km	A mixture of scrub, acid grassland (unimproved and semi-improved) with a lake and coarse grassland. The lake is used for fishing and is associated with a rich fauna of birds and invertebrates.

3.4 The desk study also retuned 35 non-statutory designated sites within 2 km of the Order Limits. This includes 27 Local Wildlife Sites (LWS), seven Local Geological Sites, and one Regionally Important Geological Site. As none of these sites include specific bird species within their citations, they are not presented in this report.

Habitat Assessment

3.5 An appraisal of the likely value of the habitats found in each subsection of the land within the Order Limits for birds is presented below.

Energy Park Land

3.6 Habitats within the Flixborough Wharf are dominated by hardstanding and buildings, which provides very limited nesting and foraging habitat for birds. Furthermore, the volume of traffic, vehicle and machinery movements (cranes associated with the port) and the number of people further reduces the favourability of the habitats within and adjacent to the Flixborough Wharf for foraging and nesting birds.

3.7 The marginal vegetation along the River Trent, adjacent to the Energy Park Land, comprises a narrow strip of common reed which provides habitat for species associated with wetland and farmland. The marginal vegetation is not considered dense/extensive enough to support breeding bittern or breeding/roosting marsh harrier, both of which are qualifying features of the SPA.

3.8 The extensive area of arable farmland to the south of the Flixborough Wharf, along with associated field drains, marginal vegetation and field margins provide suitable foraging, sheltering and nesting habitat for bird species. The farmland is suitable for ground nesting species including grey partridge (*Perdix perdix*), skylark (*Alauda arvensis*) and lapwing (*Vanellus vanellus*), and species associated with farmland/marginal vegetation, including reed bunting (*Emberiza schoeniclus*), yellowhammer (*Emberiza citrinella*), linnet (*Linaria cannabina*) and reed warbler (*Acrocephalus scirpaceus*), overwintering thrushes and starlings (*Sturnus vulgaris*) including large flocks of fieldfare (*Turdus pilaris*) and redwing (*Turdus iliacus*).

3.9 The mosaic of semi-natural habitats to the east of the Energy Park Land provide habitat for woodland and shrub nesting species, as well as conditions for ground nesting birds such as snipe (*Gallinago gallinago*) and woodcock (*Scolopax rusticol*a).

Railway Reinstatement Land

3.10 The habitats within the Railway Reinstatement Land include dense and scattered scrub, woodland and grassland, which provide suitable foraging, sheltering and nesting habitat for scrub, woodland and farmland bird species.

3.11 The areas of arable farmland to the north of Flixborough Wharf provide additional habitat for wintering birds, ground nesting species and farmland birds (as listed in section 3.8).

3.12 The adjacent disused quarry pit (Conesby Quarry LWS), provides abundant habitat for bird species, including those associated with wetland habitats, scrub and farmland.

3.13 The access tracks from the Normanby road to the Railway Reinstatement Land and Dragonby Sidings, comprise hardstanding, are regularly disturbed and are unlikely to offer potential for birds. However, the landscape surrounding these tracks is suitable for ground nesting, farmland and scrub nesting bird species.

Northern DHPWN Land

3.14 Habitats along and adjacent to the DHPWN include hedgerows, grassland, deciduous woodland, dense and scattered scrub and allotments. The Phoenix Parkway LNR/LWS and The Atkinson's Warren LNR/LWS are adjacent to the Northern DHPWN Land in the western section. To the east and south the habitats either side of the DHPWN include hardstanding, buildings, gardens, ornamental planting and small areas of scrub and tall ruderal vegetation. There is suitable habitat for scrub and tree nesting bird species.

Southern DHPWN Land

3.15 The Southern DHPWN Land is largely dominated by arable farmland, with associated field margins, arable field drains and marginal vegetation. There are small areas of plantation and semi-natural deciduous woodland scattered adjacent to the Order Limits. It is understood that construction works will only occur to the west of the M181, the easement of which features reinforced lateral drains which were recorded as dry ditches at the time of survey. The western M181 easement area is dominated by scrub, marginal and tall ruderal vegetation for the length of the subsection. There is suitable habitat for scrub and tree nesting bird species.

Wintering Bird Surveys

3.16 A total of 57 bird species were recorded during the 2018/2019 and 2019/2020 wintering bird surveys. Species, peak counts, and dates recorded are detailed in Appendix A and B.

3.17 Notable bird species are shown in Table 6. This includes marsh harrier, which is an Annex I qualifying species (Article 4.1) for the Humber Estuary SPA and was recorded foraging in the arable fields north of Flixborough Industrial Estate during the March 2020 survey. Four other species lapwing, mallard (*Anas platyrhynchos*), oystercatcher (*Haematopus ostralegus*) and teal (*Anas crecca*) are cited in the assemblage qualifier of the Humber Estuary SPA (Article 4.2) and regularly use the SPA in the non-breeding season. No SPA migratory species (Article 4.2) or non-qualifying species of interest were recorded during the surveys.

3.18 Table 6 also highlights several S41 species listed as SPI under The NERC Act 2006, as well as 10 Red listed and 11 Amber listed bird species that were recorded during the winter bird surveys. The latter are based on the BoCC4 (Eaton et al, 2015) assessment for birds in the UK, which places birds on Red[1], Amber[2] or Green lists to indicate the level of conservation concern.

Table 6: SPA, Ramsar, SSSI, S41, Red and Amber listed species recorded during the winter bird surveys

Common Name	Scientific Name	SPA species	Ramsar species	SSSI species	S41	Red Listed	Amber Listed
Lapwing	*Vanellus vanellus*	✓ Article 4.2[3]	✓ wintering & passage	✓ wintering & passage	✓	✓	
Mallard	*Anas platyrhynchos*	✓ Article 4.2					✓
Marsh harrier	*Circus aeruginosus*	✓ Article 4.1[4]	✓ breeding				✓
Oystercatcher	*Haematopus ostralegus*	✓ Article 4.2	✓ wintering & passage	✓ wintering & passage			✓
Teal	*Anas crecca*	✓ Article 4.2	✓ wintering & passage	✓ wintering & passage			✓
Bullfinch	*Pyrrhula pyrrhula*				✓		✓
Dunnock	*Prunella modularis*				✓		✓

[1] Red listed birds are those that are; Globally threatened, have shown historical population decline in the UK during 1800–1995, have shown a severe (at least 50%) decline in UK breeding population over last 25 years, or longer-term period, and have had a severe (at least 50%) contraction of their UK breeding range over last 25 years, or the longer-term period.

[2] Details on Amber listed birds can be found at https://www.rspb.org.uk/birds-and-wildlife/wildlife-guides/uk-conservation-status-explained/

[3] Listed as part of the non-breeding waterbird assemblage qualification of the Humber Estuary SPA.

[4] Listed as a qualifying breeding species under Annex 1 of the Humber Estuary SPA.

Common Name	Scientific Name	SPA species	Ramsar species	SSSI species	S41	Red Listed	Amber Listed
Grey wagtail	*Motacilla cinerea*					✓	
Herring gull	*Larus argentatus*				✓	✓	
House sparrow	*Passer domesticus*				✓	✓	
Kestrel	*Falco tinnunculus*						✓
Meadow pipit	*Anthus pratensis*						✓
Mute swan	*Cygnus olor*			✓ breeding assemblage			✓
Reed bunting	*Emberiza schoeniclus*			✓ breeding assemblage	✓		✓
Skylark	*Alauda arvensis*				✓	✓	
Snipe	*Gallinago gallinago*			✓ breeding assemblage			✓
Song thrush	*Turdus philomelos*				✓	✓	
Starling	*Sturnus vulgaris*				✓	✓	
Tree sparrow	*Passer montanus*				✓	✓	
Woodcock	*Scolopax rusticola*					✓	
Yellowhammer	*Emberiza citrinella*				✓	✓	

Note: Fieldfare and redwing are not included in the table because they are red-listed only as breeding birds

3.19 SPA, Ramsar and SSSI qualifying species were only recorded in small numbers with lapwing, mallard, marsh harrier, oystercatcher and teal recorded using habitats within or adjacent the Order Limits for foraging and/or roosting. Full species details are provided below;

- during January to March 2020 surveys (Appendix B) up to three pairs of lapwing were recorded in the arable fields within the Energy Park Land to the west of Skippingdale Retail Park. Outside the Order Limits, approximately 50 lapwing were recorded flying around arable fields north of the village of Amcotts, west of the River Trent during the survey in November 2018 (Appendix A);
- mallard were recorded on the Energy Park Land during January, February and March of the 2019/2020 surveys (Appendix B), with a peak count of 42 in March 2020 that comprised 24 birds using the water drains and arable farmland within the Order Limits. Mallard were recorded on all five of the 2018/2019 surveys (Appendix A) with birds observed roosting and feeding along the banks of the River Trent outside the Order Limits with a peak count of approximately 41 in November 2018;
- a single marsh harrier was recording foraging over the arable fields north of Flixborough Industrial Estate during the March 2020 survey (Appendix B) outside the Order Limits;
- individual and small numbers of oystercatchers were recorded in the arable farmland to the north of the Flixborough Industrial Estate outside the Order Limits during December 2019 to February 2020 surveys. A peak count of three oystercatchers were recorded during the December 2019 survey; and
- six teal were recorded during February 2020 to the east of Energy Park Land (Appendix B);

3.20 The remainder of the species recorded during the surveys were relatively common and widespread species throughout Great Britain and North Lincolnshire and representative of the habitats present in the area.

3.21 The most commonly occurring species recorded was feral pigeon (*Columba livia domestica*) with a peak count of 470 during the January 2019 survey, located on buildings withing the Flixborough Industrial Estate. Additional species with high peak counts include:

- Woodpigeon (*Columba palumbus*); a peak count of 182 during the January 2019 surveys;
- jackdaw (*Corvus monedula*); a peak count of 109 during the January 2019 survey;
- yellowhammer; a peak count of 106 during January 2020 survey;
- collared dove (*Streptopelia decaocto*); a peak of 101 the November 2019 survey;
- reed bunting; a peak count of 92 during the January 2020 survey;
- blackbird (*Turdus merula*); peak count of 63 during the December 2019 survey;
- stock dove (*Columba oenas*); a peak count of 50 during the December 2019 survey; and
- skylark; a peak count of 41 during March 2020 survey.

Breeding Bird Surveys

3.22 A total of 74 bird species were recorded during the breeding bird surveys. Appendix C and D provides a complete list of species recorded with their breeding status. The bird survey plans are presented in Appendix G and H, which includes the locations of the species present. An assemblage of species representative of the habitats present was recorded. Most are common and widespread throughout Great Britain and Lincolnshire.

3.23 Key species which were recorded as possible, probable or confirmed breeding are presented in Table 7. They include dunnock, grasshopper warbler (*Locustella naevia*), linnet, reed bunting, skylark, song thrush, starling, yellowhammer and yellow wagtail (*Motacilla flava*), which are listed under Section 41 of The NERC Act 2006 as SPI. In addition, Cetti's warbler (*Cettia cetti*), which was confirmed as breeding during the 2019 bird surveys, is listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended).

Table 7: SPA, Schedule 1, S41, Red and Amber listed species recorded during the breeding bird surveys

Common Name	Scientific Name	Breeding Status	SPA species	Sch 1	S41	Red Listed	Amber Listed
Bullfinch	*Pyrrhula pyrrhula*	Probable					✓
Cetti's warbler	*Cettia cetti*	Confirmed		✓			
Dunnock	*Prunella modularis*	Probable			✓		✓
Grasshopper warbler	*Locustella naevia*	Possible			✓	✓	
Grey Partridge	*Perdix perdix*	Possible			✓	✓	
House sparrow	*Passer domesticus*	Possible			✓	✓	
Linnet	*Linaria cannabina*	Possible			✓	✓	
Mallard	*Anas platyrhynchos*	Possible	✓ Article 4.2				✓
Meadow pipit	*Anthus pratensis*	Possible					✓

Common Name	Scientific Name	Breeding Status	SPA species	Sch 1	S41	Red Listed	Amber Listed
Reed bunting	*Emberiza schoeniclus*	Confirmed			✓		✓
Skylark	*Alauda arvensis*	Confirmed			✓	✓	
Snipe	*Gallinago gallinago*	Possible					✓
Song thrush	*Turdus philomelos*	Possible			✓	✓	
Tawny owl	*Strix aluco*	Possible					✓
Tree sparrow	*Passer montanus*	Possible			✓	✓	
Willow warbler	*Phylloscopus trochilus*	Confirmed					✓
Yellowhammer	*Emberiza citrinella*	Possible			✓	✓	
Yellow wagtail	*Motacilla flava*	Possible			✓	✓	

3.24 The peak counts, overview of counts, and location of the species listed in Table 7 during the surveys are described in detail below (see Appendix C and D for results tables):

- bullfinch were recorded frequently within the Railway Reinstatement Land and Energy Park Land and were assessed as probably breeding, due to the presence of a pair observed in suitable nesting habitat during the breeding season. A peak count of nine bullfinch was recorded during the June 2019 survey, within the Railway Reinstatement Land;
- Cetti's warbler were recorded as confirmed breeding, with singing adults and fledged young recorded in the common reed, marginal vegetation of the River Trent, close to the Flixborough Wharf, as well as a singing adult in the Conesby Quarry LWS, adjacent to the Railway Reinstatement Land. A peak count of five Cetti's warbler was recorded during the June 2019 survey. The number of Cetti's warbler present during the surveys is considered to be of local importance, however it is recognised that the marginal vegetation of the River Trent will provide additional habitat for this species in the local area;
- dunnock were frequently recorded within the Railway Reinstatement Land and Energy Park Land; the presence of fledged young along the railway confirms that this species is breeding. A peak count of fourteen dunnock were recorded during the May 2019 surveys within the Railway Reinstatement Land;
- a single grasshopper warbler was recorded on two occasions during May 2019 and June 30th 2021, located in the area where the Lysaght's drain meets the River Trent in May and the woodland north of Skippingdale Retail Park in June. It is thought that species is possibly breeding in the areas;
- grey partridge was frequently recorded in the arable fields, with a peak count of 14 recorded during the April 2021 survey. This species was recorded as possible breeding;
- house sparrows were occasionally recorded in small numbers, with a peak count of four birds recorded during the May 2021 surveys. No evidence of breeding was observed, however as suitable breeding habitat is present within the Railway Reinstatement and Energy Park Land, house sparrows were assessed as possibly breeding;
- linnet were occasionally recorded within the Railway Reinstatement Land in small numbers, pairs or as individual birds. This species was recorded in larger numbers

in the Energy Park Land, with a peak count of 35 birds recorded during the June 30th 2021 survey. It is thought that they are possibly breeding in the area;

- reed bunting were occasionally recorded within the Railway Reinstatement Land, and in greater numbers within the arable fields, where a peak count of 35 birds was recorded during the May 2021 surveys. This species was recorded as confirmed as breeding within the marginal vegetation along the River Trent and arable cropland;
- mallard were recorded in small numbers during the 2019 surveys (a peak count of five), with non-breeding birds observed flying over. Greater numbers of mallard were recorded during the 2020/2021 surveys (a peak count of 21 recorded in May 2021), with confirmed breeding in the arable farmland;
- meadow pipit were recorded as possibly breeding in the arable farmland, with a peak count of 10 birds recorded during the May 2021 survey;
- skylark were recorded singing in the arable fields a during all survey visits. A single bird was confirmed as breeding within the Conesby Quarry LWS, with an adult seen displaying during the June 2020 visit. A peak count of 81 skylarks were recorded during the May 2021 survey;
- snipe were recorded in small numbers in the arable farmland and grassland of the Energy Park Land. A peak count of four were observed in April 2021. This species is assessed as possibly breeding;
- song thrush were frequently recorded singing within the Railway Reinstatement Land and habitats surrounding the arable farmland, with a peak count of eight recorded during the June 30th 2021 survey. This species was assessed as possibly breeding in the area;
- one tawny owl (*Strix aluco*) was recorded in a tree within the Railway Reinstatement Land on one occasion in June 2019. It is possible that this species is breeding along or adjacent to the Railway Reinstatement Land;
- small numbers of tree sparrow were recorded occasionally during the 2020/2021 surveys in the arable cropland, with a peak count of five in the June 18th 2021 survey. It is possible that this species is breeding in the area;
- willow warbler were recorded singing within the Railway Reinstatement Land and in the 2020/2021 surveys on all occasions, with confirmed breeding during the June 2019 visit, comprising five instances of recently fledged young along the railway line and a peak count of 26 birds;
- yellowhammer, which were recorded singing on all survey visits, including within the Railway Reinstatement Land and in the arable farmland. A peak count of 31 yellowhammer were recorded during the April 2021 survey, most of which were recorded in the Energy Park Land. Birds were recorded as individuals along the arable field boundaries and a flock of 18 yellowhammer were also observed feeding in the arable cropland; and
- yellow wagtail were recorded during the 2020/2021 surveys, with a peak count of 21 yellow wagtail observed in the arable crops of the Energy Park Land during the May 2021 surveys, and were recorded as possible breeding.

Migratory and Wintering Bird Surveys 2021-2022

3.25 A total of 86 bird species were recorded during the migratory bird surveys either using habitats within the Order Limits and adjacent land for roosting/foraging or flying over. Appendix K provides a complete list of species recorded and survey plans are presented in Appendix L, which includes the locations of the species present. An assemblage of species representative of the habitats present was recorded. Most are common and widespread.

3.26 Notable bird species are shown in Table 8. This includes nine qualifying species for the Humber Estuary SPA, six Ramsar qualifying species and eight SSSI qualifying species. Table 8 also highlights several S41 species listed as SPI under The NERC Act 2006, as

well as 15 Red listed and 31 Amber listed bird species that were recorded during the migratory and winter bird surveys.

Table 8: SPA, Ramsar, SSSI, S41, Red and Amber listed species (BoCC5 – Dec 2021) recorded during the Migratory and wintering bird surveys

Common Name	Scientific Name	SPA species	Ramsar species	SSSI species	S41	Red Listed	Amber Listed
Curlew	*Numenius arquata*	✓ Article 4.2[5]	✓ wintering & passage	✓ wintering & passage	✓		
Golden Plover	*Pluvialis apricaria*	✓ Article 4.1[6]	✓ wintering & passage	✓ wintering & passage			
Lapwing	*Vanellus vanellus*	✓ Article 4.2	✓ wintering & passage	✓ wintering & passage	✓	✓	
Mallard	*Anas platyrhynchos*	✓ Article 4.2					✓
Marsh harrier	*Circus aeruginosus*	✓ Article 4.1[7]	✓ breeding	✓ breeding			✓
Oystercatcher	*Haematopus ostralegus*	✓ Article 4.2	✓ wintering & passage	✓ wintering & passage			✓
Redshank	*Tringa totanus*	✓ Article 4.2		✓ wintering & passage			✓
Shelduck	*Tadorna tadorna*	✓ Article 4.2		✓ wintering & passage			✓
Teal	*Anas crecca*	✓ Article 4.2	✓ wintering & passage	✓ wintering & passage			✓
Black-headed gull	*Chroicocephalus ridibundus*						✓
Bullfinch	*Pyrrhula pyrrhula*				✓		✓
Common gull	*Larus canus*						✓
Common sandpiper	*Actitis hypoleucos*						✓
Dunnock	*Prunella modularis*				✓		✓
Fieldfare	*Turdus pilaris*					✓	
Great black-backed gull	*Larus marinus*						✓
Greenfinch	*Chloris chloris*					✓	
Green sandpiper	*Tringa ochropus*						✓
Greylag goose	*Anser anser*						✓
Grey partridge	*Perdix perdix*				✓	✓	
Grey wagtail	*Motacilla cinerea*						✓
Herring gull	*Larus argentatus*				✓	✓	
House sparrow	*Passer domesticus*				✓	✓	
Kestrel	*Falco tinnunculus*						✓
Kingfisher	*Alcedo atthis*			✓ breeding assemblage			✓
Lesser black-backed gull	*Larus fuscus*						✓
Lesser redpoll	*Acanthis cabaret*				✓	✓	
Linnet	*Linaria cannabina*				✓	✓	
Meadow pipit	*Anthus pratensis*						✓
Mistle thrush	*Turdus viscivorus*					✓	
Moorhen	*Gallinula chloropus*						✓
Mute swan	*Cygnus olor*			✓ breeding assemblage			✓
Pink-footed goose	*Anser brachyrhynchus*						✓
Quail	*Coturnix coturnix*						✓

[5] Listed as part of the non-breeding waterbird assemblage qualification of the Humber Estuary SPA.
[6] Listed as a qualifying wintering species under Annex 1 of the Humber Estuary SPA.
[7] Listed as a qualifying breeding species under Annex 1 of the Humber Estuary SPA.

Common Name	Scientific Name	SPA species	Ramsar species	SSSI species	S41	Red Listed	Amber Listed
Reed bunting	*Emberiza schoeniclus*			✓ breeding assemblage	✓		✓
Reed warbler	Acrocephalus scirpaceus			✓ breeding assemblage			
Redwing	*Turdus iliacus*						✓
Rook	*Corvus frugilegus*						✓
Sedge warbler	*Acrocephalus schoenobaenus*						✓
Skylark	*Alauda arvensis*				✓	✓	
Snipe	*Gallinago gallinago*						✓
Song thrush	*Turdus philomelos*				✓		✓
Starling	*Sturnus vulgaris*				✓	✓	
Stock dove	*Columba oenas*						✓
Tree sparrow	*Passer montanus*				✓	✓	
Whimbrel	*Numenius phaeopus*					✓	
Whitethroat	*Curruca communis*						✓
Whooper swan	*Cygnus cygnus*						✓
Willow warbler	*Phylloscopus trochilus*						✓
Woodcock	*Scolopax rusticola*					✓	
Woodpigeon	*Columba palumbus*						✓
Wren	*Troglodytes troglodytes*						✓
Yellowhammer	*Emberiza citrinella*				✓	✓	
Yellow wagtail	*Motacilla flava*			✓ breeding assemblage	✓	✓	

3.27 SPA, Ramsar and SSSI qualifying species were only recorded in small numbers with golden plover, lapwing, mallard, oystercatcher, redshank and teal recorded using habitats within the Order Limits for foraging and/or roosting. Curlew, marsh harrier and shelduck were noted in the surrounding area. Full species details below;

- curlew - listed as part of the non-breeding waterbird assemblage qualification of the Humber Estuary SPA, RAMSAR and SSSI. No records from within the Order Limits however five birds were recorded flying south along the River Trent to the north of Flixborough Industrial Estate on Visit 1 and two again in same area on Visit 2;
- golden plover - listed as a qualifying wintering species under Annex 1 of the Humber Estuary SPA and non-breeding waterbird assemblage for the SSSI. Between Visit 15 to 18, birds were recorded using the arable fields within the middle of the Energy Park Land predominately for roosting with a peak of 82 present on Visit 15, with 51 on Visit 16, six on Visit 17 and 25 on Visit 18. Elsewhere, outside the Order Limits a significant flock of 290 birds were sighted in flight south over the River Trent during Visit 14 to the west of the Energy Park Land, seven flew over heading east to the east of Flixborough Industrial Estate on Visit 2, one flew south west over fields to north of the Order Limits on Visit 6, three flew over to the north on Visit 13 and one was along the River Trent to the north on Visit 24;
- lapwing - listed as part of the non-breeding waterbird assemblage qualification of the Humber Estuary SPA, RAMSAR and SSSI. From Visit 11 to Visit 14 birds were present roosting on the arable fields within the Energy Park Land. Lapwing favoured the field to the west of Park Ings Farm where numbers ranged from 14 to a peak of 31 on Visit 14. Three birds were recorded again on Visit 22 while birds were noted outside the Order Limits to the north with one on Visit 21, three on Visit 22 and two on Visit 25;
- mallard - listed as part of the non-breeding waterbird assemblage qualification of the Humber Estuary SPA associating with River Trent and Lysaght's Drain, were recorded on all but one of the 26 surveys with a peak count of 45 on Visit 5. Records from within the Order Limits were restricted to 19 of the 26 surveys dominated by

single figure counts involving birds feeding along the Lysaght's Drain and adjoining drains to the south where notable counts comprised 22 on Visit 11 and eleven on Visit 22;

- marsh harrier - listed as a qualifying breeding species under Annex 1 of the Humber Estuary SPA and breeding species for the RAMSAR and SSSI. One bird flew south west over arable fields to the north of Flixborough Industrial Estate, outside the Order Limits to the north on Visit 8;
- oystercatcher - listed as part of the non-breeding waterbird assemblage qualification of the Humber Estuary SPA, RAMSAR and SSSI. Two birds were present within the south east corner of the Energy Park Land on Visit 19. Two birds were noted flying south down the River Trent to the west of the Order Limits on Visit 22;
- redshank - listed as part of the non-breeding waterbird assemblage qualification of the Humber Estuary SPA and SSSI. Between Visits 14-18 and Visits 22-24 birds were recorded feeding in water drains within the survey area, of these three were in the Energy Park Land drains on Visit 16 and four on Visit 23 with single birds present on Visits 14, 17, 22 & 24. Outside the Order Limits to the north of Flixborough Industrial Estate four birds were noted on Visit 15, nine on Visit 16, one on Visit 18 and two on Visit 19;
- shelduck - listed as part of the non-breeding waterbird assemblage qualification of the Humber Estuary SPA and SSSI. No records from within the Order Limits, one bird was recorded flying south over farmland to the north of Flixborough Industrial Estate adjacent to the River Trent on Visit 11; and
- teal - listed as part of the non-breeding waterbird assemblage qualification of the Humber Estuary SPA, RAMSAR and SSSI. One bird was present in large water drain at the south east corner of the Energy Park Land near Skippingdale Industrial Park on Visit 8.

3.28 Additional wildfowl and wader sightings comprise;

- green sandpiper – up to three birds were present between Visit 11 to Visit 18, feeding in water drains within the southern Energy Park Land and to the north of Flixborough Industrial Estate and one on Visit 22;
- greylag goose – two flew south down the River Trent during Visit 2, 149 birds flew over in two skeins during Visit 7 heading north west, one flew south over fields to the south of Flixborough Industrial Estate on on Visit 8, ten flew south along the River Trent to the north of Flixborough Wharf on Visit 9, two flew north along the River Trent on Visit 11, one flew north on Visit 22 and five flew west over the Energy Park Land on Visit 24;
- mute swan – one on Visit 4 and five on Visit 5 involving two on the River Trent to the north of Flixborough Wharf and three flew south east over the Energy Park Land towards Skippingdale Industrial Park. Two birds frequented Lysaght's Drain area, Energy Park Land on Visits 12, 17, 18 and 26 with an additional two birds flying south over Flixborough Industrial Estate on Visit 11 and four birds flying south over the survey area on Visit 12;
- pink-footed goose – 64 on Visit 6 flew over the northern edge of Flixborough Industrial Estate in two skeins, 45 flew over the Energy Park Land during Visit 7 heading north west, and 253 flew over Flixborough Industrial Estate and arable fields to north in three skeins during Visit 8, 88 flew over on Visit 11 including two skeins of 19 and 29 birds over the Energy Park Land, 65 flew north along River Trent on Visit 14 and a significant movement of 338 birds flew over the survey area in four skeins on Visit 15; and
- whooper swan – 24 flew south over the main Energy Park Land from the direction of Flixborough Industrial Estate on Visit 9 and three flew south over the survey area on Visit 12.

3.29 Full survey results are included in Appendix K and L. The remainder of the species recorded during the surveys were relatively common and widespread species throughout Great Britain and North Lincolnshire and representative of the habitats present in the area.

3.30 The most abundantly occurring species recorded were 1990 black-headed gull (Visit 1), 1490 starling and 1142 woodpigeon during Visit 10. Additional species with high peak counts include: 725 Feral pigeon (Visit 13), 360 rook (Visit 18), 202 Jackdaw (Visit 18), 154 linnet (Visit 9), 144 goldfinch (Visit 3), 132 carrion crow (Visit 1), 110 pheasant (Visit 13), 90 common gull (Visit 10), 69 grey partridge (Visit 11) and 54 skylark (Visit 5).

4. Evaluation

Wintering and migratory birds

4.1 The Humber Estuary Ramsar Site, which includes the section of the River Trent immediately west of the Order Limits, and the Humber Estuary SPA, which is located approximately 5.8 km north, support a number of internationally important wintering bird populations. However, suitable habitat for these qualifying bird species within Order Limits is limited. The intensively managed arable farmland with associated arable field drains, marginal vegetation, arable field margins and hedgerows provide refuge and foraging habitat for only small numbers of wintering waterbirds. The wintering and migratory bird surveys support this assessment, with only occasional and small numbers of qualifying waterbirds recorded in the arable fields and water drains, including golden plover, lapwing, mallard, oystercatcher, redshank and teal whilst recorded nearby were curlew, and shelduck.

4.2 26 walkover bird surveys were undertaken between August 2021 and April 2022, encompassing the open habitat within the Energy Park Land and adjacent habitat to the north of Flixborough Industrial Estate. These follow on from five surveys undertaken between November 2019 to March 2020. Only occasional and small numbers of qualifying waterbirds were recorded in the open arable fields and land drains found within the Order Limits.

4.3 SPA, Ramsar and SSSI qualifying species were only recorded in small numbers with golden plover, lapwing, mallard, oystercatcher, redshank and teal recorded using habitats within the Order Limits for foraging and/or roosting. Of these, golden plover, lapwing and mallard were recorded in numbers of greater than 10 individuals on a single survey visit. Additionally curlew, marsh harrier and shelduck were recorded within the surrounding area only. Details are provided below with respect to sightings within the Order Limits;

- golden plover - listed as a qualifying wintering species under Annex 1 of the Humber Estuary SPA and non-breeding waterbird assemblage for the SSSI. Between Visit 15 to 18, roosting birds were recorded using the arable fields within the middle of the Energy Park Land with a peak of 82 present on Visit 15 dropping to 51 on Visit 16, six on Visit 17 and 25 on Visit 18. Favoured fields were located at NGR: SE 86773 13616 and NGR: SE 87158 13112;
- lapwing - listed as part of the non-breeding waterbird assemblage qualification of the Humber Estuary SPA, RAMSAR and SSSI. From Visit 11 to Visit 14, birds were present roosting on the arable fields within the Energy Park Land, favouring the field at NGR: SE 87023 14026 located to the west of Park Ings Farm. Here numbers ranged from 14 to a peak of 31 on Visit 14. Three birds were recorded again on Visit 22;
- mallard - listed as part of the non-breeding waterbird assemblage qualification of the Humber Estuary SPA associating with Lysaght's Drain and connecting drains within the Energy Park Land. Birds were recorded on 19 of the 26 surveys, with records dominated by single figure counts. Notable counts comprised 22 mallards on Visit 11 and 11 on Visit 22;
- oystercatcher - listed as part of the non-breeding waterbird assemblage qualification of the Humber Estuary SPA, RAMSAR and SSSI. Two birds were present within the south-east corner of the Energy Park Land on Visit 19;
- redshank - listed as part of the non-breeding waterbird assemblage qualification of the Humber Estuary SPA and SSSI. Birds were recorded feeding in water drains within the Energy Park Land, three on Visit 16, four on Visit 23 and single birds present on Visits 14, 17, 22 & 24; and

- teal - listed as part of the non-breeding waterbird assemblage qualification of the Humber Estuary SPA, RAMSAR and SSSI. One bird was present in large water drain at the south-east corner of the Energy Park Land on Visit 8.

4.4 The River Trent, which is part of the Humber Estuary Ramsar Site and contiguous with the Humber Estuary SPA, is directly adjacent to the Project. The wintering bird surveys included five vantage point surveys of the River Trent from both the east and west banks between November 2018 to March 2019. The surveys found that this area of the River Trent and adjacent terrestrial habitats are not locally important for waterbirds which are listed as qualifying species of the Ramsar and SPA designations. Significantly sized roosting or foraging flocks of waterbirds were limited and only recorded during the November 2018 survey, comprising a count of c.50 lapwing on the arable farmland to the west of the River Trent, and c.41 mallard roosting and foraging along the banks of the River Trent.

4.5 Marsh harrier - listed as a qualifying breeding species under Annex 1 of the Humber Estuary SPA and breeding species for the RAMSAR and SSSI was noted when a single bird flew south west over arable fields to the north of Flixborough Industrial Estate, outside the order limits to the north on Visit 8 during the 2021/2022 surveys. On a single occasion during the 2019/2020 surveys, a single marsh harrier was observed foraging over the stubble crop fields, close to the River Trent, and to the north of the Flixborough Industrial Estate. It is understood, however, that there will be no significant loss of habitat to the north of the Flixborough Industrial Estate;

4.6 86 species were recorded during the 2022/2020 surveys, involved several notable bird species, including 16 Red and 35 Amber listed bird species on BoCC5. Impacts to these species should be carefully considered and adequately compensated for, notably by providing suitable passage/winter foraging habitats for farmland birds such as grey partridge, linnet, skylark, tree sparrow and yellowhammer.

Breeding birds

4.7 A range of habitats within the Order Limits provide opportunities for a diverse assemblage of breeding birds that is considered to be locally important. Key species identified during the breeding bird surveys include Cetti's warbler, dunnock, grasshopper warbler, linnet, reed bunting, skylark, song thrush, starling, yellowhammer, and yellow wagtail. Impacts to these species should be carefully considered and adequately compensated for.

4.8 The following key areas were identified which provide significant opportunities for breeding birds within the Order Limits. Figure 6 below illustrates the locations of key habitats.

Arable farmland both to the north and south of the Flixborough Industrial Estate, with associated field margins, arable field drains, set-aside land, hedgerows and scrub, provides breeding habitat for farmland birds. This includes the following species which were recorded as confirmed, probable and possible breeding within the Order Limits; skylark, reed bunting, yellowhammer, linnet, grey partridge, yellow wagtail and meadow pipit.

The River Trent is located immediately adjacent to the Order Limits features marginal vegetation dominated by tall common reed growth along the eastern bank. The river and marginal vegetation provide breeding habitat for the following confirmed, probable, and possible breeding birds; Cetti's warbler, grasshopper warbler, reed bunting. During the surveys, birds were often observed flying and foraging between the arable farmland and the marginal vegetation of the River Trent.

The Dragonby to Flixborough railway line, which features areas of scrub, woodland and more open areas supports and assemblage of scrub and woodland birds including to the following species which were assessed as confirmed, probable, or possible breeding; dunnock, bullfinch, willow warbler, linnet, yellowhammer, lesser whitethroat (*Sylvia curruca*), blackcap (*Sylvia atricapilla*), great spotted woodpecker (*Dendrocopos major*), great tit (*Parus major*), chiffchaff (*Phylloscopus collybita*) and greenfinch (*Chloris chloris*). Following the initial breeding bird surveys, the Conesby Quarry Local Wildlife Site was included within the Order Limits of the Project. As it is understood that there will be no loss of breeding bird habitat, additional surveys of this area were not conducted. However, the breeding bird surveys of the Railway Reinstatement Land recorded species including Cetti's warbler singing from within the Local Wildlife Site. The mosaic of scrub and wetlands will provide abundant breeding bird habitat.

The mosaic of semi-natural habitats in the eastern section of the Energy Park Land provides cover for ground nesting and scrub nesting species, including the following birds which were assessed as confirmed, probable, or possible breeding in the area; lesser whitethroat, chiffchaff, snipe, woodcock, song thrush, rook (*Corvus frugilegus*), buzzard (*Buteo buteo*) and grey partridge.

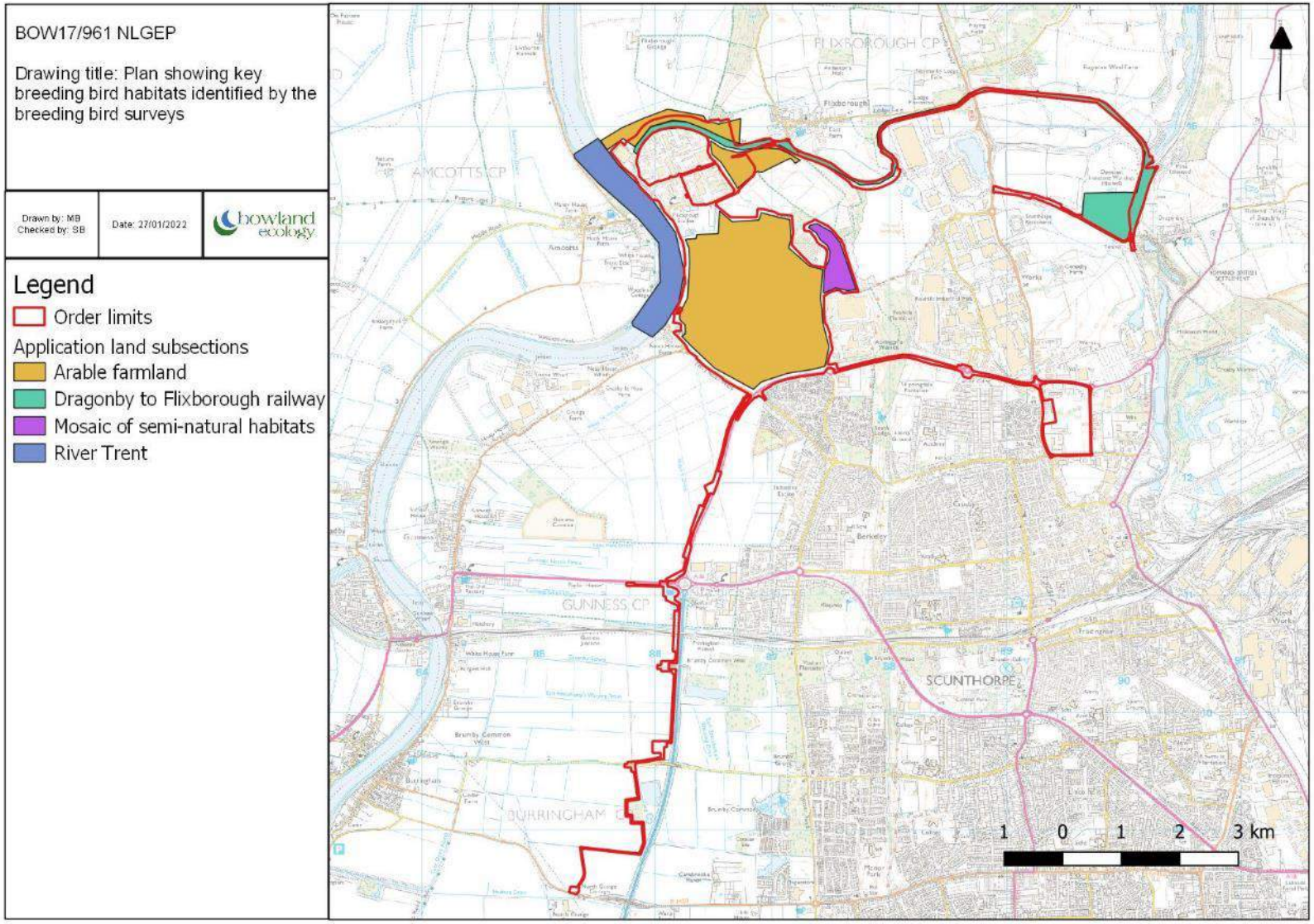

Figure 6. Plan showing key habitats identified by the breeding bird surveys.

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Appendix A: Wintering Bird Survey Results (2018 - 2019)

BTO code	Species	Scientific name	30 Nov	18 Dec	22 Jan	14 Feb	1 Mar	BoCC4
B.	Blackbird	*Turdus merula*			8	4	10	Green
BH	Black-headed gull	*Chroicocephalus ridibundus*	5			2		Amber
BT	Blue tit	*Cyanistes caeruleus*			2	6	3	Green
BZ	Buzzard	*Buteo buteo*				2		Green
C.	Carrion crow	*Corvus corone*		5	5	13	11	Green
CA	Cormorant	*Phalacrocorax carbo*		1		1	1	Green
CD	Collared dove	*Streptopelia decaocto*			1		1	Green
CH	Chaffinch	*Fringilla coelebs*		1				Green
CM	Common gull	*Larus canus*		12	9			Amber
D.	Dunnock	*Prunella modularis*		2	5	2	5	Amber
FP	Feral pigeon	*Columba livia domestica*	c.150	c.200	c.470	c.400	c.290	Green
GO	Goldfinch	*Carduelis carduelis*			6	1	18	Green
GR	Greenfinch	*Chloris chloris*				1		Green
GT	Great tit	*Parus major*					2	Green
HG	Herring gull	*Larus argentatus*			1	2	2	Green
JD	Jackdaw	*Coloeus monedula*		109				Green
L.	Lapwing	*Vanellus vanellus*	c.50				1	Red
M.	Mistle thrush	*Turdus viscivorus*				1	1	Green
MA	Mallard	*Anas platyrhynchos*	c.41	3	14	8	17	Amber
MG	Magpie	*Pica pica*		2		1	1	Green
PH	Pheasant	*Phasianus colchicus*		1	1		2	Green
PW	Pied wagtail	*Motacilla alba*		2	1	6		Green
R.	Robin	*Erithacus rubecula*		1	3	3	7	Green
RL	Red-legged partridge	*Alectoris rufa*					1	Green
S.	Skylark	*Alauda arvensis*				1	1	Red
SD	Stock dove	*Columba oenas*		1	2	3	2	Amber
ST	Song thrush	*Turdus philomelos*		1			1	Red
WP	Wood pigeon	*Columba palumba*		2	9	13	12	Green
WR	Wren	*Troglodytes troglodytes*		1	1	1	3	Green
Y.	Yellowhammer	*Emberiza citrinella*					2	Red

Appendix B: Wintering Bird Survey Results (2019 - 2020)

BTO code	Species	Scientific name	13 Nov	16/17 Dec	14/15 Jan	19/20 Feb	17/18 Mar	BoCC4
B.	Blackbird	*Turdus merula*	24	63	33	20	17	Green
BH	Black-headed gull	*Chroicocephalus ridibundus*		9	20	27	4	Amber
BT	Blue tit	*Cyanistes caeruleus*	4	22	19	13	12	Green
BF	Bullfinch	*Pyrrhula pyrrhula*		2	1	11	3	Amber
BZ	Buzzard	*Buteo buteo*	2	2		1	5	Green
C.	Carrion crow	*Corvus corone*	25	26	37	25	54	Green
CA	Cormorant	*Phalacrocorax carbo*			1	1	1	Green
CD	Collared dove	*Streptopelia decaocto*	101					Green
CH	Chaffinch	*Fringilla coelebs*	4	14		4	9	Green
CC	Chiffchaff	*Phylloscopus collybita*					7	Green
CM	Common gull	*Larus canus*	7		18	34		Amber
D.	Dunnock	*Prunella modularis*	5	3		5	9	Amber
FF	Fieldfare	*Turdus pilaris*	3	20	20	8		Red
GO	Goldfinch	*Carduelis carduelis*	6	1		3	1	Green
GT	Great tit	*Parus major*	3	8	5	10	12	Green
GR	Greenfinch	*Chloris chloris*		3				Green
GE	Green sandpiper	*Tringa ochropus*		3	2	3		Amber
G.	Green woodpecker	*Picus viridis*		1			1	Green
GL	Grey wagtail	*Motacilla cinerea*	4	1	1	1		Red
GS	Great spotted woodpecker	*Dendrocopos major*					2	Green
HG	Herring gull	*Larus argentatus*	2	6	9	3	3	Green
H.	Grey heron	Ardea cinerea	1	1				Green
HS	House sparrow	*Passer domesticus*		6		8		Red
JD	Jackdaw	*Coloeus monedula*	3	3	4	26	28	Green
J.	Jay	Garrulus glandarius	1	1				Green
K.	Kestrel	*Falco tinnunculus*	3	2	6	3	4	Amber
KF	Kingfisher	*Alcedo atthis*			2	1		Amber
L.	Lapwing	*Vanellus vanellus*			5	6	6	Red
ET	Little egret	*Egretta garzetta*	6					Green
LT	Long-tailed tit	*Aegithalos caudatus*	15	25	10	5	1	Green
M.	Mistle thrush	*Turdus viscivorus*			4			Green

MA	Mallard	*Anas platyrhynchos*			7	4	42	Amber
MG	Magpie	*Pica pica*		3	7	10	7	Green
MR	Marsh harrier	*Circus aeruginosus*					1	Amber
MP	Meadow pipit	*Anthus pratensis*	1	2	9	8	4	Amber
MS	Mute swan	*Cygnus olor*	1					Amber
OC	Oystercatcher	*Haematopus ostralegus*		3	1	2		Amber
PH	Pheasant	*Phasianus colchicus*	16	10	5	6	8	Green
PW	Pied wagtail	*Motacilla alba*	2	6	3	2	6	Green
RB	Reed bunting	*Emberiza schoeniclus*	4	33	92	31	8	Amber
R.	Robin	*Erithacus rubecula*	7	15	19	18	22	Green
RL	Red-legged partridge	*Alectoris rufa*	5	24	2	8	10	Green
RE	Redwing	*Turdus iliacus*	19	62	91	19	6	Red
S.	Skylark	*Alauda arvensis*	2	4	1	9	47	Red
SN	Snipe	*Gallinago gallinago*		2	1			Amber
SH	Sparrowhawk	*Accipiter nisus*	1	2	1	1		Green
SG	Starling	*Sturnus vulgaris*	46	25	75		9	Red
SD	Stock dove	*Columba oenas*	2		50	2		Amber
SC	Stonechat	Saxicola rubicola	3	1				Green
ST	Song thrush	*Turdus philomelos*		3	1		1	Red
T.	Teal	*Anas crecca*				6		Amber
TS	Tree sparrow	*Passer montanus*	8	8	12			Red
WK	Woodcock	*Scolopax rusticola*				1		Red
WP	Wood pigeon	*Columba palumba*	79	45	180	182	93	Green
WR	Wren	*Troglodytes troglodytes*	16	20	16	11	20	Green
Y.	Yellowhammer	*Emberiza citrinella*		23	106	24	2	Red

Appendix C: Breeding Bird Survey Results (April - June 2019)

BTO code	Species	Scientific name	Breeding status	12 April 2019	22/23 May 2019	19/20 June 2019	BoCC4
B.	Blackbird	*Turdus merula*	Probable breeding	14	17	22	Green
BC	Blackcap	*Sylvia atricapilla*	Possible breeding	6	15	12	Green
BF	Bullfinch	*Pyrrhula pyrrhula*	Probable breeding	2	2	9	Amber
BG	Brent goose	*Branta bernicla*	Non-breeding			1	Amber
BH	Black-headed gull	*Chroicocephalus ridibundus*	Non-breeding	3		1	Amber
BT	Blue tit	*Cyanistes caeruleus*	Confirmed breeding	25	7	29	Green
C.	Carrion crow	*Corvus corone*	Probable breeding	17	12	11	Green
CC	Chiffchaff	*Phylloscopus collybita*	Possible breeding	15	4	6	Green
CD	Collared dove	*Streptopelia decaocto*	Possible breeding	4	3	1	Green
CH	Chaffinch	*Fringilla coelebs*	Probable breeding	9	15	7	Green
CU	Curlew	*Numenius arquata*	Non- breeding		1		Red
CW	Cetti's warbler	*Cettia cetti*	Confirmed breeding		2	5	Green
D.	Dunnock	*Prunella modularis*	Probable breeding	11	14	9	Amber
FP	Feral pigeon	*Columba livia*	Non-breeding	15			Green
G.	Green woodpecker	*Picus viridis*	Possible breeding		1	2	Green
GC	Goldcrest	*Regulus regulus*	Possible breeding			1	Green
GK	Greenshank	*Tringa nebularia*	Non-breeding	3			Amber
GH	Grasshopper warbler	*Locustella naevia*	Possible breeding		1		Red
GJ	Greylag goose	*Anser anser*	Non- breeding		1		Amber
GO	Goldfinch	*Carduelis carduelis*	Possible breeding	15	13	6	Green
GR	Greenfinch	*Chloris chloris*	Possible breeding	1			Green
GS	Great spotted woodpecker	*Dendrocopos major*	Possible breeding		1	1	Green
GT	Great tit	*Parus major*	Confirmed breeding	16	4	10	Green
H.	Grey heron	Ardea cinerea	Non-breeding	1		1	Green
HG	Herring gull	*Larus argentatus*	Non- breeding	1	1		Green
HM	House martin	*Delichon urbicum*	Non- breeding		7	3	Amber
HS	House sparrow	*Passer domesticus*	Non- breeding	3	1	5	Red
JD	Jackdaw	*Coloeus monedula*	Possible breeding	5	2	3	Green
K.	Kestrel	*Falco tinnunculus*	Non- breeding		1		Amber
L.	Lapwing	*Vanellus vanellus*	Non-breeding		2		Red

LB	Lesser black-backed gull	*Larus fuscus*	Non- breeding	1	1	7	Amber
LI	Linnet	*Linaria cannabina*	Possible breeding	10	9	13	Red
LT	Long-tailed tit	*Aegithalos caudatus*	Confirmed breeding		1	4	Green
LW	Lesser whitethroat	*Sylvia curruca*	Possible breeding		6		Green
MA	Mallard	*Anas platyrhynchos*	Non-breeding	4	1	3	Amber
MG	Magpie	*Pica pica*	Possible breeding	5	4	4	Green
MP	Meadow pipit	*Anthus pratensis*	Non- breeding	1			Amber
OC	Oystercatcher	*Haematopus ostralegus*	Non- breeding	1			Amber
PH	Pheasant	*Phasianus colchicus*	Possible breeding	6	2	3	Green
PW	Pied wagtail	*Motacilla alba*	Probable breeding	1	2	2	Green
R.	Robin	*Erithacus rubecula*	Confirmed breeding	16	8	12	Green
RB	Reed bunting	*Emberiza schoeniclus*	Confirmed breeding	8	6	6	Amber
RL	Red-legged partridge	*Alectoris rufa*	Possible breeding			2	Green
RW	Reed warbler	*Acrocephalus scirpaceus*	Possible breeding		15	9	Green
S.	Skylark	*Alauda arvensis*	Confirmed breeding	6	6	6	Red
SC	Stonechat	Saxicola rubicola	Possible breeding	1			Green
SD	Stock dove	*Columba oenas*	Non-breeding	2		7	Amber
SG	Starling	*Sturnus vulgaris*	Non-breeding	1	22		Red
SI	Swift	*Apus apus*	Non-breeding			1	Amber
SK	Siskin	*Spinus spinus*	Non- breeding			1	Green
SL	Swallow	*Hirundo rustica*	Non- breeding		10	3	Green
ST	Song thrush	*Turdus philomelos*	Possible breeding	3	4	6	Red
SU	Shelduck	*Tadorna tadorna*	Non- breeding		1		Amber
SW	Sedge warbler	*Acrocephalus schoenobaenus*	Confirmed breeding		6	6	Green
T.	Teal	*Anas crecca*	Non- breeding	3			Amber
TO	Tawny owl	*Strix aluco*	Possible breeding			1	Amber
WH	Whitethroat	*Sylvia communis*	Confirmed breeding		7	25	Green
WP	Wood pigeon	*Columba palumba*	Possible breeding	50	26	42	Green
WR	Wren	*Troglodytes troglodytes*	Confirmed breeding	30	14	20	Green
WW	Willow warbler	*Phylloscopus trochilus*	Confirmed breeding	8	14	26	Amber
Y.	Yellowhammer	*Emberiza citrinella*	Possible breeding	4	13	10	Red

Appendix D: Breeding Bird Survey Results (June 2020, April to June 2021)

BTO code	Species	Scientific name	Breeding status	19/20 June 2020	12/13 April 2021	12/13 May 2021	18 June 2021	30 June 2021	BoCC4
B.	Blackbird	*Turdus merula*	Possible breeding	24	12	28	11	11	Green
BC	Blackcap	*Sylvia atricapilla*	Possible breeding	11	3	13	2	2	Green
BF	Bullfinch	*Pyrrhula pyrrhula*	Possible breeding	4	1	2			Amber
BH	Black-headed gull	*Chroicocephalus ridibundus*	Non-breeding		2			11	Amber
BT	Blue tit	*Cyanistes caeruleus*	Confirmed breeding	15	19	5	18	9	Green
BZ	Buzzard	*Buteo buteo*	Confirmed breeding	3	2	1	1		Green
C.	Carrion crow	*Corvus corone*	Possible breeding	24	54	48	1	16	Green
CA	Cormorant	*Phalacrocorax carbo*	Non-breeding				1		Green
CC	Chiffchaff	*Phylloscopus collybita*	Possible breeding	19	13	8	5	5	Green
CD	Collared dove	*Streptopelia decaocto*	Possible breeding	2	1	1			Green
CH	Chaffinch	*Fringilla coelebs*	Possible breeding	2	6	7	6	11	Green
D.	Dunnock	*Prunella modularis*	Possible breeding	12	12	12	4	12	Amber
G.	Green Woodpecker	*Picus viridis*	Possible breeding				1		Green
GC	Goldcrest	*Regulus regulus*	Possible breeding	1					Green
GE	Green sandpiper	*Tringa ochropus*	Non-breeding	1	1				Amber
GH	Grasshopper Warbler	*Locustella naevia*	Possible breeding					1	Red
GO	Goldfinch	*Carduelis carduelis*	Possible breeding	25	9	13	14	9	Green
GR	Greenfinch	*Chloris chloris*	Possible breeding	1	1	2		3	Green
GS	Great Spotted Woodpecker	*Dendrocopos major*	Possible breeding				1		Green
GT	Great tit	*Parus major*	Confirmed breeding	7	17	6	5	9	Green
GW	Garden warbler	*Sylvia borin*	Possible breeding	1					Green
HS	House sparrow	*Passer domesticus*	Possible breeding			4	2		Red
JD	Jackdaw	*Coloeus monedula*	Possible breeding	2	38	6	9	10	Green
K.	Kestrel	*Falco tinnunculus*	Non- breeding	2		1	1	2	Amber
KF	Kingfisher	*Alcedo atthis*	Non-breeding	1					Amber

LB	Lesser black-backed gull	*Larus fuscus*	Non- breeding	3			6	1	Amber
LI	Linnet	*Linaria cannabina*	Possible breeding	26	5	27	17	35	Red
LT	Long-tailed tit	*Aegithalos caudatus*	Confirmed breeding	6	9	2		4	Green
LW	Lesser whitethroat	*Curruca curruca*	Possible breeding	6		3		3	Green
MA	Mallard	*Anas platyrhynchos*	Confirmed breeding	15	12	21		7	Amber
MG	Magpie	*Pica pica*	Possible breeding	5	6	7		5	Green
MH	Moorhen	*Gallinula chloropus*	Possible breeding			1	2	2	Green
MP	Meadow pipit	*Anthus pratensis*	Possible breeding	7	6	10	4	5	Amber
NH	Nuthatch	*Sitta europaea*	Non-breeding					1	Green
OC	Oystercatcher	*Haematopus Ostralegus*	Non-breeding					1	Amber
P.	Grey partridge	*Perdix perdix*	Possible breeding	5	14	10	6	4	Red
PH	Pheasant	*Phasianus colchicus*	Possible breeding	9	37	33		9	Green
PW	Pied wagtail	*Motacilla alba*	Probable breeding	3	6	1		3	Green
R.	Robin	*Erithacus rubecula*	Confirmed breeding	13	13	17	4	15	Green
RB	Reed bunting	*Emberiza schoeniclus*	Confirmed breeding	16	26	35	6	9	Amber
RK	Redshank	*Tringa totanus*	Non- breeding		2				Amber
RL	Red-legged partridge	*Alectoris rufa*	Possible breeding	18		9	6	7	Introduced
RO	Rook	*Corvus frugilegus*	Confirmed breeding	26	65	36	26	9	Green
RW	Reed warbler	*Acrocephalus scirpaceus*	Possible breeding	6		1			Green
SW	Sedge warbler	*Acrocephalus schoenobaenus*	Confirmed breeding	8		10	1		Green
S.	Skylark	*Alauda arvensis*	Probable breeding	35	39	81	12	19	Red
SN	Snipe	*Gallinago gallinago*	Possible breeding	2	4		2	3	Amber
SH	Sparrowhawk	*Accipiter nisus*	Possible breeding		2		1		Green
SD	Stock dove	*Columba oenas*	Non-breeding	8	10	22	11	29	Amber
SG	Starling	*Sturnus vulgaris*	Non-breeding		3	18	16	23	Red
SI	Swift	*Apus apus*	Non-breeding		1		6	2	Amber
SL	Swallow	*Hirundo rustica*	Non- breeding	9	1	10			Green
ST	Song thrush	*Turdus philomelos*	Possible breeding	3	3	7	1	8	Red
TC	Tree creeper	*Certhia familiaris*	Possible breeding	1					Green
TS	Tree sparrow	*Passer montanus*	Possible breeding	4	3	2	5	4	Red

WH	Whitethroat	*Curruca communis*	Confirmed breeding	20		48	2	3	Green
WP	Wood pigeon	*Columba palumba*	Possible breeding	99	175	154	40	53	Green
WR	Wren	*Troglodytes troglodytes*	Confirmed breeding	38	26	39	16	6	Green
WW	Willow warbler	*Phylloscopus trochilus*	Confirmed breeding	9	6	11	5	1	Amber
Y.	Yellowhammer	*Emberiza citrinella*	Possible breeding	3	31	17	7	10	Red
YW	Yellow wagtail	*Motacilla flava*	Possible breeding	3		21		2	Red

Appendix E: Wintering Bird Survey Plans (2018 - 2019)

BOW17/961 NLGEP

Drawing title: 30.11.2018 Wintering Bird Survey Plan

Drawn by: MB
Checked by: SB

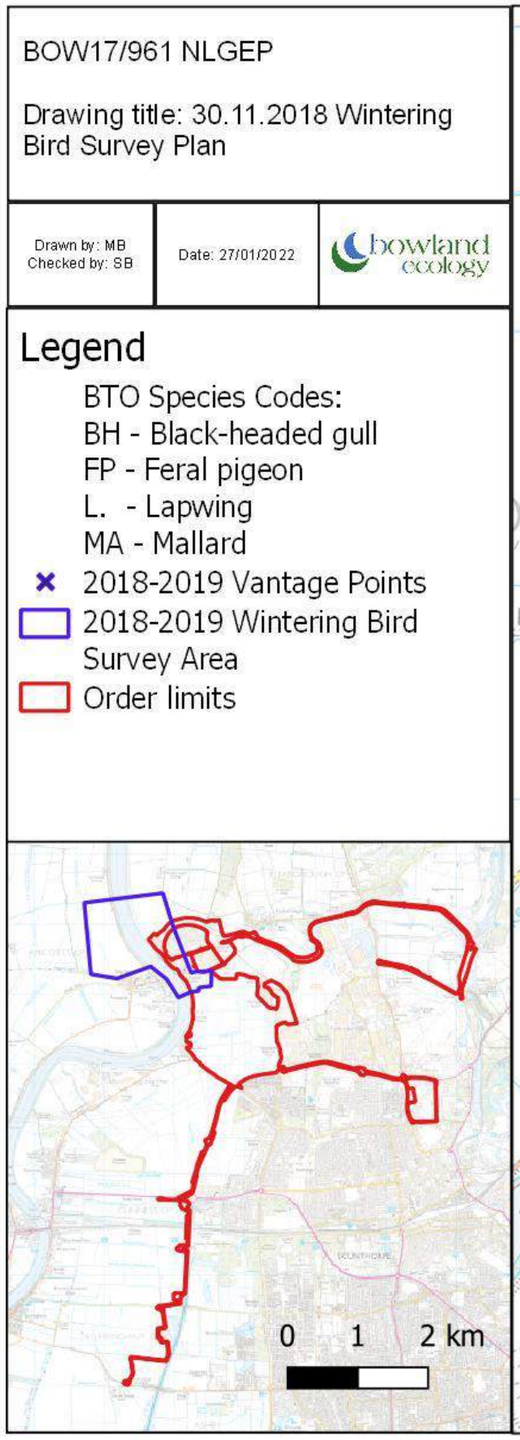
Date: 27/01/2022

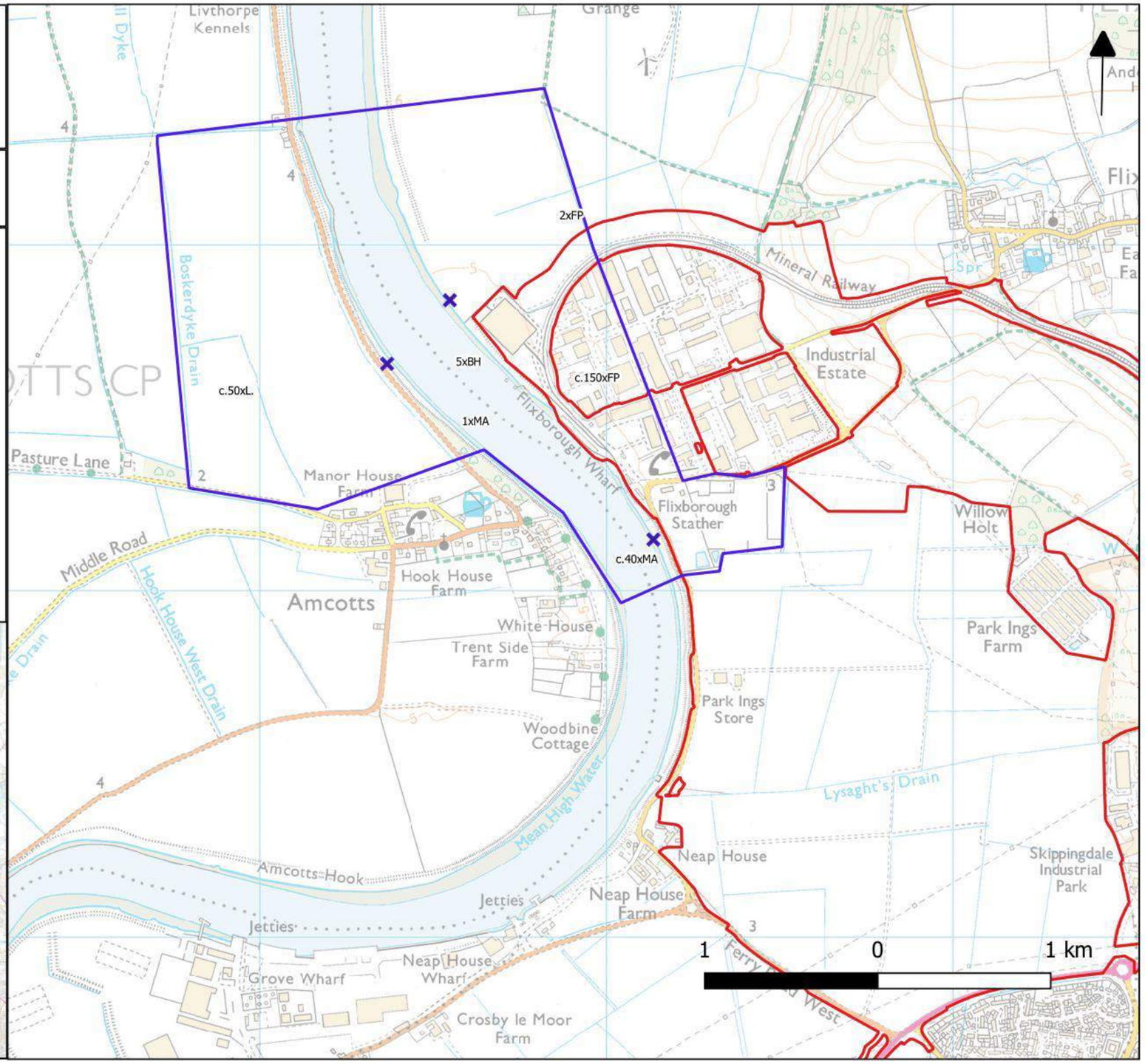
bowland ecology

Legend

BTO Species Codes:
BH - Black-headed gull
FP - Feral pigeon
L. - Lapwing
MA - Mallard

- 2018-2019 Vantage Points
- 2018-2019 Wintering Bird Survey Area
- Order limits





BOW17/961 NLGEP

Drawing title: 18.12.2018 Wintering Bird Survey Plan

Drawn by: MB
Checked by: SB

Date: 26/01/2022

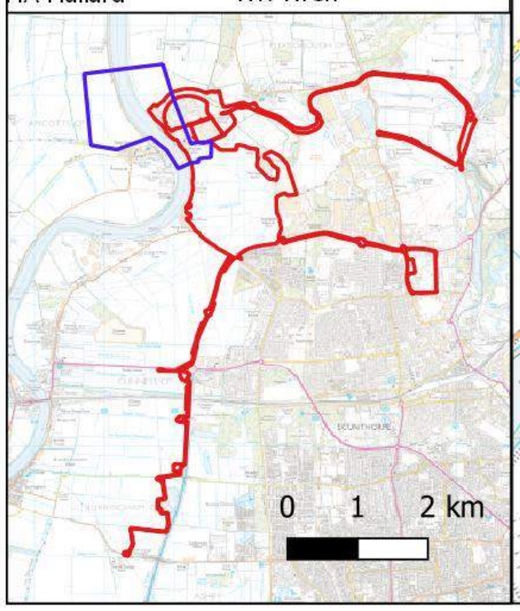
bowland ecology

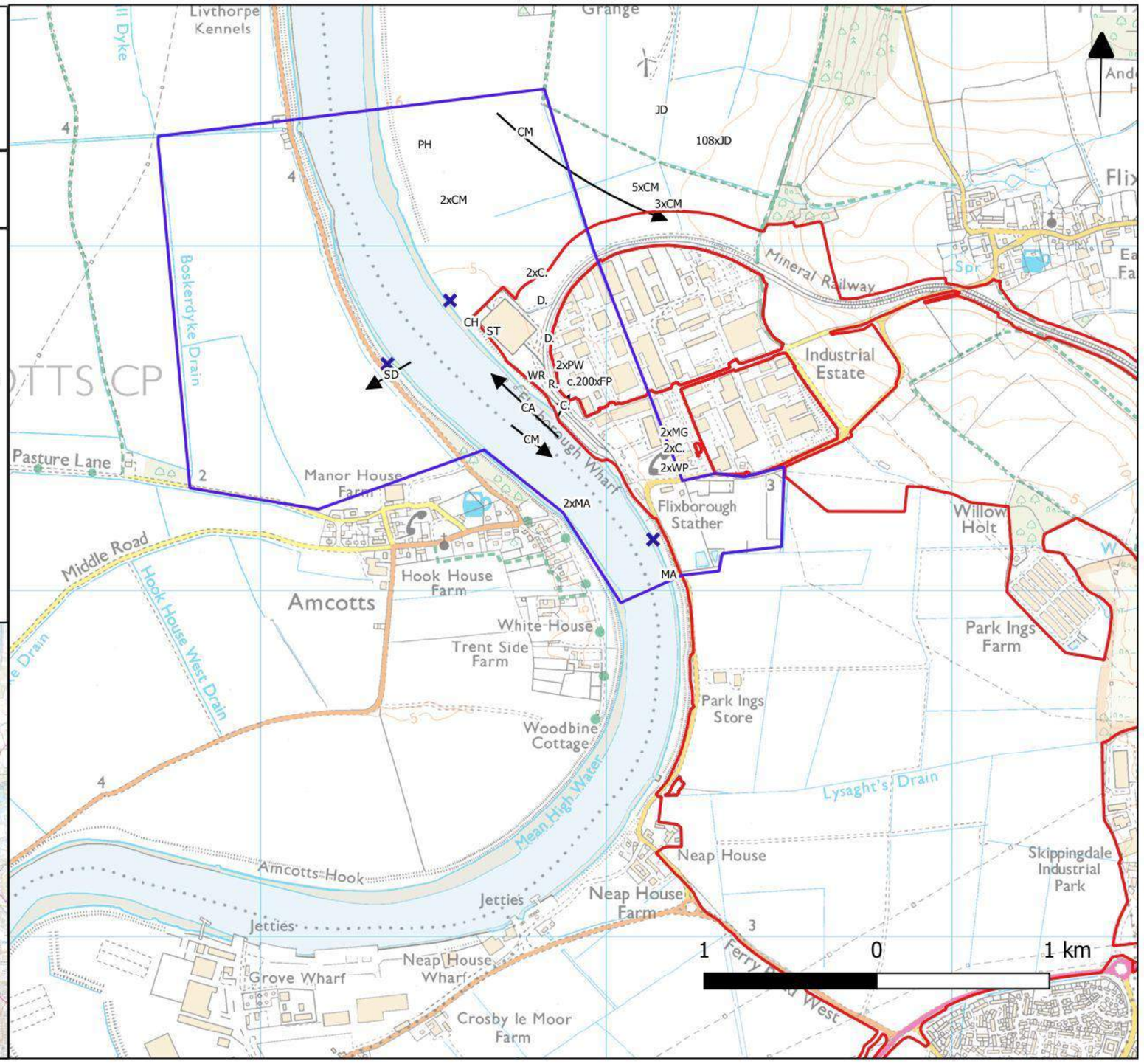
Legend

- Birds 18.12.18
- 2018-2019 Vantage Points
- Bird arrows 18.12.18
- 2018-2019 Wintering Bird Survey Area
- Order limits

BTO Species Codes:

C. Carrion Crow	MG Magpie
CA Cormorant	PH Pheasant
CH Chaffinch	PW Pied Wagtail
CM Common Gull	R. Robin
D. Dunnock	SD Stock Dove
FP Feral Pigeon	ST Song Thrush
JD Jackdaw	WP Woodpigeon
MA Mallard	WR Wren





BOW17/961 NLGEP

Drawing title: 22.01.2019 Wintering Bird Survey Plan

Drawn by: MB
Checked by: SB

Date: 26/01/2022

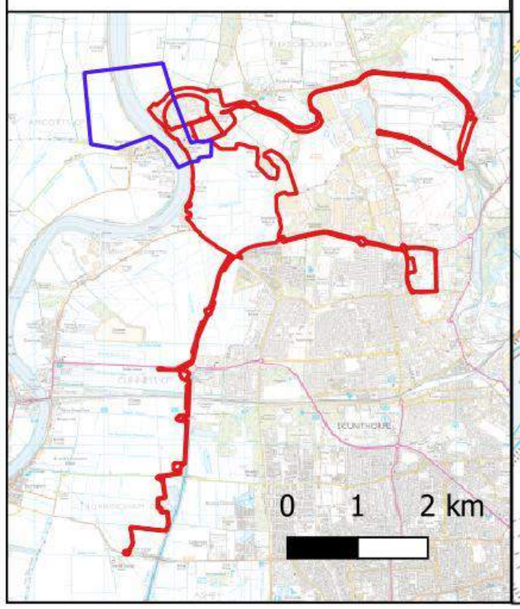
bowland ecology

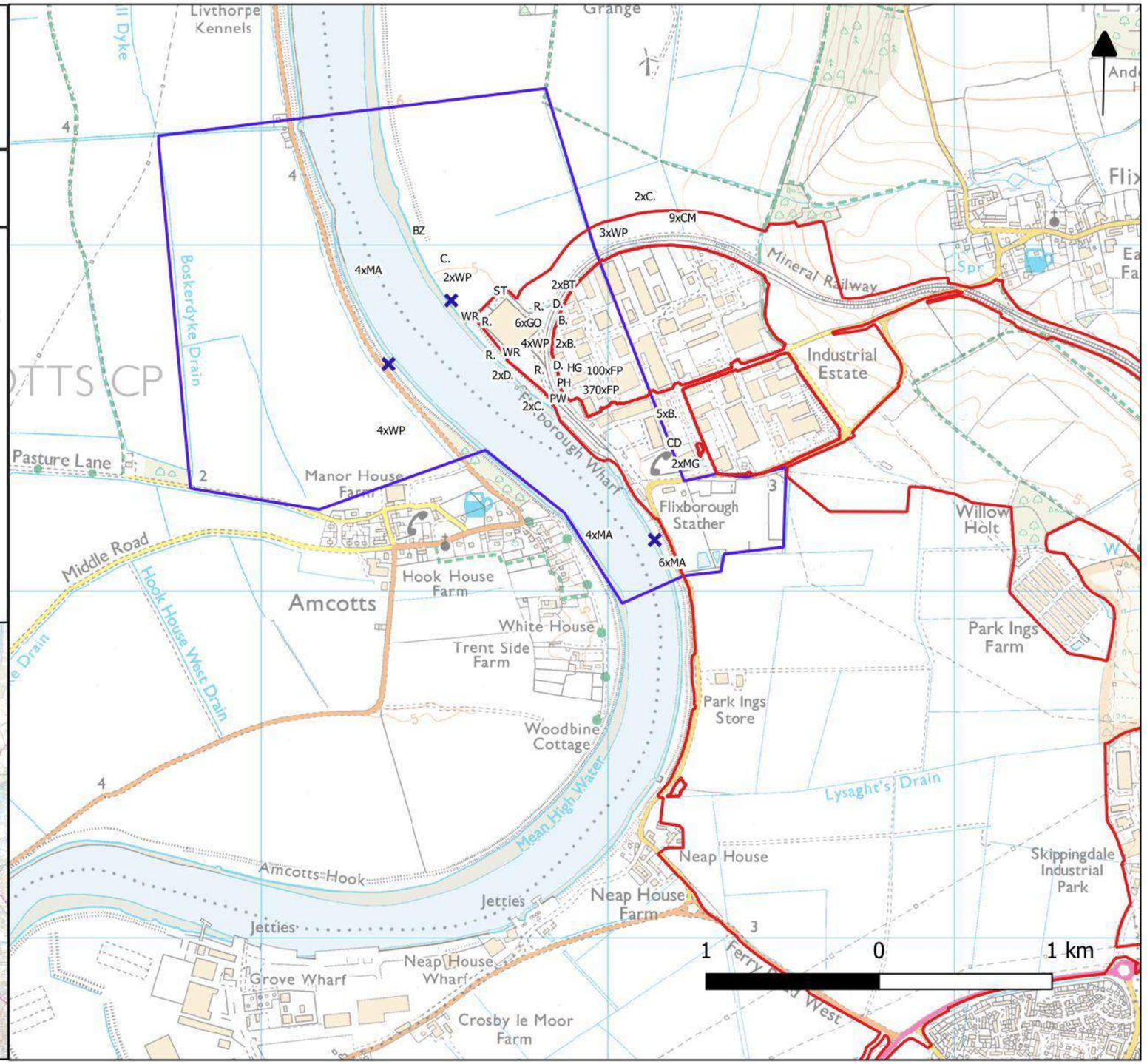
Legend

- 2018-2019 Vantage Points
- 2018-2019 Wintering Bird Survey Area
- Order limits

Bird Species Codes:

B. Blackbird	MA Mallard
BT Blue Tit	MG Magpie
BZ Buzzard	PH Pheasant
C. Carrion Crow	PW Pied Wagtail
CD Collared Dove	R. Robin
CM Common Gull	ST Stock Dove
D. Dunnock	WP Woodpigeon
FP Feral Pigeon	WR Wren
GO Goldfinch	
HG Herring Gull	





BOW17/961 NLGEP

Drawing title: 14.02.2019 Wintering Bird Survey Plan

Drawn by: MB
Checked by: SB

Date: 27/01/2022

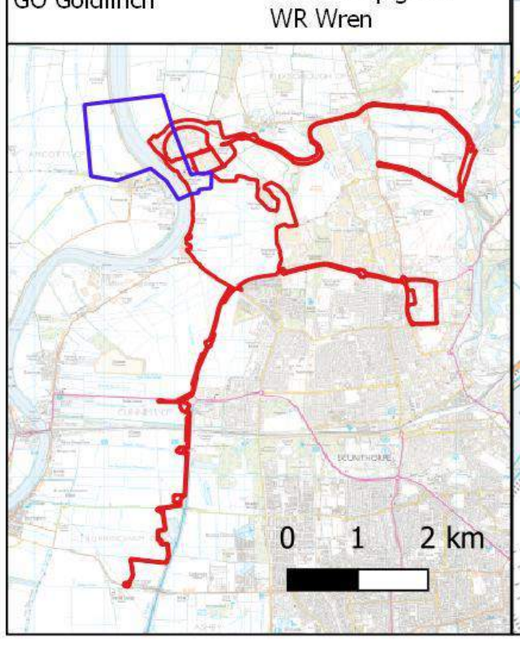
bowland ecology

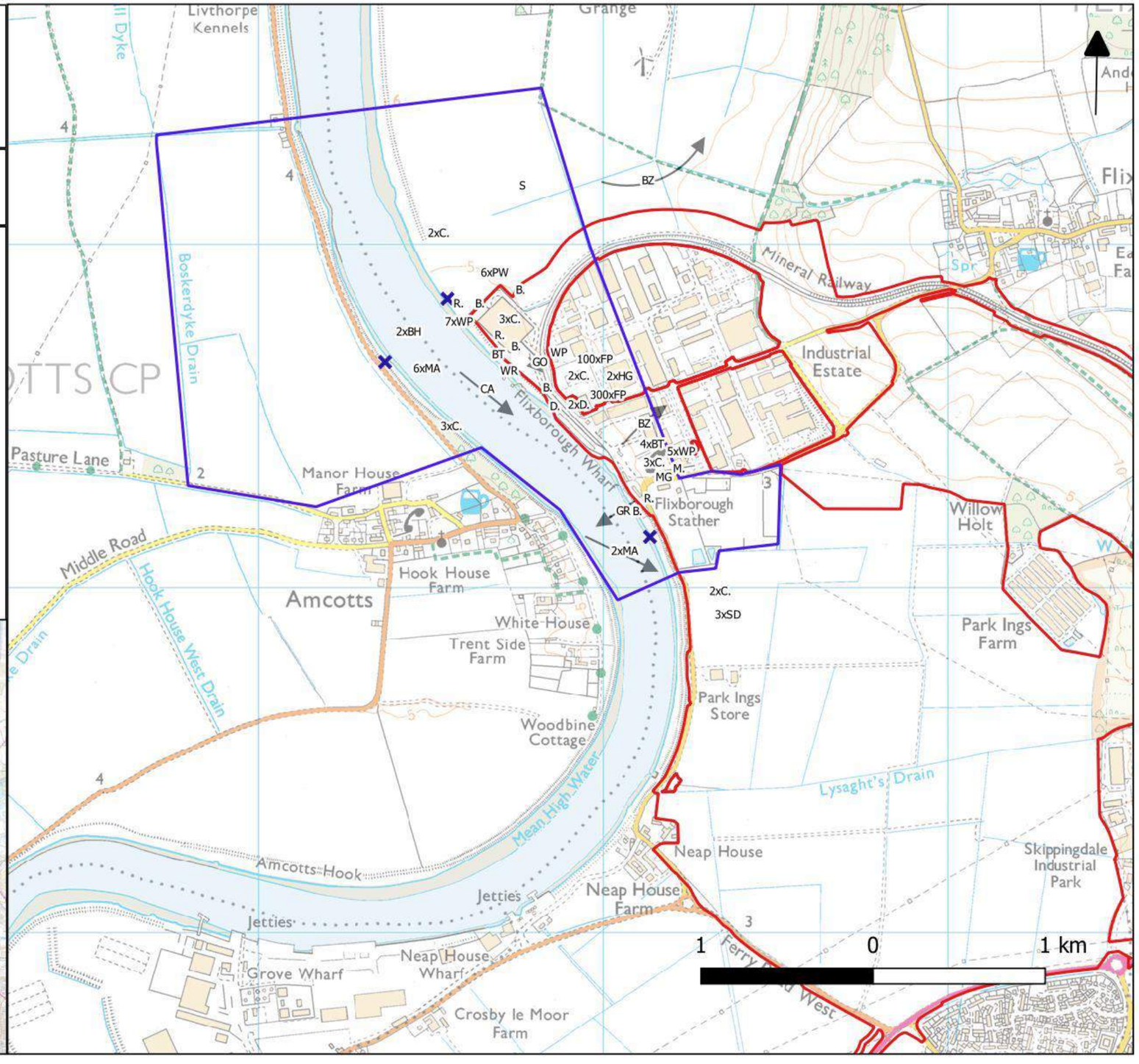
Legend

- 2018-2019 Vantage Points
- 2018-2019 Wintering Bird Survey Area
- Order limits

Bird Species Codes:

B. Blackbird	GR Greenfinch
BH Black Headed Gull	HG Herring Gull
BT Blue Tit	M. Mistle Thrush
BZ Buzzard	MA Mallard
C. Carrion Crow	MG Magpie
CA Cormorant	PW Pied Wagtail
D. Dunnock	R. Robin
FP Feral Pigeon	S Skylark
GJ Greylag Goose	SD Stock Dove
GO Goldfinch	WP Woodpigeon
	WR Wren





BOW17/961 NLGEP

Drawing title: 22.01.2019 Wintering Bird Survey Plan

Drawn by: MB
Checked by: SB

Date: 26/01/2022

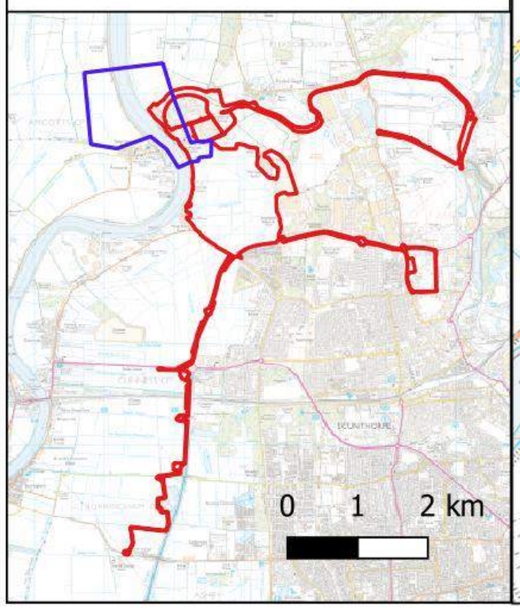
bowland ecology

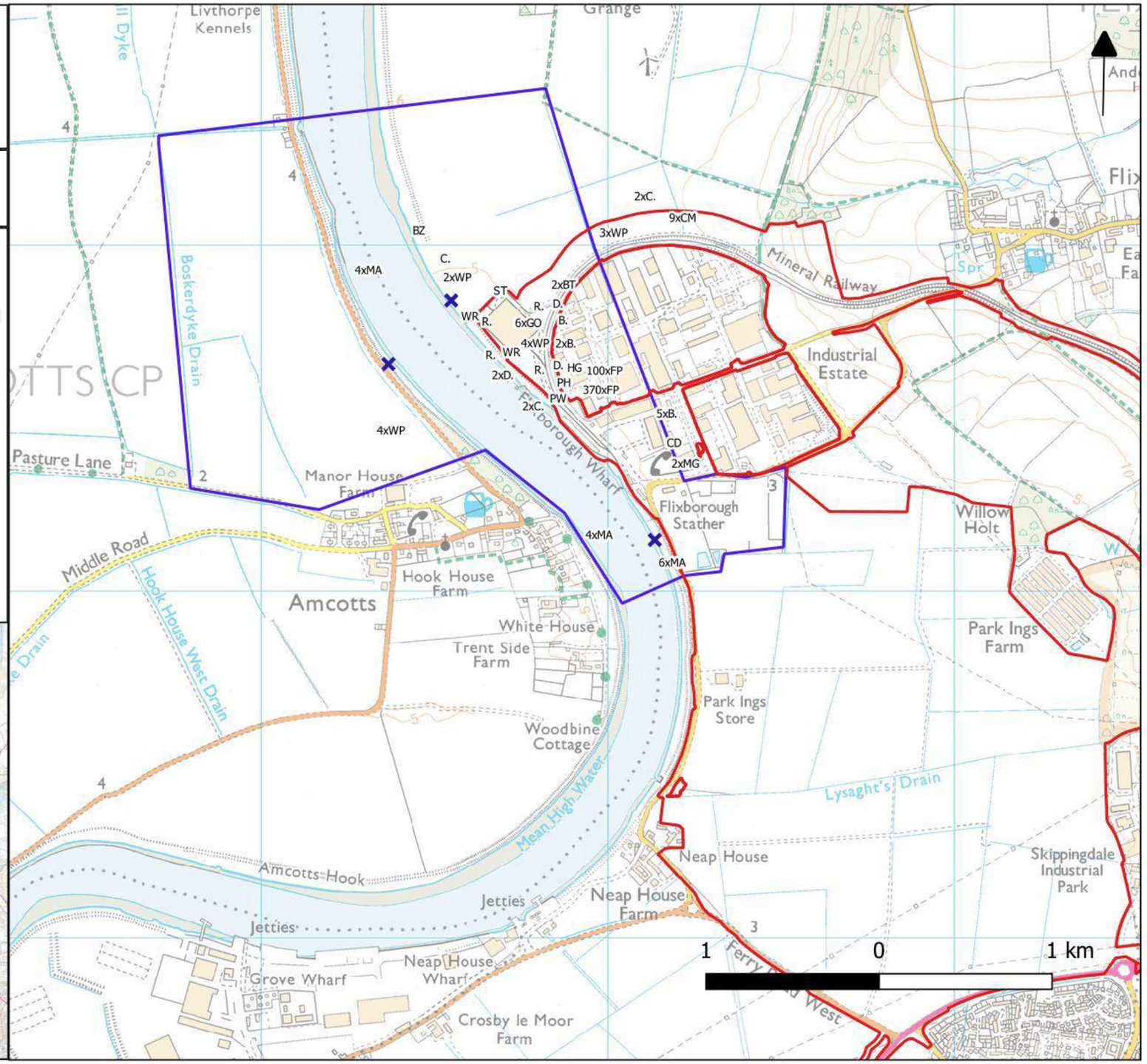
Legend

- 2018-2019 Vantage Points
- 2018-2019 Wintering Bird Survey Area
- Order limits

Bird Species Codes:

B. Blackbird	MA Mallard
BT Blue Tit	MG Magpie
BZ Buzzard	PH Pheasant
C. Carrion Crow	PW Pied Wagtail
CD Collared Dove	R. Robin
CM Common Gull	ST Stock Dove
D. Dunnock	WP Woodpigeon
FP Feral Pigeon	WR Wren
GO Goldfinch	
HG Herring Gull	





BOW17/961 NLGEP

Drawing title: 01.03.2019 Wintering Bird Survey Plan

Drawn by: MB
Checked by: SB

Date: 26/01/2022

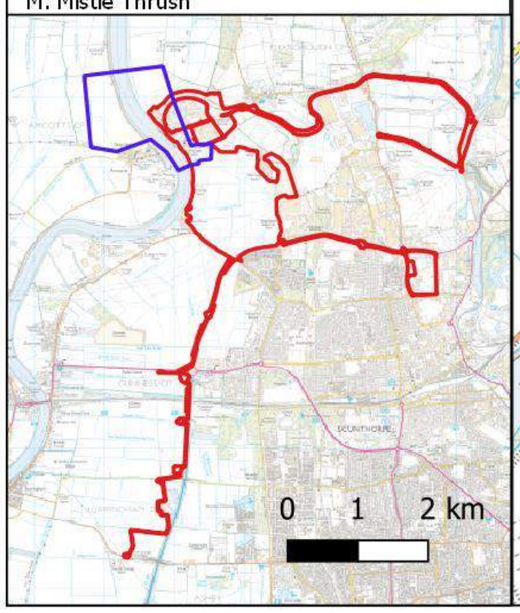
bowland ecology

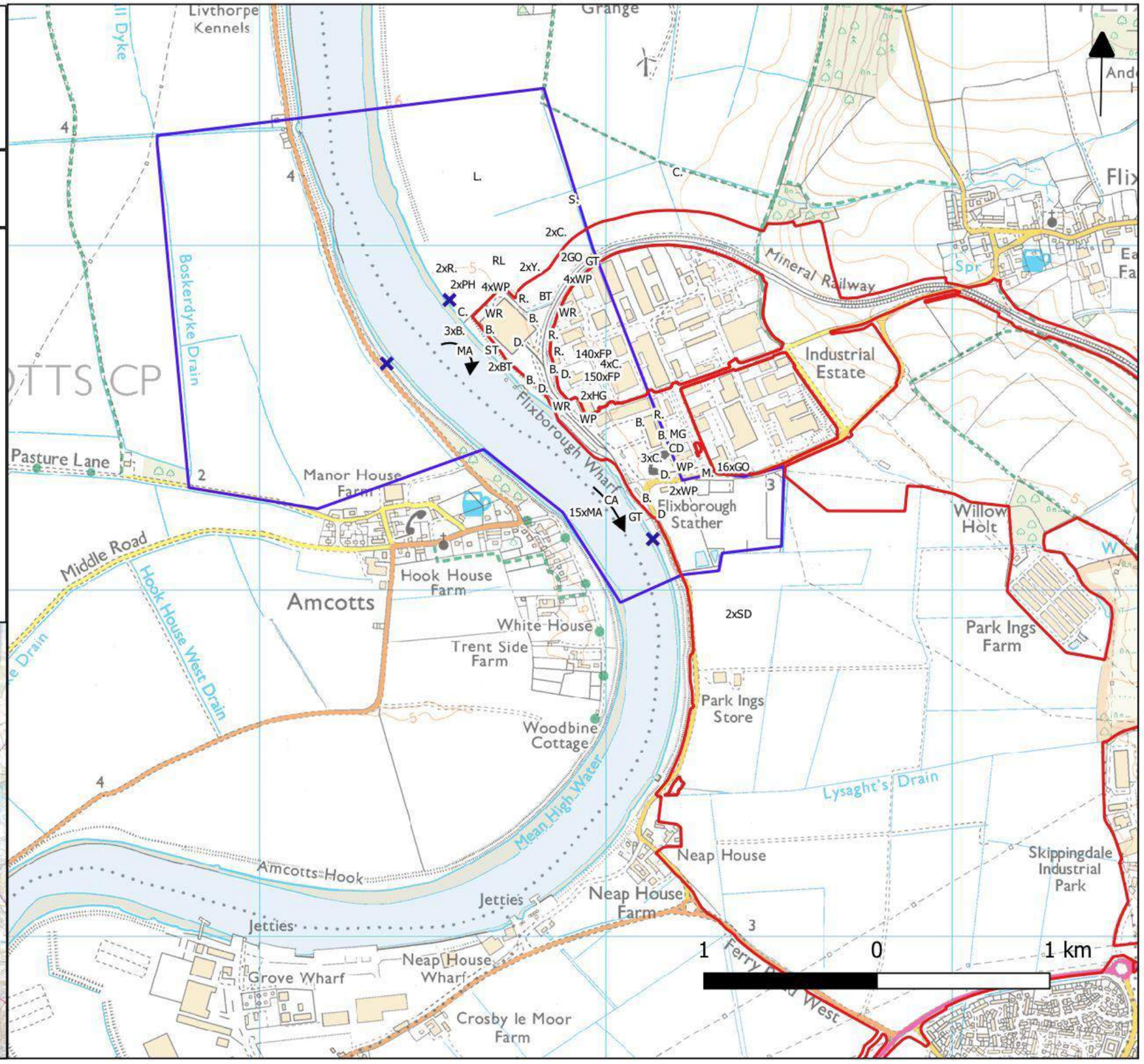
Legend

- 2018-2019 Vantage Points
- 2018-2019 Wintering Bird Survey Area
- Order limits

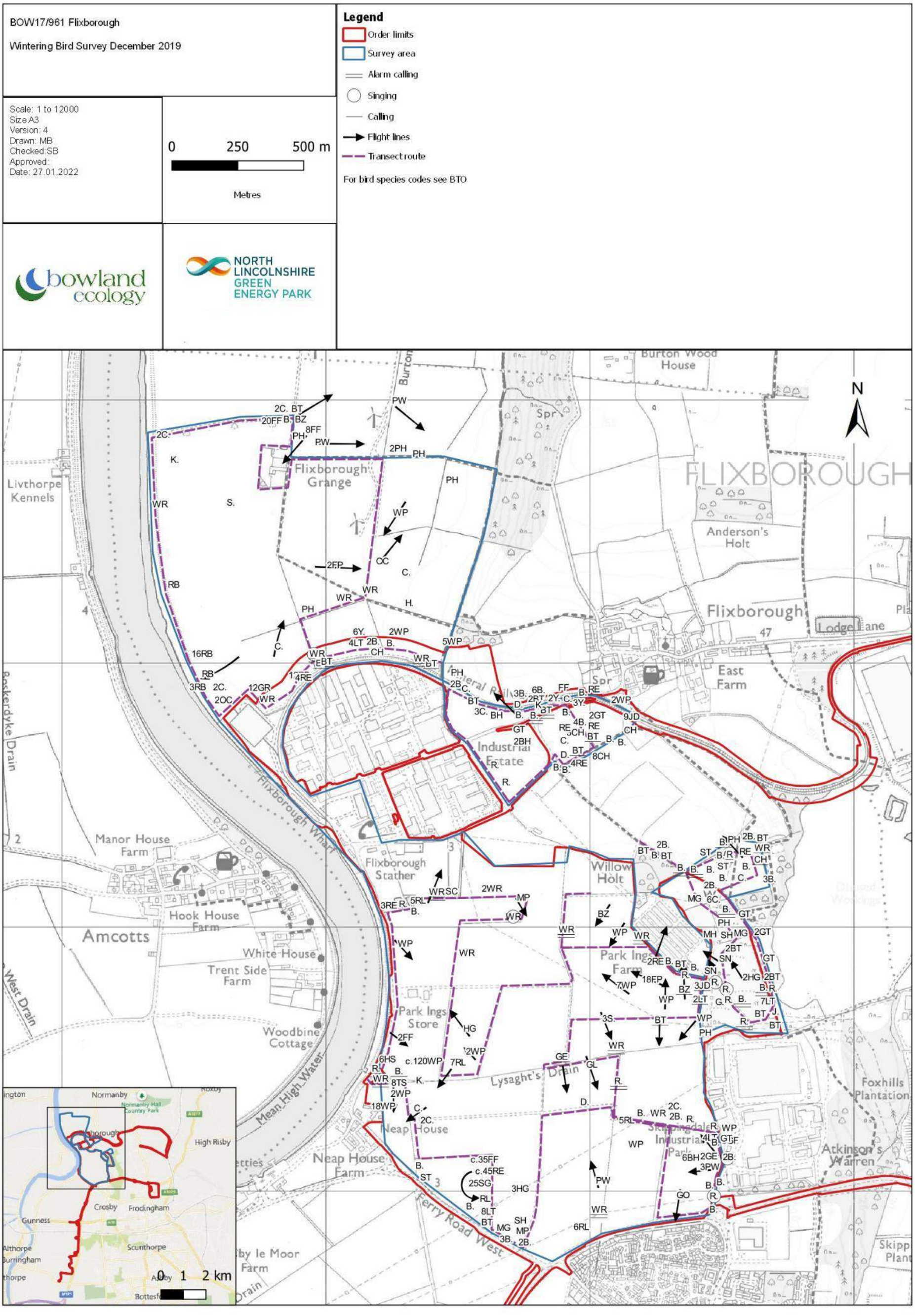
Bird Species Codes:

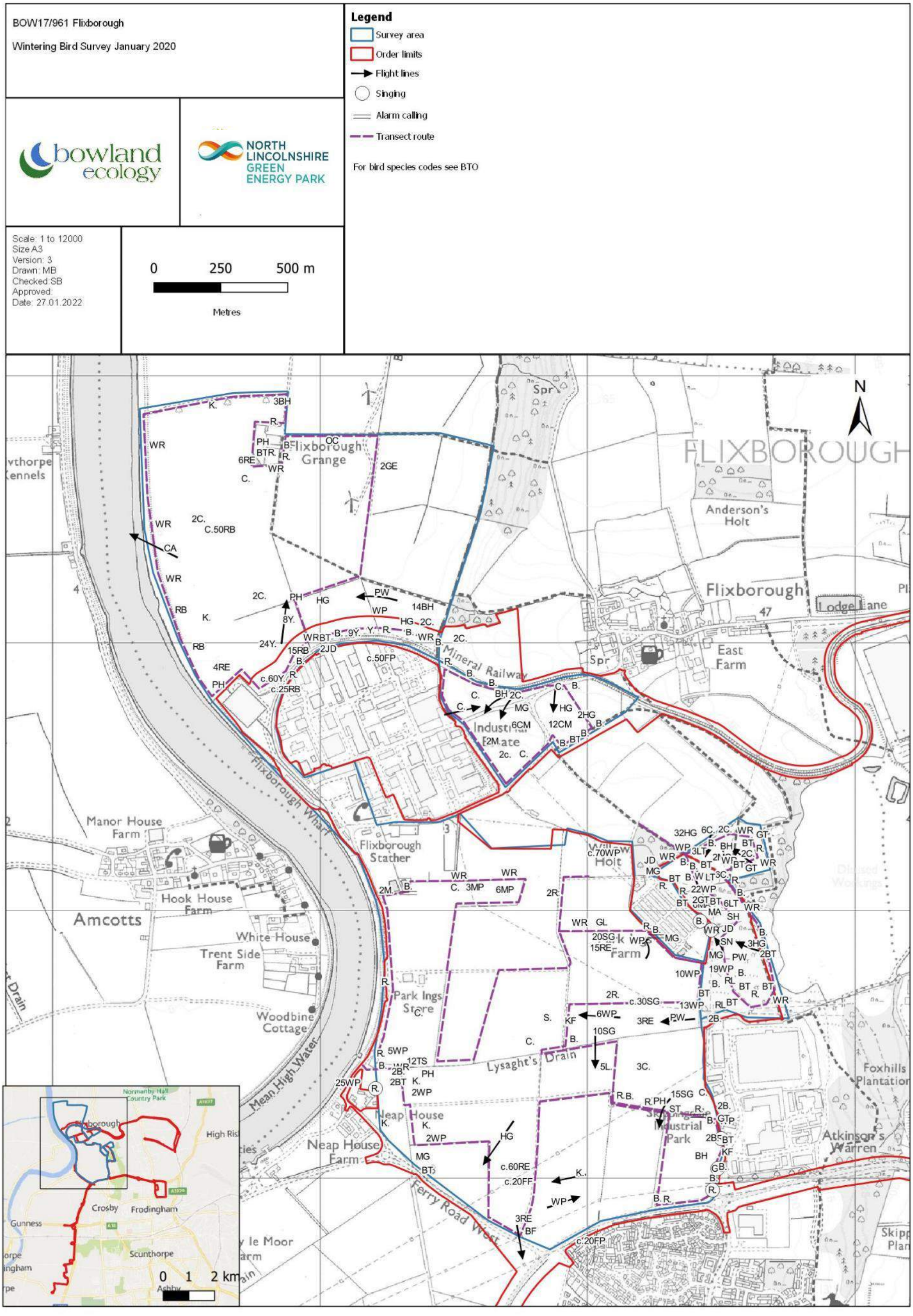
B. Blackbird	MA Mallard
BT Blue Tit	MG Magpie
C. Carrion Crow	PH Pheasant
CA Cormorant	R. Robin
CD Collared Dove	RL Red-Legged Partridge
D. Dunnock	S. Skylark
FP Feral pigeon	SD Stock Dove
GO Goldfinch	ST Song Thrush
GT Great Tit	WP Woodpigeon
HG Herring Gull	WR Wren
L. Lapwing	Y. Yellowhammer
M. Mistle Thrush	





Appendix F: Wintering Bird Survey Plans (2019 - 2020)




BOW17/961 Flixborough
Wintering Bird Survey January 2020
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK
Scale: 1 to 12000
Size A3
Version: 3
Drawn: MB
Checked:SB
Approved:
Date: 27.01.2022
0 250 500 m
Metres
Legend
Survey area
Order limits
Flight lines
Singing
Alarm calling
Transect route
For bird species codes see BTO
N
FLIXBOROUGH
Flixborough Grange
Anderson's Holt
Flixborough
Lodge Lane
East Farm
Mineral Railway
Flixborough Wharf
Manor House Farm
Flixborough Stather
Hook House Farm
Amcotts
White House
Trent Side Farm
Woodbine Cottage
Park Ings Store
Neap House
Neap House Farm
Lysaght's Drain
Ferry Road West
Mean High Water
Foxhills Plantation
Atkinson's Warren
Industrial Park
Crosby
Frodingham
Scunthorpe
Gunness
0 1 2 km

BOW17/961 Flixborough

Wintering Bird Survey February 2020

bowland ecology

NORTH LINCOLNSHIRE GREEN ENERGY PARK

Scale: 1 to 12000
Size A3
Version: 4
Drawn: MB
Checked:SB
Approved:
Date: 27.01.2022

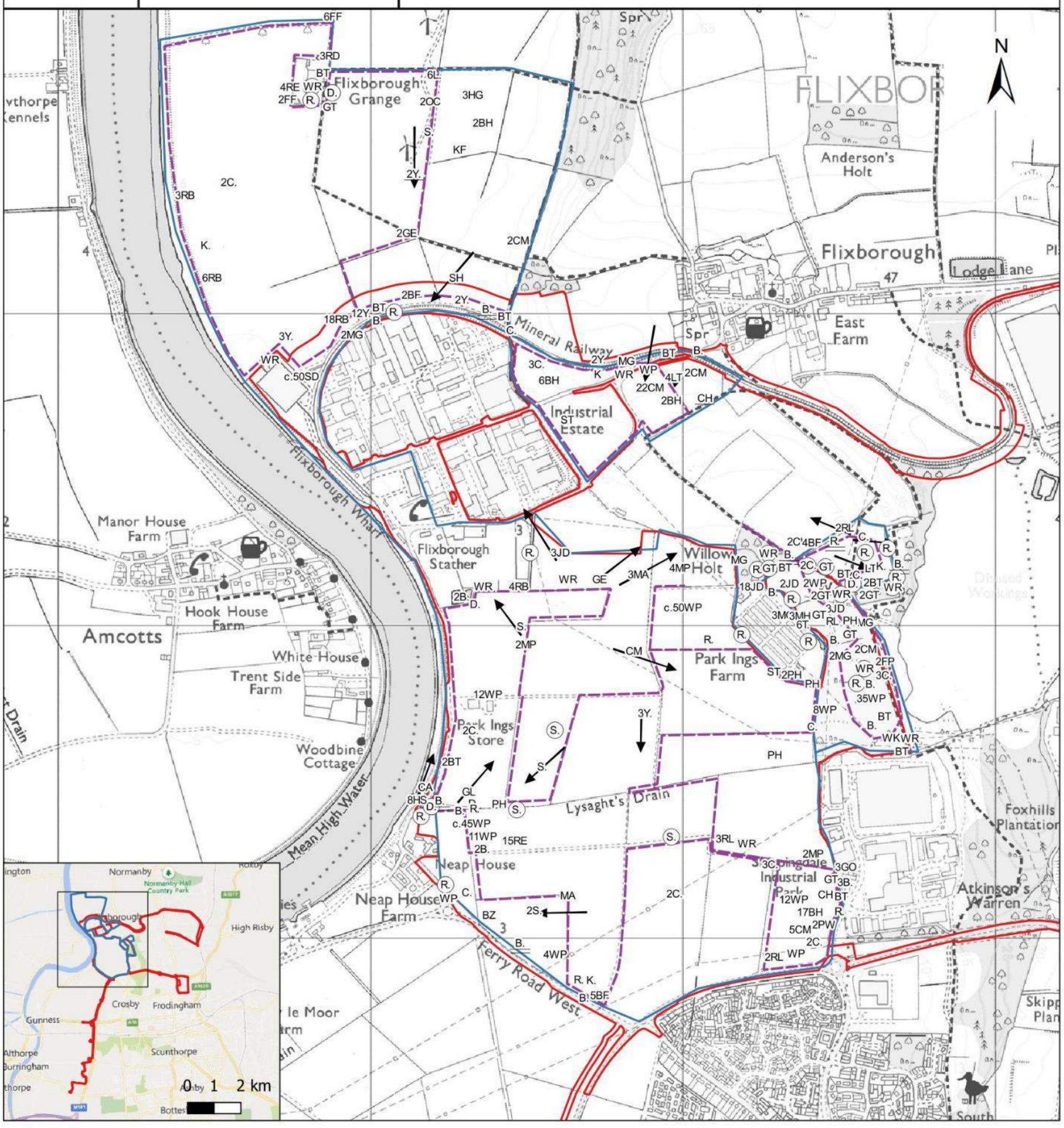
0 250 500 m

Metres

Legend

- Order limits
- Survey area
- Transect route
- Alarm calling
- Singing
- Calling
- Bird flight lines

For bird species codes see BTO



BOW17/961 Flixborough

Wintering Bird Survey March 2020

bowland ecology

NORTH LINCOLNSHIRE GREEN ENERGY PARK

Scale: 1 to 12000
Size A3
Version: 4
Drawn: MB
Checked:SB
Approved:
Date: 27.01.2022

0 250 500 m

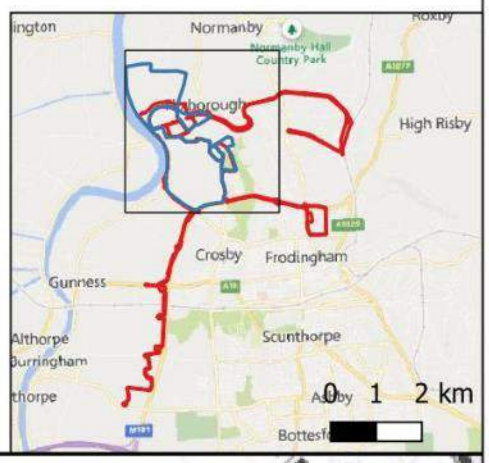
Metres

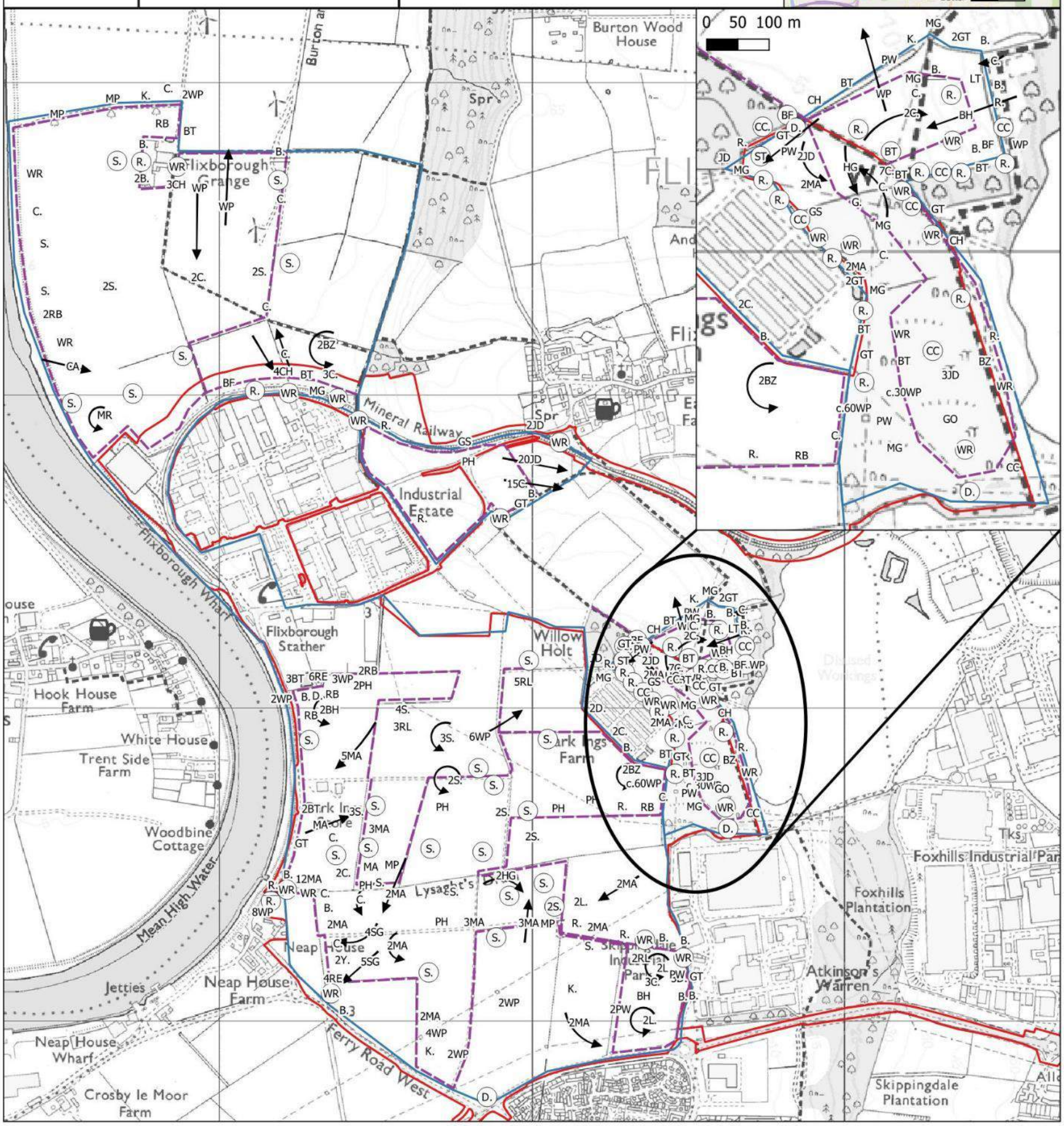
Legend

- Order limits
- Survey area
- Bird flight lines
- Alarm calling
- Singing
- Transect route

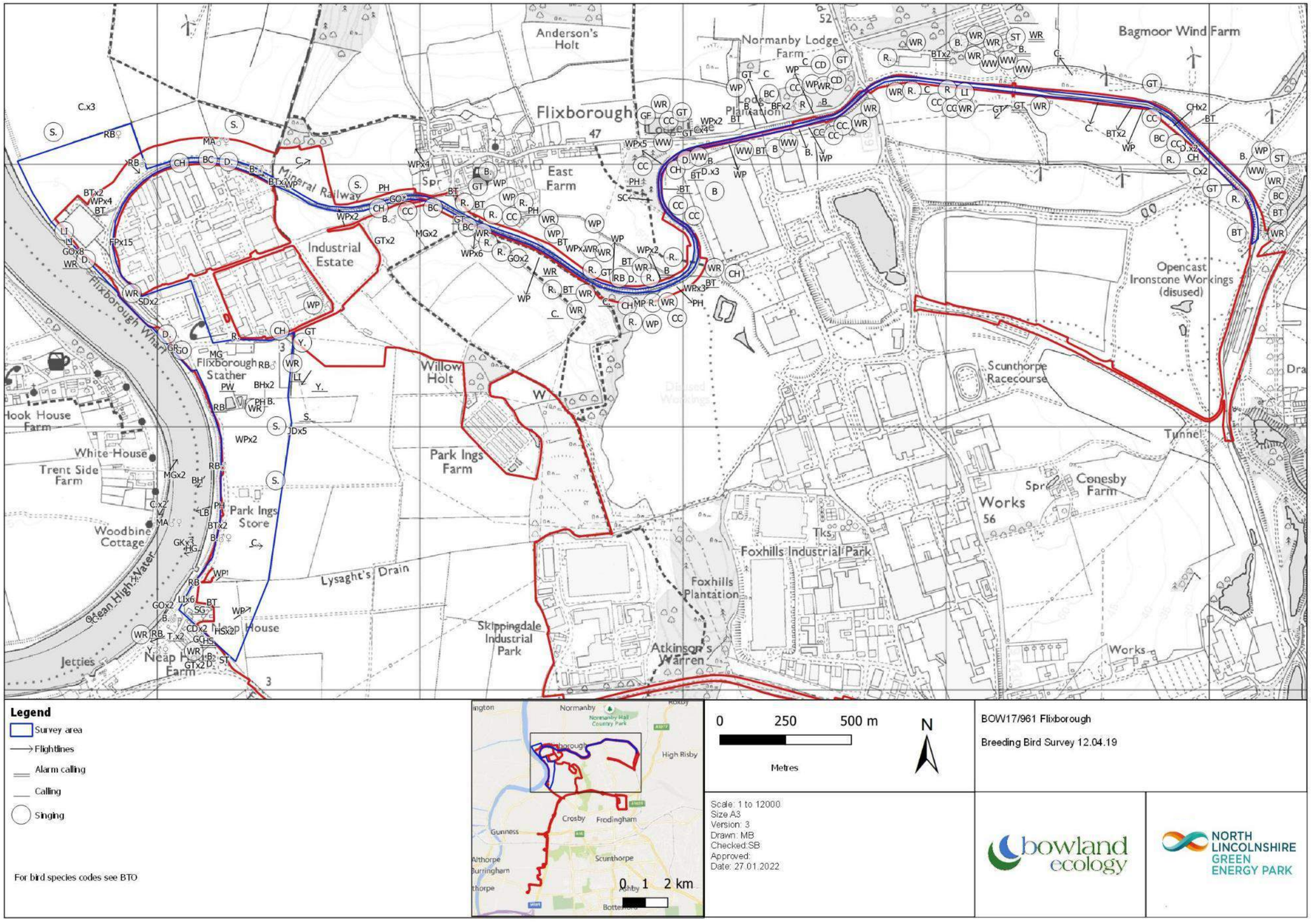
For bird species codes see BTO

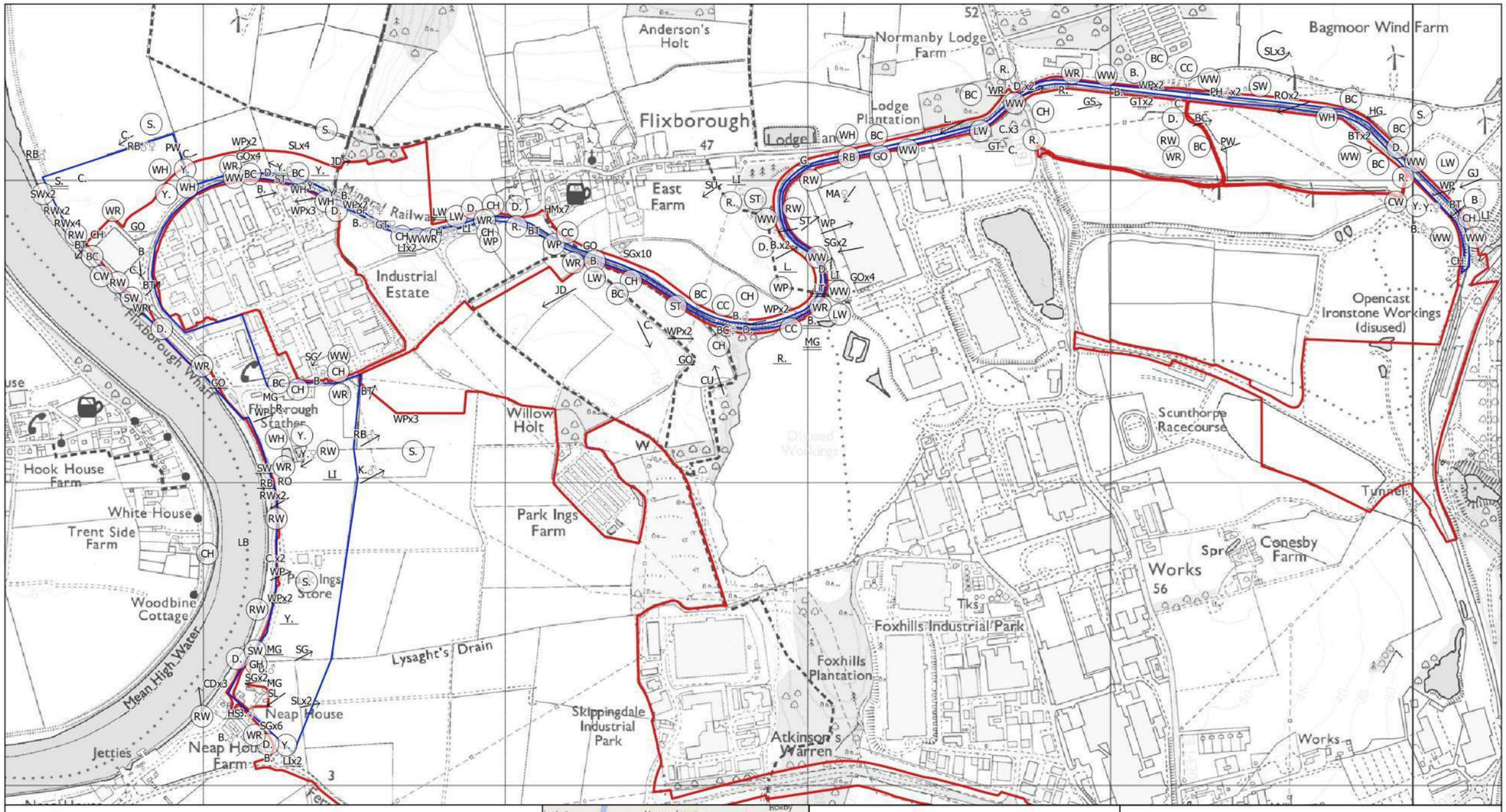
N

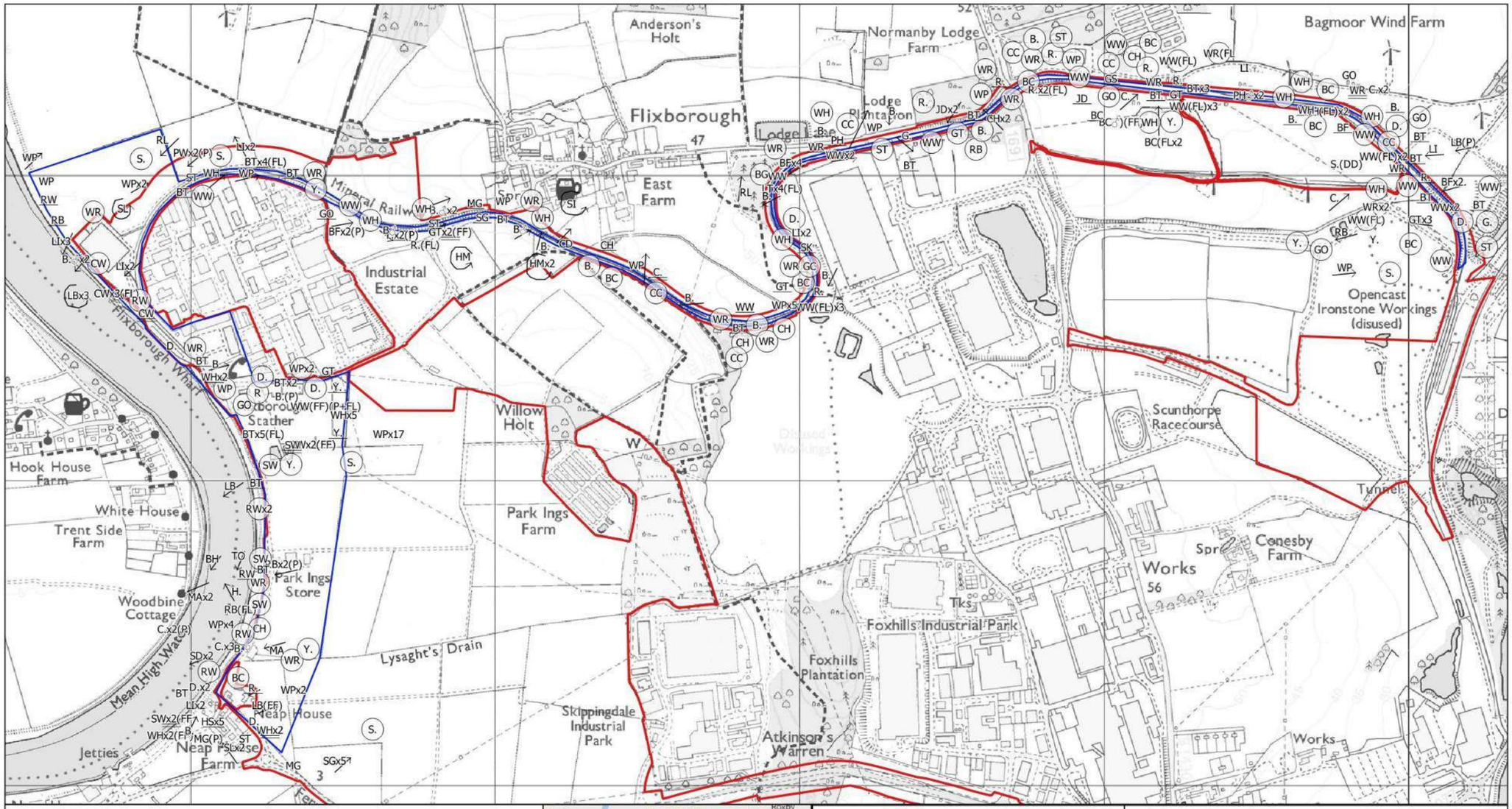




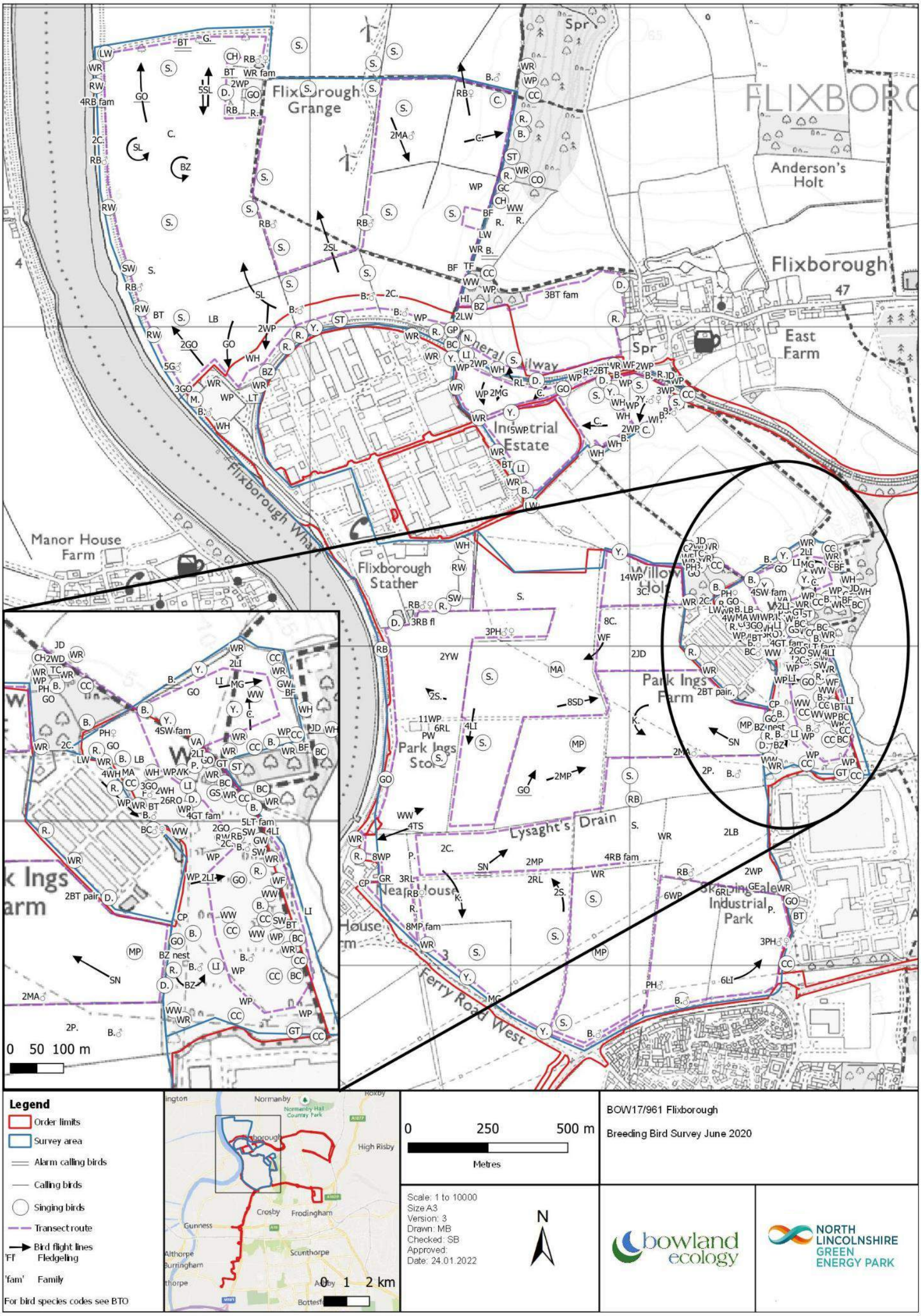
Appendix G: Breeding Bird Survey Plans (April to June 2019)

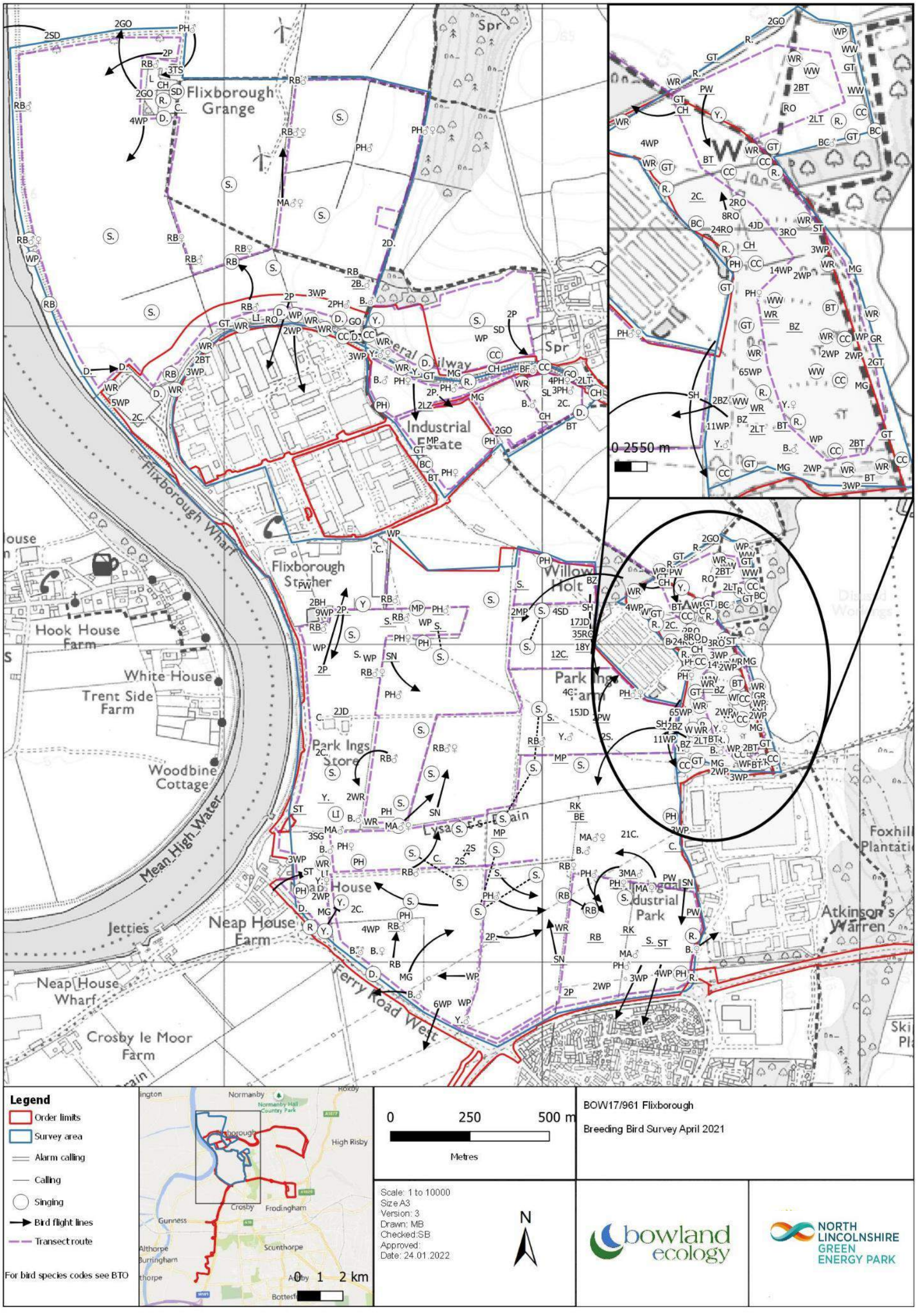


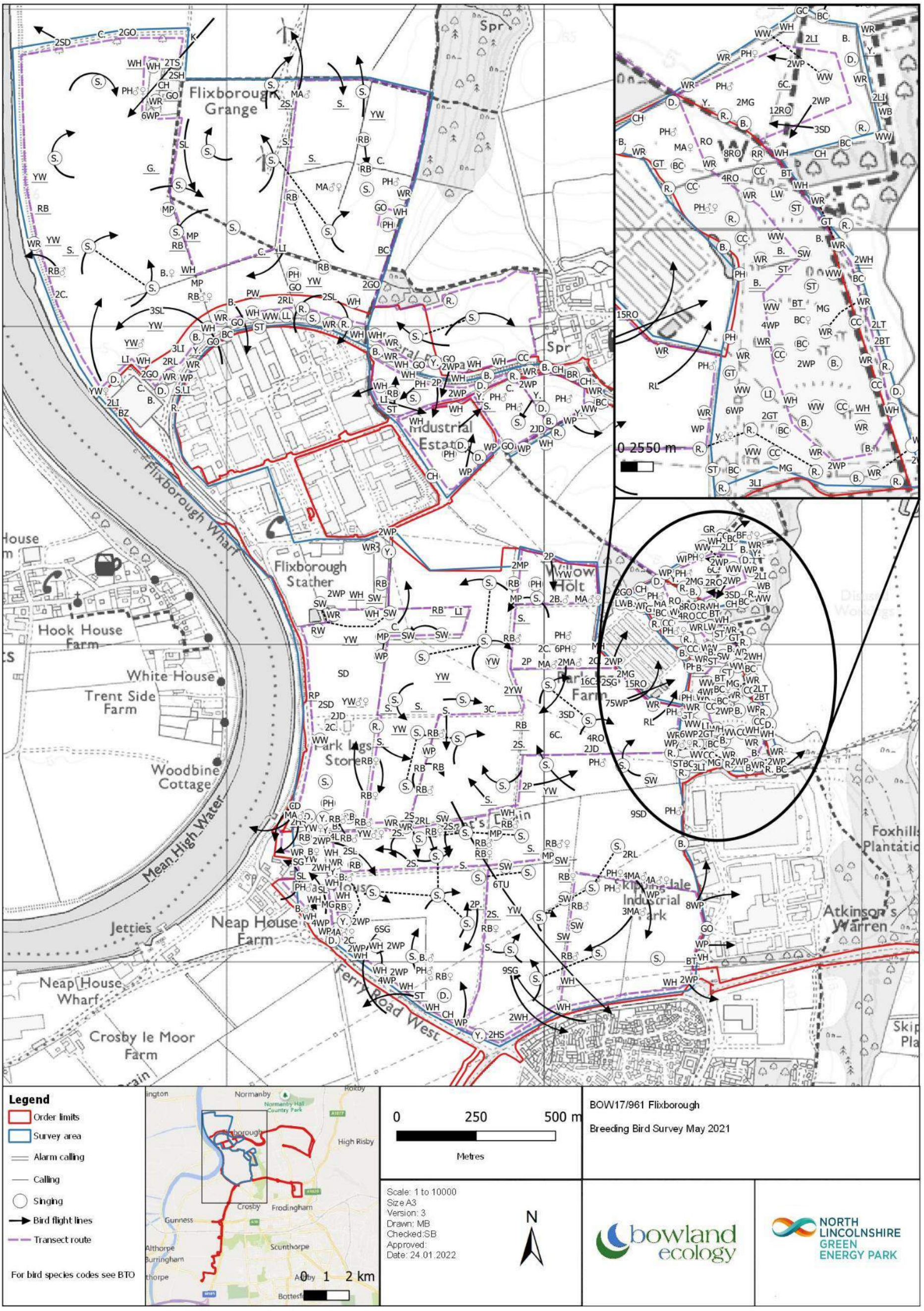

Anderson's Holt
Normanby Lodge Farm
Bagmoor Wind Farm
Flixborough
Lodge Plantation
Lodge Lane
East Farm
Mineral Railway
Industrial Estate
Flixborough Wharf
Opencast Ironstone Workings (disused)
Willow Holt
Park Ings Farm
Scunthorpe Racecourse
Hook House Farm
White House
Trent Side Farm
Woodbine Cottage
Flixborough Stather
Mean High Water
Lysaght's Drain
Neap House
Neap House Farm
Jetties
Skippingdale Industrial Park
Foxhills Plantation
Foxhills Industrial Park
Atkinson's Warren
Conesby Farm
Works
Tunnel
Legend
Order limits
Survey area
Flightlines
Alarm calling
Calling
Singing
For bird species codes see BTO
Normanby
High Risby
Crosby
Frodingham
Gunness
Scunthorpe
Althorpe
Burringham
0 1 2 km
0 250 500 m
Metres
N
Scale: 1 to 12000
Size:A3
Version: 2
Drawn: MB
Checked:SB
Approved:
Date: 26.01.2022
BOW17/961 Flixborough
Breeding Bird Survey 22.05.19
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK

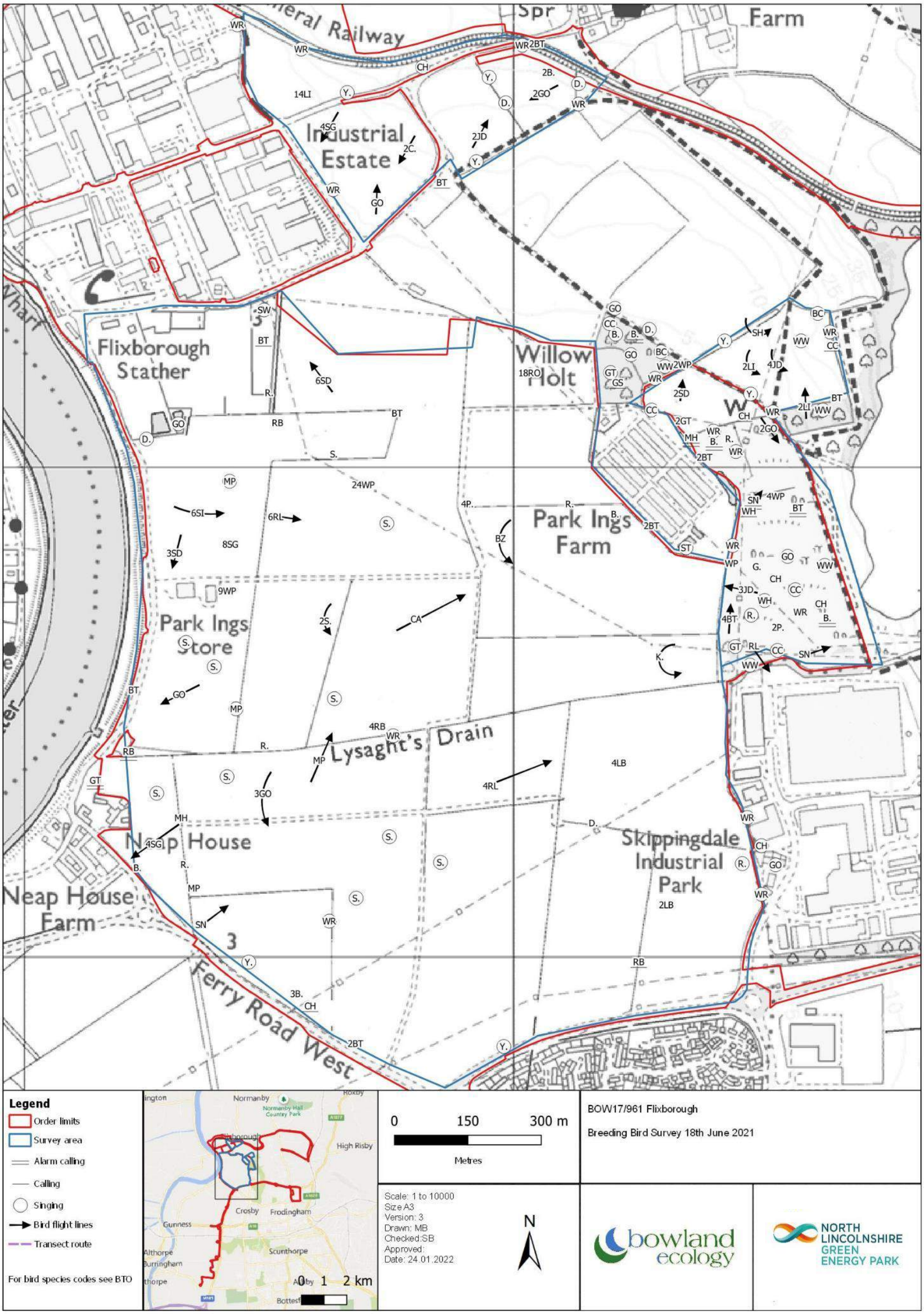

Anderson's Holt
Normanby Lodge Farm
Bagmoor Wind Farm
Flixborough
Lodge Plantation
East Farm
Industrial Estate
Flixborough Wharf
Opencast Ironstone Workings (disused)
Scunthorpe Racecourse
Willow Holt
Park Ings Farm
Hook House Farm
White House
Trent Side Farm
Woodbine Cottage
Park Ings Store
Lysaghe's Drain
Foxhills Industrial Park
Foxhills Plantation
Skippingdale Industrial Park
Atkinson's Warren
Conesby Farm
Works
Tunnel
Jetties
Neap House
Neap House Farm
Mean High Water
Mineral Railway
Legend
Survey area
Order limits
Flightlines
Alarm calling
Calling
Singing
For bird species codes see BTO
0 250 500 m
Metres
N
BOW17/961 Flixborough
Breeding Bird Survey 20.06.19
Scale: 1 to 12000
Size A3
Version: 2
Drawn: MB
Checked:SB
Approved:
Date: 26.01.2022
Normanby
Normanby Hall Country Park
High Risby
Crosby
Frodingham
Gunness
Scunthorpe
Ashby
Bottesford
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK

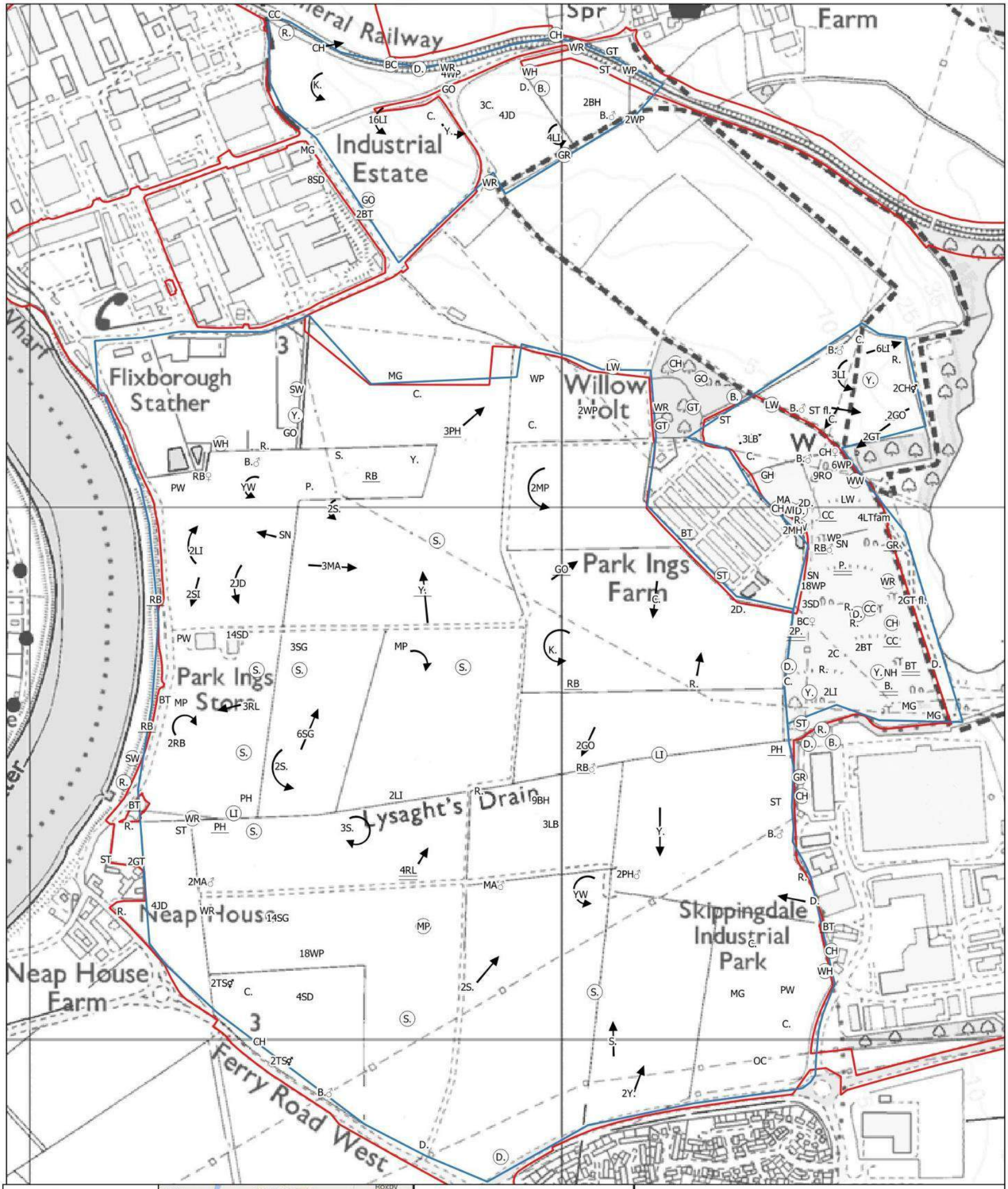
Appendix H: Breeding Bird Survey Plans (June 2020, and April to June 2021)




Flixborough Grange
Flixborough Wharf
Flixborough Stather
Hook House Farm
White House
Trent Side Farm
Woodbine Cottage
Mean High Water
Jetties
Neap House
Neap House Farm
Neap House Wharf
Crosby le Moor Farm
Ferry Road West
Industrial Estate
Willow Holt
Park Ings Farm
Park Ings Store
Industrial Park
Foxhill Plantation
Atkinson's Warren
0 2550 m
Legend
Order limits
Survey area
Alarm calling
Calling
Singing
Bird flight lines
Transect route
For bird species codes see BTO
0 250 500 m
Metres
BOW17/961 Flixborough
Breeding Bird Survey April 2021
Scale: 1 to 10000
Size A3
Version: 3
Drawn: MB
Checked:SB
Approved:
Date: 24.01.2022
N
0 1 2 km
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK


Flixborough Grange
Flixborough Wharf
Flixborough Stather
Industrial Estate
Hook House Farm
White House
Trent Side Farm
Woodbine Cottage
Mean High Water
Jetties
Neap House Farm
Neap House Wharf
Crosby le Moor Farm
Ferry Road West
Park Lugs Store
Willow Holt
Park Farm
Foxhills Plantation
Atkinson's Warren
0 2550 m
Legend
Order limits
Survey area
Alarm calling
Calling
Singing
Bird flight lines
Transect route
For bird species codes see BTO
0 250 500 m
Metres
BOW17/961 Flixborough
Breeding Bird Survey May 2021
Scale: 1 to 10000
Size A3
Version: 3
Drawn: MB
Checked:SB
Approved:
Date: 24.01.2022
N
0 1 2 km
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK


Farm
Industrial Estate
Flixborough Stather
Willow Holt
Park Ings Farm
Park Ings Store
Lysaght's Drain
Neap House
Neap House Farm
Skippingdale Industrial Park
Ferry Road West
Legend
Order limits
Survey area
Alarm calling
Calling
Singing
Bird flight lines
Transect route
For bird species codes see BTO
0 150 300 m
Metres
BOW17/961 Flixborough
Breeding Bird Survey 18th June 2021
Scale: 1 to 10000
Size A3
Version: 3
Drawn: MB
Checked:SB
Approved:
Date: 24.01.2022
N
0 1 2 km
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK


Flixborough Stather
Industrial Estate
Willow Holt
Park Ings Farm
Park Ings Store
Neap House
Neap House Farm
Lysaght's Drain
Skippingdale Industrial Park
Ferry Road West
Legend
Order limits
Survey area
Alarm calling
Calling
Singing
Bird flight lines
Transect route
For bird species codes see BTO
0 150 300 m
Metres
BOW17/961 Flixborough
Breeding Bird Survey 30th June 2021
Scale: 1 to 10000
Size A3
Version: 3
Drawn: MB
Checked:SB
Approved:
Date: 24.01.2022
N
0 1 2 km
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK

Appendix I: Bird Populations Listed as Qualifying Features of the Humber Estuary SPA

The Humber Estuary SPA qualifies under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive. During the breeding season the area regularly supports:	
Common Name	**Key Population Facts**
Bittern *Botaurus stellaris*	10.5% of the population in Great Britain 2000-2002
Avocet *Recurvirostra avosetta*	8.6% of the population in Great Britain 1998-2002
Marsh harrier *Circus aeruginosus*	6.3% of the breeding population in Great Britain
Little Tern *Sterna albifrons*	2.1% of the breeding population in Great Britain
Over winter the area regularly supports:	
Bittern *Botaurus stellaris*	4% of the population in Great Britain 1998/9 to 2002/3
Avocet *Recurvirostra avosetta*	1.7% of the population in Great Britain 1996/7 to 2000/1
Hen harrier *Circus cyaneus*	1.1% of the population in Great Britain 1997/8 to 2001/2
Bar-tailed godwit *Limosa lapponica*	4.4% of the population in Great Britain 1996/7 to 2000/1
Golden plover *Pluvialis apricaria*	12.3% of the population in Great Britain 1996/7 to 2000/1
On passage the area regularly supports:	
Ruff *Philomachus pugnax*	1.4% of the population in Great Britain 1996-2000.
The Humber Estuary SPA also qualifies under Article 4.2 of the Directive by supporting populations of European importance of the following migratory species. Over winter the area regularly supports the following:	
Shelduck *Tringa totanus*	1.5% of the north western Europe (breeding) population
Knot *Calidris canutus*	6.3% of the wintering north eastern Canada/Greenland/Iceland/North western Europe population
Black-tailed Godwit *Limosa limosa*	3.2% of the Icelandic breeding population 1996/7 to 2000/1
Dunlin *Calidris alpina alpina*	1.7% of the northern Siberia, Europe, Western Africa population 1996/7 to 2000/1
Redshank *Tringa totanus*	3.6% of the eastern Atlantic wintering population 1996/7 to 2000/1
On passage the area regularly supports:	
Knot *Calidris canutus*	4.1% of the north eastern Canada/Greenland/Iceland/ north western Europe population 1996-2000
Dunlin *Calidris alpina alpina*	1.5% of the northern Siberia, Europe, Western Africa population 1996-2000

Black-tailed godwit *Limosa limosa islandica*	2.6% of the Icelandic breeding population 1996-2000
Redshank Tringa tetanus	5.7% of the eastern Atlantic wintering population1996-2000
In the non-breeding season the area regularly supports 153934 waterfowl including:	
Mallard (*Anas platyrhynchos)*, golden plover (*Pluvialis apricaria)*, bar-tailed godwit (*Limosa lapponica*), shelduck (*Tadorna tadorna*), knot (*Calidris canutus*), dunlin (*Calidris alpina*), redshank (*Tringa tetanus*), dark-bellied brent goose (*Branta bernicla bernicla*), bittern (*Botaurus stellaris*), teal (*Anas crecca*), curlew (*Numenius arquata*), pochard (*Aythya farina*), goldeneye (*Bucephala clangula*), oystercatcher (*Haematopus ostralegus*), ringed plover (*Charadrius hiaticula*), grey plover (*Pluvialis squatarola*), lapwing (*Vanellus vanellus*), sanderling (*Calidris alba*), black-tailed godwit (*Limosa limosa islandica*), wigeon (*Anas Penelope*) and whimbrel (*Numenius phaeopus*)	

Appendix J: Breeding Evidence and BTO Species Codes

Non-breeding

F	Flying over
M	Species observed but suspected to be still on Migration
U	Species observed but suspected to be summering non-breeder

Possible breeder

H	Species observed in breeding season in suitable nesting Habitat
S	Singing male present (or breeding calls heard) in breeding season in suitable breeding habitat

Probable breeding

P	Pair observed in suitable nesting habitat in breeding season
T	Permanent Territory presumed through registration of territorial behaviour (song etc) on at least two different days a week or more apart at the same place or many individuals on one day
D	Courtship and Display (judged to be in or near potential breeding habitat; be cautious with wildfowl)
N	Visiting probable Nest site
A	Agitated behaviour or anxiety calls from adults, suggesting probable presence of nest or young nearby
I	Brood patch on adult examined in the hand, suggesting Incubation
B	Nest Building or excavating nest-hole

Confirmed breeding

DD	Distraction-Display or injury feigning

UN Used Nest or eggshells found (occupied or laid within period of survey)

FL Recently Fledged young (nidicolous species) or downy young (nidifugous species). Careful consideration should be given to the likely provenance of any fledged juvenile capable of significant geographical movement. Evidence of dependency on adults (e.g. feeding) is helpful. Be cautious, even if the record comes from suitable habitat.

ON Adults entering or leaving nest-site in circumstances indicating Occupied Nest (including high nests or nest holes, the contents of which cannot be seen) or adults seen incubating

FF Adult carrying Faecal sac or Food for young

NE Nest containing Eggs

NY Nest with Young seen or heard

BTO SPECIES CODES

AC	Arctic Skua	GA	Gadwall	LE	Long-eared Owl	SM	Sand Martin
AE	Arctic Tern	GX	Gannet	LT	Long-tailed Tit	SS	Sanderling
AV	Avocet	GW	Garden Warbler	MG	Magpie	TE	Sandwich Tern
BO	Barn Owl	GY	Garganey	MA	Mallard	VI	Savi's Warbler
BY	Barnacle Goose	GC	Goldcrest	MN	Mandarin Duck	SQ	Scarlet Rosefinch
BA	Bar-tailed Godwit	EA	Golden Eagle	MX	Manx Shearwater	SP	Scaup
BR	Bearded Tit	OL	Golden Oriole	MR	Marsh Harrier	CY	Scottish Crossbill
BS	Berwick's Swan	GF	Golden Pheasant	MT	Marsh Tit	SW	Sedge Warbler
BI	Bittern	GP	Golden Plover	MW	Marsh Warbler	NS	Serin
BK	Black Grouse	GN	Goldeneye	MP	Meadow Pipit	SA	Shag
TY	Black Guillemot	GO	Goldfinch	MU	Mediterranean Gull	SU	Shelduck
BX	Black Redstart	GD	Goosander	ML	Merlin	SX	Shorelark
BJ	Black Tern	GI	Goshawk	M.	Mistle Thrush	SE	Short-eared Owl
B.	Blackbird	GH	Grasshopper Warbler	MO	Montagu's Harrier	SV	Shoveler
BC	Blackcap	GB	Great Black-backed Gull	MH	Moorhen	SK	Siskin
BH	Black-headed Gull	GG	Great Crested Grebe	MS	Mute Swan	S.	Skylark
BN	Black-necked Grebe	ND	Great Northern Diver	N.	Nightingale	SZ	Slavonian Grebe
BW	Black-tailed Godwit	NX	Great Skua	NJ	Nightjar	SN	Snipe
BV	Black-throated Diver	GS	Great Spotted Woodpecker	NH	Nuthatch	SB	Snow Bunting
BT	Blue Tit	GT	Great Tit	OP	Osprey	ST	Song Thrush
BU	Bluethroat	GE	Green Sandpiper	OC	Oystercatcher	SH	Sparrowhawk
BL	Brambling	G.	Green Woodpecker	PX	Peafowl/Peacock	AK	Spotted Crake
BG	Brent Goose	GR	Greenfinch	PE	Peregrine	SF	Spotted Flycatcher
BF	Bullfinch	GK	Greenshank	PH	Pheasant	DR	Spotted Redshank
BZ	Buzzard	H.	Grey Heron	PF	Pied Flycatcher	SG	Starling
CG	Canada Goose	P.	Grey Partridge	PW	Pied Wagtail	SD	Stock Dove
CP	Capercaillie	GV	Grey Plover	PG	Pink-footed Goose	SC	Stonechat
C.	Carrion Crow	GL	Grey Wagtail	PT	Pintail	TN	Stone-curlew
CW	Cetti's Warbler	GJ	Greylag Goose	PO	Pochard	TM	Storm Petrel
CH	Chaffinch	GU	Guillemot	PM	Ptarmigan	SL	Swallow
CC	Chiffchaff	FW	Guineafowl (Helmeted)	PU	Puffin	SI	Swift
CF	Chough	HF	Hawfinch	PS	Purple Sandpiper	TO	Tawny Owl
CL	Cirl Bunting	HH	Hen Harrier	Q.	Quail	T.	Teal
CT	Coal Tit	HG	Herring Gull	RN	Raven	TK	Temminck's Stint
CD	Collared Dove	HY	Hobby	RA	Razorbill	TP	Tree Pipit
CM	Common Gull	HZ	Honey Buzzard	RG	Red Grouse	TS	Tree Sparrow
CS	Common Sandpiper	HC	Hooded Crow	KT	Red Kite	TC	Treecreeper
CX	Common Scoter	HP	Hoopoe	ED	Red-backed Shrike	TU	Tufted Duck
CN	Common Tern	HM	House Martin	RM	Red-breasted Merganser	TT	Turnstone
CO	Coot	HS	House Sparrow	RQ	Red-crested Pochard	TD	Turtle Dove
CA	Cormorant	JD	Jackdaw	FV	Red-footed Falcon	TW	Twite
CB	Corn Bunting	J.	Jay	RL	Red-legged Partridge	WA	Water Rail
CE	Corncrake	K.	Kestrel	NK	Red-necked Phalarope	W.	Wheatear
CI	Crested Tit	KF	Kingfisher	LR	Redpoll (Lesser)	WM	Whimbrel
CR	Crossbill (Common)	KI	Kittiwake	RK	Redshank	WC	Whinchat
CK	Cuckoo	KN	Knot	RT	Redstart	WG	White-fronted Goose
CU	Curlew	LM	Lady Amherst's Pheasant	RH	Red-throated Diver	WH	Whitethroat
DW	Dartford Warbler	LA	Lapland Bunting	RE	Redwing	WS	Whooper Swan
DI	Dipper	L.	Lapwing	RB	Reed Bunting	WN	Wigeon
DO	Dotterel	TL	Leach's Petrel	RW	Reed Warbler	WT	Willow Tit
DN	Dunlin	LB	Lesser Black-backed Gull	RZ	Ring Ouzel	WW	Willow Warbler
D.	Dunnock	LS	Lesser Spotted Woodpecker	RP	Ringed Plover	OD	Wood Sandpiper
EG	Egyptian Goose	LW	Lesser Whitethroat	RI	Ring-necked Parakeet	WO	Wood Warbler
E.	Eider	LI	Linnet	R.	Robin	WK	Woodcock
FP	Feral Pigeon	ET	Little Egret	DV	Rock Dove (not feral)	WL	Woodlark
ZL	Feral/hybrid goose	LG	Little Grebe	RC	Rock Pipit	WP	Woodpigeon
ZF	Feral/hybrid mallard type	LU	Little Gull	RO	Rook	WR	Wren
FF	Fieldfare	LO	Little Owl	RS	Roseate Tern	WY	Wryneck
FC	Firecrest	LP	Little Ringed Plover	RY	Ruddy Duck	YW	Yellow Wagtail
F.	Fulmar	AF	Little Tern	RU	Ruff	Y.	Yellowhammer

Appendix K: Migratory and Wintering Bird Survey Results (2021 - 2022)

Species (Code)	Scientific name	BoCC5	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10
blackbird (B.)	Turdus merula	Green	11	11	2	13	3	13	2	14	15	12
blackcap (BC)	Sylvia atricapilla	Green	1	4	4	1	1					
black-headed gull (BH)	Chroicocephalus ridibundus	Amber	1990	276	13	39	907	464	30	136	81	135
blue tit (BT)	Cyanistes caeruleus	Green	1	7	7	7	6	7	11	10	3	9
brambling (BL)	Fringilla montifringilla	Green									1	
bullfinch (BF)	Pyrrhula pyrrhula	Amber		1	1		2	2				
buzzard (BZ)	Buteo buteo	Green	4	4	2		2	4	4	3		2
carrion crow (C.)	Corvus corone	Green	132	64	57	88	58	118	74	66	65	56
Cetti's warbler (CW)	Cettia cetti	Green								1		
chaffinch (CH)	Fringilla coelebs	Green	2	1	3	13	3	9		7	5	4
chiffchaff (CC)	Phylloscopus collybita	Green	8	7	4	2	7	4		3		
collared dove (CD)	Streptopelia decaocto	Green	1	2	1	4		2		1	3	
common gull (CM)	Larus canus	Amber	40	29	2	16	2	7	7	61	31	90
cormorant (CA)	Phalacrocorax carbo	Green		2				1				
curlew (CU)	Numenius arquata	Red	5	2								
dunnock (D.)	Prunella modularis	Amber	6	5	2	2	5	8	2	18	12	2
feral pigeon (FP)	Columba livia domestica	Green	3	153	20	204	30	159	534	171	133	46
goldcrest (GC)	Regulus regulus	Green						1			5	
golden plover (GP)	Pluvialis apricaria	Green		7				1				
goldfinch (GO)	Carduelis carduelis	Green	25	16	144	46	41	43	67	32	7	12
great black-backed gull (GB)	Larus marinus	Amber	1				1					
great spotted woodpecker (GS)	Dendrocopos major	Green	1	2			2		1			1
great tit (GT)	Parus major	Green	8	6	10	7	2	9	3	17	4	1
green woodpecker (G.)	Picus viridis	Green	2	3	1	2		3		3	1	
greenfinch (GR)	Chloris chloris	Red	2		1	7					2	
grey heron (H.)	Ardea cinerea	Green							1	3		
grey partridge (P.)	Perdix perdix	Red	31	18	33	16	32	16	23	47	31	53
grey wagtail (GL)	Motacilla cinerea	Amber		3	0		1	2		1	1	
greylag goose (GJ)	Anser anser	Amber		2					149	1	10	
herring gull (HG)	Larus argentatus	Red		3	3	24	8				1	1
hobby (HY)	Falco subbuteo	Green			2	1						
house sparrow (HS)	Passer domesticus	Red		4	44		40		6	10		
jackdaw (JD)	Coloeus monedula	Green	16	53	8	19	2	71		23	31	78
jay (J.)	Garrulus glandarius	Green	2	3	3			2			1	
kestrel (K.)	Falco tinnunculus	Amber	5	4	3	3	3	8	1	1		2
kingfisher (KF)	Alcedo atthis	Amber	1					1	1		1	
lesser black-backed gull (LB)	Larus fuscus	Amber	6	3	1	8	2	2				
linnet (LI)	Linaria cannabina	Red	86	82	91	150	61	97	135	125	154	80
little egret (ET)	Egretta garzetta	Green							1	1		5

Species (Code)	Scientific name	BoCC5	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10
long-tailed tit (LT)	Aegithalos caudatus	Green	5	2	8	5	2	10	1	2	11	8
magpie (MG)	Pica pica	Green	19	11	4	9	10	11	9	21	11	12
mallard (MA)	Anas platyrhynchos	Amber	3	7	27	8	45		10	19	21	36
marsh harrier (MR)	Circus aeruginosus	Amber								1		
meadow pipit (MP)	Anthus pratensis	Amber	1	4	4	37	6	11	9	13	14	6
moorhen (MH)	Gallinula chloropus	Amber		1	2		3	1			2	1
mute swan (MS)	Cygnus olor	Amber				1	5					
nuthatch (NH)	Sitta europaea	Green										1
peregrine (PE)	Falco peregrinus	Green		1	1							1
pheasant (PH)	Phasianus colchicus	Green	7	7	15	8	20	35	8	101	74	36
pied wagtail (PW)	Motacilla alba	Green	3	1	1	6	10	16	4	10	13	1
pink-footed goose (PG)	Anser brachyrhynchus	Amber						64	45	253		
quail (Q.)	Coturnix coturnix	Amber			1							
red-legged partridge (RL)	Alectoris rufa	Green		3		1	4	9		6	7	
redwing (RE)	Turdus iliacus	Amber										4
reed bunting (RB)	Emberiza schoeniclus	Amber	29	48	42	49	30	39	12	31	30	6
reed warbler (RW)	Acrocephalus scirpaceus	Green	3									
robin (R.)	Erithacus rubecula	Green	5	18	19	19	13	18	10	21	23	6
rook (RO)	Corvus frugilegus	Amber	16	32	7	15	13	27		7	18	60
siskin (SK)	Spinus spinus	Green					1	2				10
skylark (S.)	Alauda arvensis	Red	9	11	8	4	54	30	17	49	30	21
song thrush (ST)	Turdus philomelos	Amber	1		1		3				3	1
sparrowhawk (SH)	Accipiter nisus	Green	1	1	1	1	1	2		3		1
starling (SG)	Sturnus vulgaris	Red	423	6		101		191		209	10	1490
stock dove (SD)	Columba oenas	Amber	19	19	3	7	8	2		2		1
swallow (SL)	Hirundo rustica	Green	23	11	8	8		1				
teal (T.)	Anas crecca	Amber								1		
treecreeper (TC)	Certhia familiaris	Green		1	1							
tree sparrow (TS)	Passer montanus	Red	2					6			2	21
wheatear (W.)	Oenanthe oenanthe	Amber					1		1			
whinchat (WC)	Saxicola rubetra	Red				1						
whitethroat (WH)	Curruca communis	Amber	7	7	2							
whooper swan (WS)	Cygnus cygnus	Amber									24	
woodpigeon (WP)	Columba palumbus	Amber	452	476	243	390	283	653	298	297	291	1142
wren (WR)	Troglodytes troglodytes	Amber	11	18	7	11	8	16		23	23	4
yellow wagtail (YW)	Motacilla flava	Red	1	1	1							
yellowhammer (Y.)	Emberiza citrinella	Red	7	4	12	8	7	8	1	16	6	14

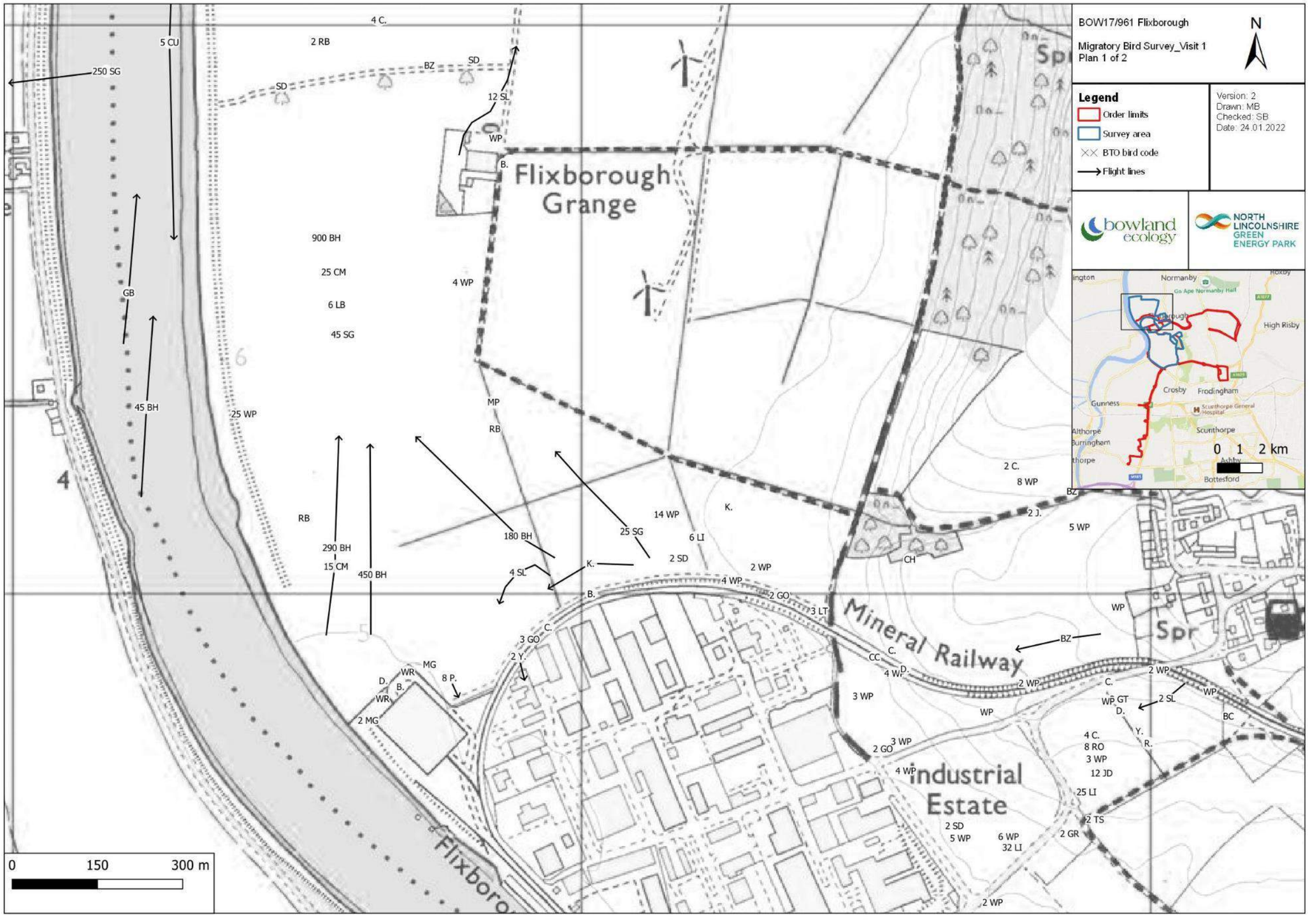
Species (Code)	Scientific name	BoCC5	V11	V12	V13	V14	V15	V16	V17	V18
blackbird (B.)	Turdus merula	None	33	29	57	43	30	18	4	21
black-headed gull (BH)	Chroicocephalus ridibundus	A	67	65	13	48	14	3	5	31
blue tit (BT)	Cyanistes caeruleus	None	5	7	14	3	2	17	10	8
bullfinch (BF)	Pyrrhula pyrrhula	S41, A		2	2			6		2
buzzard (BZ)	Buteo buteo	None	7	4	4	6	1	5	2	1
carrion crow (C.)	Corvus corone	None	42	43	81	73	32	63	34	96
chaffinch (CH)	Fringilla coelebs	None	6	5	17	2	16	10	4	5
collared dove (CD)	Streptopelia decaocto	None		1						
common gull (CM)	Larus canus	A	42	21	4	66	21	28	4	70
cormorant (CA)	Phalacrocorax carbo	None					1		23	1
dunnock (D.)	Prunella modularis	S41, A	10	11	11	9	9	7	6	3
feral pigeon (FP)	Columba livia domestica	None	85	430	725	267			73	
fieldfare (FF)	Turdus pilaris	Sch 1, R	28		3	16	39	45		
goldcrest (GC)	Regulus regulus	None	2		1				1	
golden plover (GP)	Pluvialis apricaria	None			3	290	82	51	6	25
goldfinch (GO)	Carduelis carduelis	None	10	1		6	3	13	1	7
great spotted woodpecker (GS)	Dendrocopos major	None		1		1		1		
great tit (GT)	Parus major	None	6	2	7	3	3	9	3	5
green sandpiper (GE)	Tringa ochropus	Sch 1, A	2	1	2	2	1	3		2
green woodpecker (G.)	Picus viridis	None		1			1		1	
greenfinch (GR)	Chloris chloris	R			3			1	5	1
grey heron (H.)	Ardea cinerea	None	1			1	1	1		
grey partridge (P.)	Ardea cinerea	S41, R	69	34	24	63	36	25	23	24
grey wagtail (GL)	Motacilla cinerea	A	1	1			1	1	1	
greylag goose (GJ)	Anser anser	A	2							
herring gull (HG)	Larus argentatus	S41, R		1			1			
house sparrow (HS)	Passer domesticus	S41, R		1					1	
jackdaw (JD)	Coloeus monedula	None		14	23	34	17	4	8	202
kestrel (K.)	Falco tinnunculus	A	2	2	4	3	2	1	4	2
kingfisher (KF)	Alcedo atthis	Sch 1, A	1	1	1	2		2		
lapwing (L.)	Vanellus vanellus	S41, R	25	14	21	31	27			
lesser redpoll (LR)	Acanthis cabaret	S41, R					1			
linnet (LI)	Linaria cannabina	S41, R	3	26	21		2		10	
little egret (ET)	Egretta garzetta	None	2	2		3	1	4	1	1
long-tailed tit (LT)	Aegithalos caudatus	None	6	16	19	4		24	4	4
magpie (MG)	Pica pica	None	9	10	11	15	7	4	1	4
mallard (MA)	Anas platyrhynchos	A	42	14	34	32	25	34	9	4
meadow pipit (MP)	Anthus pratensis	A	17	3	45	30	15	49	21	9
mistle thrush (M.)	Turdus viscivorus	R		1						1
moorhen (MH)	Gallinula chloropus	A	3	3	2	3	1	4	1	
mute swan (MS)	Cygnus olor	A	2	6					2	2
peregrine (PE)	Falco peregrinus	Sch 1			1					
pheasant (PH)	Phasianus colchicus	None	39	76	110	38	35	10	22	55
pied wagtail (PW)	Motacilla alba	None	3	5	6	2	7	8	2	
pink-footed goose (PG)	Anser brachyrhynchus	A	88			65	1338			
red-legged partridge (RL)	Alectoris rufa	None	3		19					3
redshank (RK)	Tringa totanus	A				1	4	12	1	1
redwing (RE)	Turdus iliacus	Sch 1, A	4	1	7	2	5	3	2	6
reed bunting (RB)	Emberiza schoeniclus	S41, A	24	16	22	16	29	6	22	27
robin (R.)	Erithacus rubecula	None	12	19	10	10	9	6	6	8
rook (RO)	Corvus frugilegus	A	2	2	96	10	1		250	360

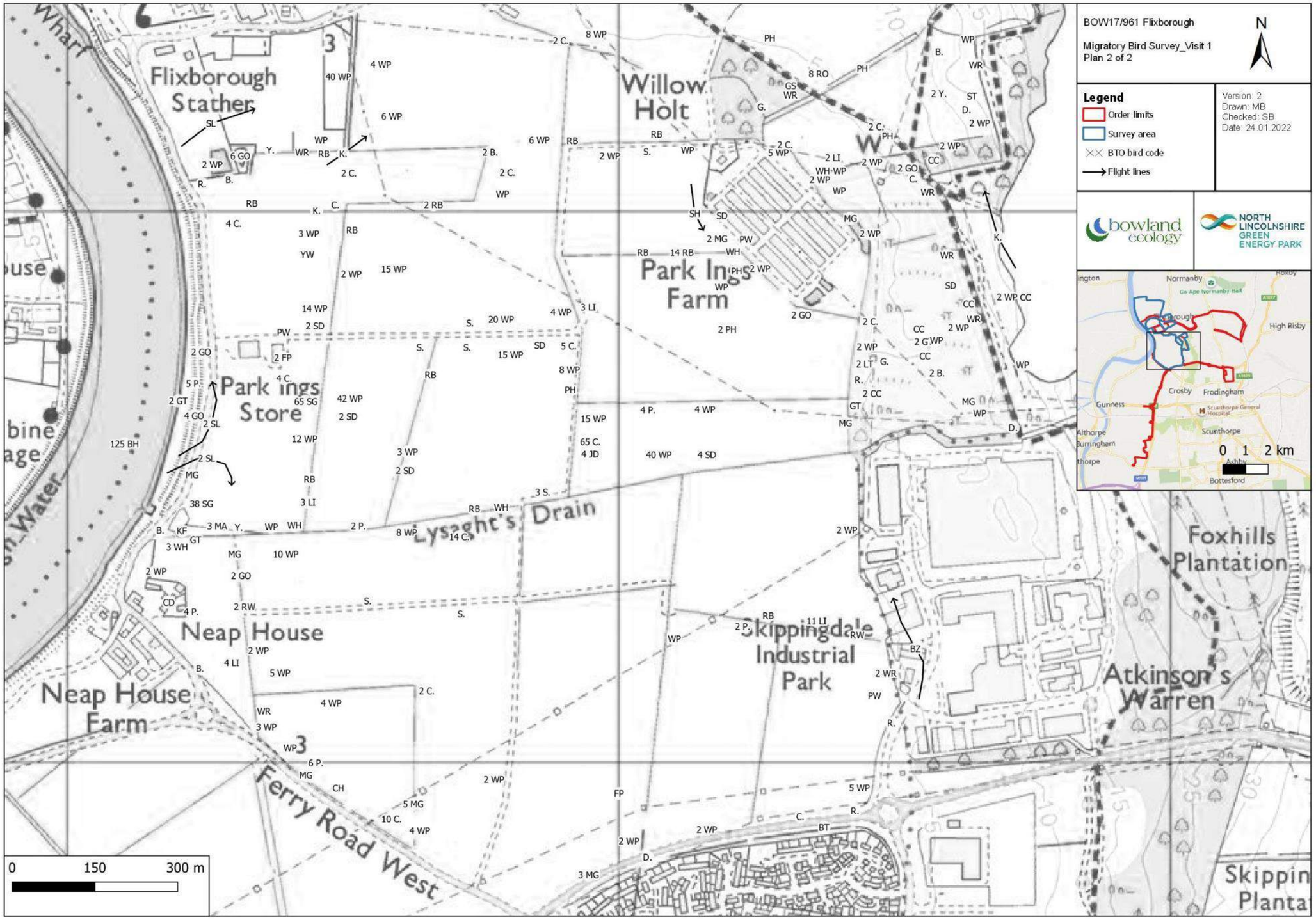
Species (Code)	Scientific name	BoCC5	V11	V12	V13	V14	V15	V16	V17	V18
shelduck (SU)	Tadorna tadorna	A	1							
skylark (S.)	Alauda arvensis	S41, R	28	14	19	29	22	10	26	46
snipe (SN)	Gallinago gallinago	A	2			2	1	5		1
song thrush (ST)	Turdus philomelos	S41, A	2	10	9	4	16	12	7	11
sparrowhawk (SH)	Accipiter nisus	None	1	1		2		2	1	
starling (SG)	Sturnus vulgaris	S41, R	25	4	363	213	13	26	32	162
stock dove (SD)	Columba oenas	A	5	3	13	12	4	4	4	8
stonechat (SC)	Saxicola rubicola	None					2	2		
whooper swan (WS)	Cygnus cygnus	Sch 1, A		3						
woodcock (WK)	Scolopax rusticola	R		1						
woodpigeon (WP)	Columba palumbus	A	71	52	483	721	714	193	847	505
wren (WR)	Troglodytes troglodytes	A	11	15	17	15	14	12	6	10
yellowhammer (Y.)	Emberiza citrinella	S41, R	13	30	11	6	16	4	24	27

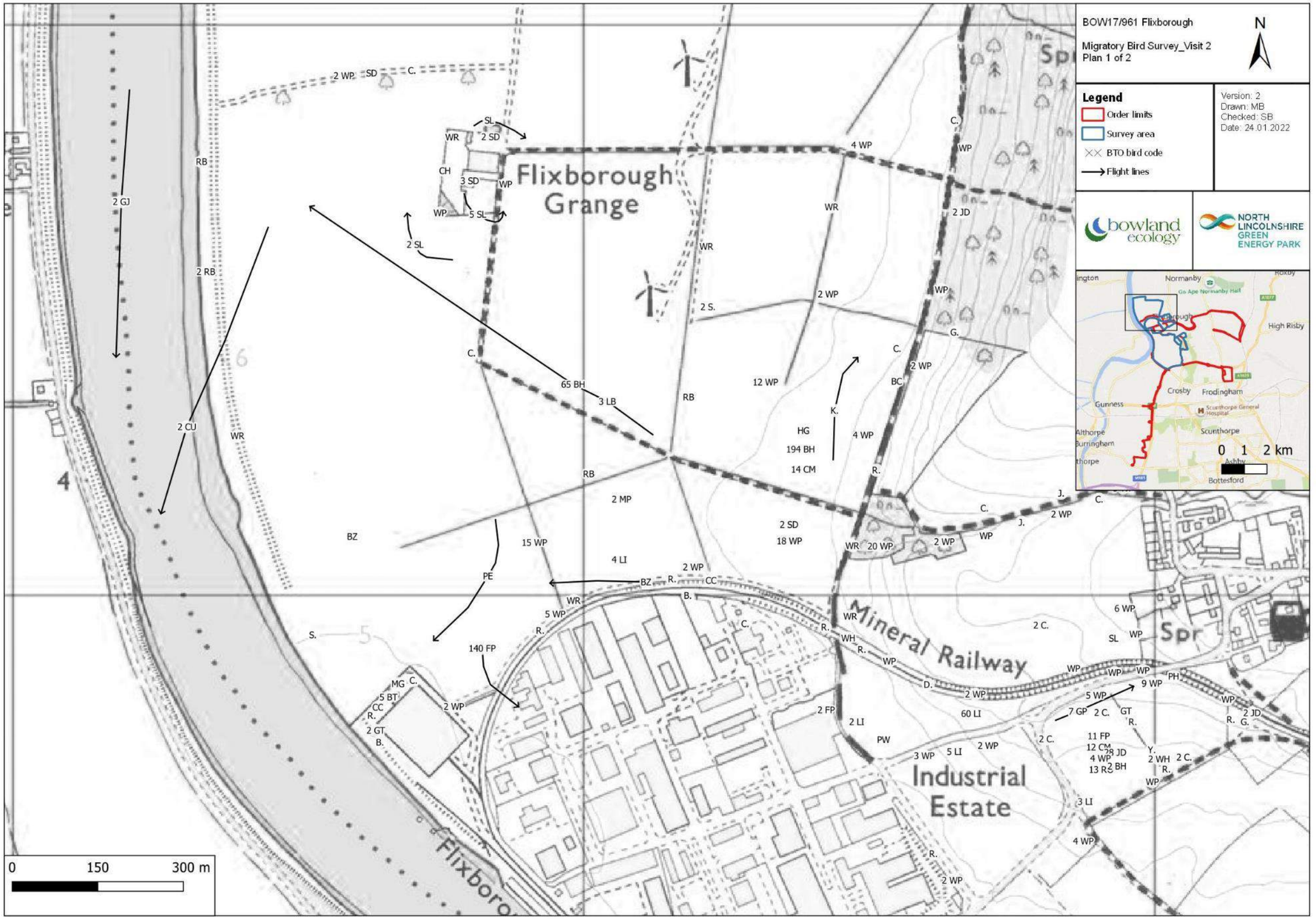
Species (Code)	Scientific name	BoCC5	V19	V20	V21	V22	V23	V24	V25	V26
barn owl (BO)	Tyto alba	Sch 1							1	
blackbird (B.)	Turdus merula	None	11	6	2	12	13	11	6	24
blackcap (BC)	Sylvia atricapilla	None						1	3	2
black-headed gull (BH)	Chroicocephalus ridibundus	A				1	2	5	1	
blue tit (BT)	Cyanistes caeruleus	None	4	12	3	2	5	5	8	5
buzzard (BZ)	Buteo buteo	None	1	2	1	2	3	2	4	
carrion crow (C.)	Corvus corone	None	47	31	32	33	39	24	11	17
Cetti's warbler (CW)	Cettia cetti	Sch 1				1				
chaffinch (CH)	Fringilla coelebs	None	1	1	2	6	3		12	5
chiffchaff (CC)	Phylloscopus collybita	None			1	6	6	8	9	6
coal tit (CT)	Periparus ater	None			1					
collared dove (CD)	Streptopelia decaocto	None				1			1	2
common gull (CM)	Larus canus	A	67	49	3	1	7	3	1	
common sandpiper (CS)	Actitis hypoleucos	A	1				1	1		
dunnock (D.)	Prunella modularis	S41, A	1	3	7	13	8	4	9	11
feral pigeon (FP)	Columba livia domestica	None					8			
fieldfare (FF)	Turdus pilaris	Sch 1, R	14							
goldcrest (GC)	Regulus regulus	None							1	
golden plover (GP)	Pluvialis apricaria	None						1		
goldfinch (GO)	Carduelis carduelis	None	15	5	7	5	9	6	12	14
great spotted woodpecker (GS)	Dendrocopos major	None		2		1	2	1		
great tit (GT)	Parus major	None	14	1	7	3	7	4	4	1
green sandpiper (GE)	Tringa ochropus	Sch 1, A				1				
green woodpecker (G.)	Picus viridis	None	1			3	8			2
greenfinch (GR)	Chloris chloris	R				1		5	2	1
grey heron (H.)	Ardea cinerea	None					1		2	1
grey partridge (P.)	Ardea cinerea	S41, R	18		3	15	2		6	11
grey wagtail (GL)	Motacilla cinerea	A							2	
greylag goose (GJ)	Anser anser	A				1		5		
herring gull (HG)	Larus argentatus	S41, R	1							
house sparrow (HS)	Passer domesticus	S41, R	1					3		
jackdaw (JD)	Coloeus monedula	None			1	2	5		1	8
jay (J.)	Garrulus glandarius	None			1					
kestrel (K.)	Falco tinnunculus	A	1	3			4		1	2
lapwing (L.)	Vanellus vanellus	S41, R			1	6			2	
lesser black-backed gull (LB)	Larus fuscus	A	2	1		7				

Species (Code)	Scientific name	BoCC5	V19	V20	V21	V22	V23	V24	V25	V26
lesser whitethroat (LW)	Curruca curruca	None							1	
linnet (LI)	Linaria cannabina	S41, R	3	3	6	16	15	7	20	33
long-tailed tit (LT)	Aegithalos caudatus	None					1		2	
magpie (MG)	Pica pica	None	7	6	4	5	2	2	5	1
mallard (MA)	Anas platyrhynchos	A	11	5	2	24	15	6	13	9
meadow pipit (MP)	Anthus pratensis	A	4	3		11		2	5	7
mistle thrush (M.)	Turdus viscivorus	R	1	1						
moorhen (MH)	Gallinula chloropus	A								1
mute swan (MS)	Cygnus olor	A								2
oystercatcher (OC)	Haematopus ostralegus	A	2			2				
pheasant (PH)	Phasianus colchicus	None	20	17	17	25	8	10	8	24
pied wagtail (PW)	Motacilla alba	None	2	5		2		1	2	
red-legged partridge (RL)	Alectoris rufa	None	3	4	1	2	1	2		
redshank (RK)	Tringa totanus	A	2			1	4	1		
reed bunting (RB)	Emberiza schoeniclus	S41, A	10	1	5	46	5	12	18	28
reed warbler (RW)	Acrocephalus scirpaceus	None							1	
robin (R.)	Erithacus rubecula	None	3	5	5	6	6	2	7	7
rook (RO)	Corvus frugilegus	A		5		2				4
sedge warbler (SW)	Acrocephalus schoenobaenus	A							3	10
skylark (S.)	Alauda arvensis	S41, R	32	31	18	87	34	47	35	70
snipe (SN)	Gallinago gallinago	A	1		1	1				
song thrush (ST)	Turdus philomelos	S41, A				3	1			5
sparrowhawk (SH)	Accipiter nisus	None		1		1				
starling (SG)	Sturnus vulgaris	S41, R	18							1
stock dove (SD)	Columba oenas	A	2			6			9	9
stonechat (SC)	Saxicola rubicola	None	1							
swallow (SL)	Hirundo rustica	None							2	2
tree sparrow (TS)	Passer montanus	S41, R				2			4	1
whimbrel (WM)	Numenius phaeopus	Sch 1, R								1
whitethroat (WH)	Curruca communis	A							6	15
willow warbler (WW)	Phylloscopus trochilus	A						1	5	6
woodcock (WK)	Scolopax rusticola	R					1			
woodpigeon (WP)	Columba palumbus	A	170	172	203	352	68	97	182	232
wren (WR)	Troglodytes troglodytes	A		1	4	12	5	8	20	21
yellow wagtail (YW)	Motacilla flava	S41, R							8	9
yellowhammer (Y.)	Emberiza citrinella	S41, R	4	4	7	12	6	2	11	8

Appendix L: Migratory and Wintering Bird Survey Plans (2021 - 2022)




BOW17/961 Flixborough
Migratory Bird Survey_Visit 1
Plan 2 of 2
N
Legend
Order limits
Survey area
BTO bird code
Flight lines
Version: 2
Drawn: MB
Checked: SB
Date: 24.01.2022
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK
Flixborough Stather
Willow Holt
Park Ings Farm
Park Ings Store
Neap House
Neap House Farm
Lysaght's Drain
Ferry Road West
Skippingdale Industrial Park
Foxhills Plantation
Atkinson's Warren
Normanby
High Risby
Crosby
Frodingham
Gunness
Scunthorpe
Althorpe
Burringham
Ashby
Bottesford
0 1 2 km
0 150 300 m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Plan 1 of 2
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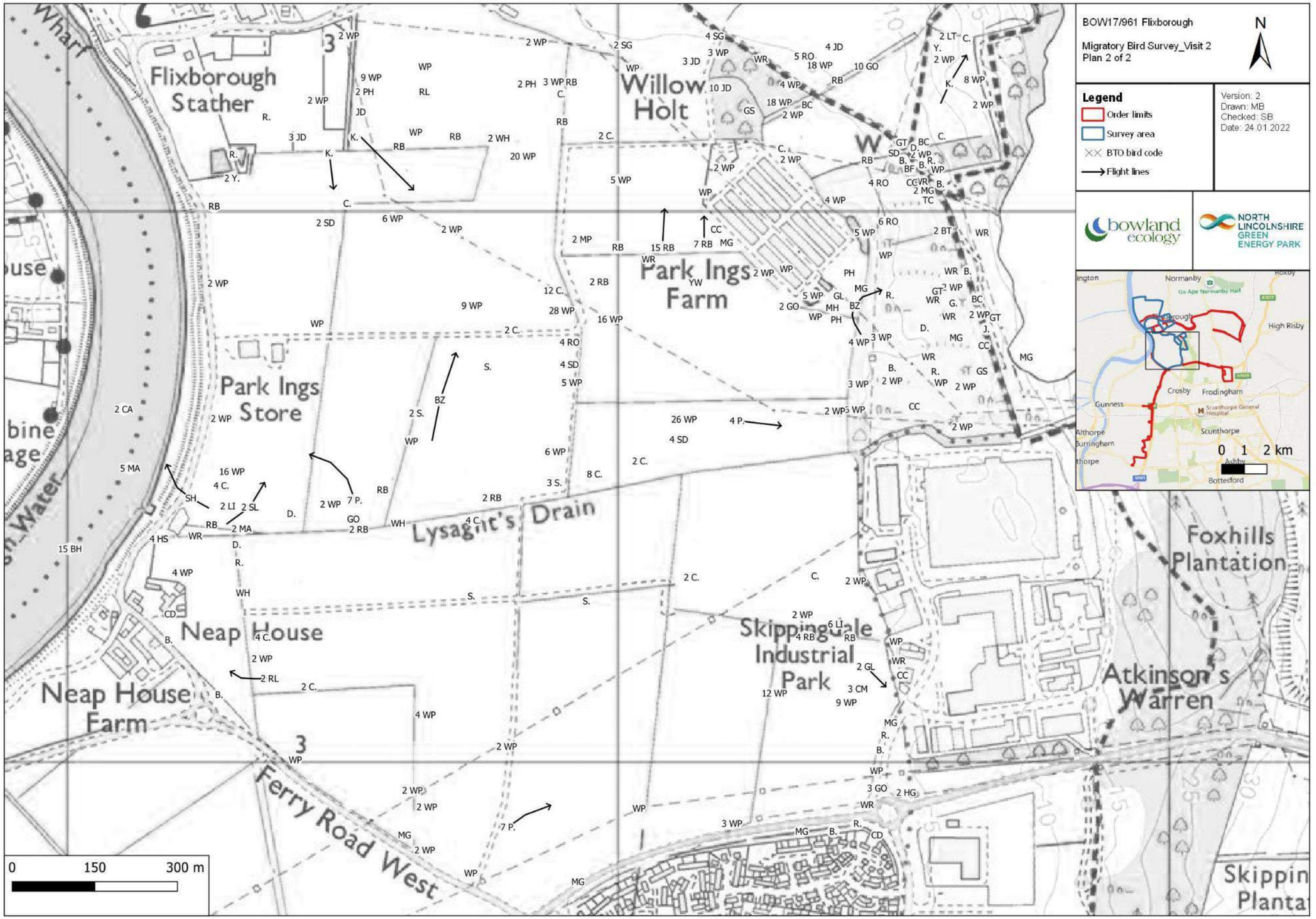
Survey area
BTO bird code
Flight lines
Version: 2
Drawn: MB
Checked: SB
Date: 24.01.2022
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK
Flixborough Grange
Mineral Railway
Industrial Estate
Normanby
High Risby
Crosby
Frodingham
Gunness
Scunthorpe
Bottesford
0 1 2 km
0 150 300 m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Migratory Bird Survey_Visit 2
Plan 2 of 2
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Legend
Order limits
Survey area
BTO bird code
Flight lines
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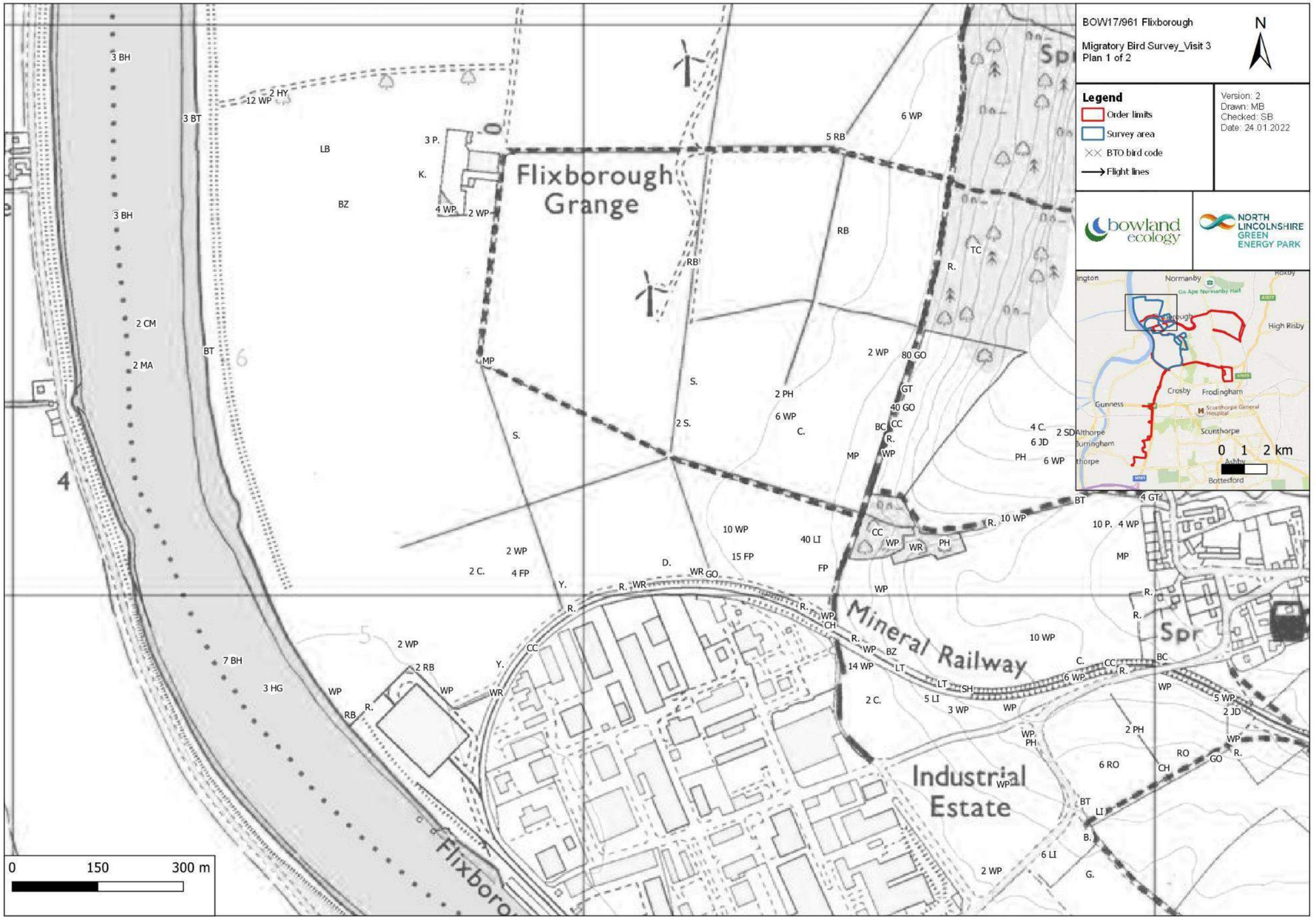
Drawn: MB
Checked: SB
Date: 24.01.2022
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK
Flixborough Stather
Willow Holt
Park Ings Farm
Park Ings Store
Neap House
Neap House Farm
Skippingdale Industrial Park
Foxhills Plantation
Atkinson's Warren
Lysaght's Drain
Ferry Road West
Normanby
High Risby
Crosby
Frodingham
Scunthorpe
Bottesford
0 1 2 km
0 150 300 m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Plan 1 of 2
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Order limits
Survey area
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Flight lines
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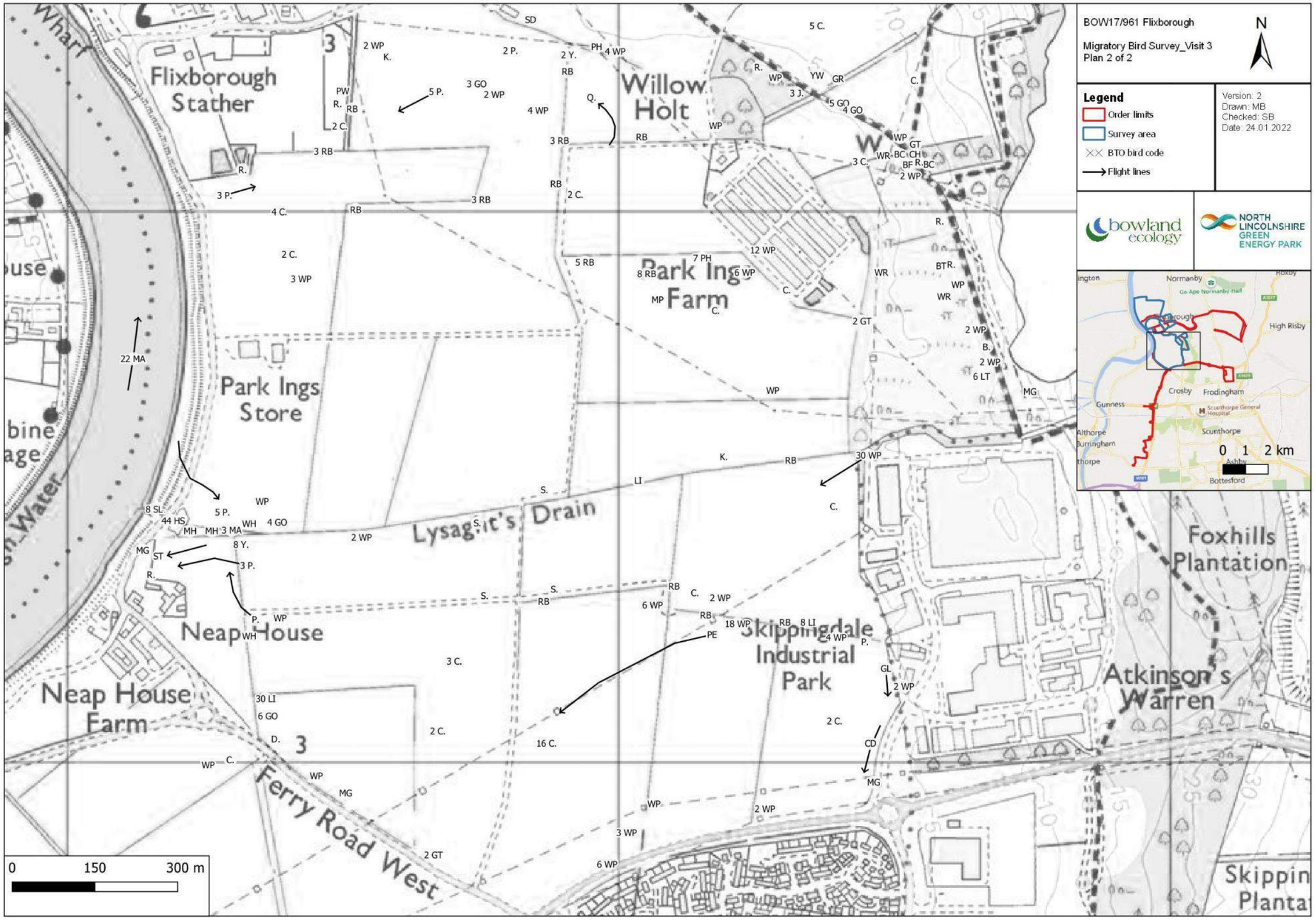
Drawn: MB
Checked: SB
Date: 24.01.2022
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK
Flixborough Grange
Mineral Railway
Industrial Estate
Normanby
High Risby
Crosby
Frodingham
Scunthorpe
Gunness
Althorpe
Burringham
Ashby
Bottesford
0 1 2 km
0 150 300 m


BOW17/961 Flixborough
Migratory Bird Survey_Visit 3
Plan 2 of 2
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Order limits
Survey area
BTO bird code
Flight lines
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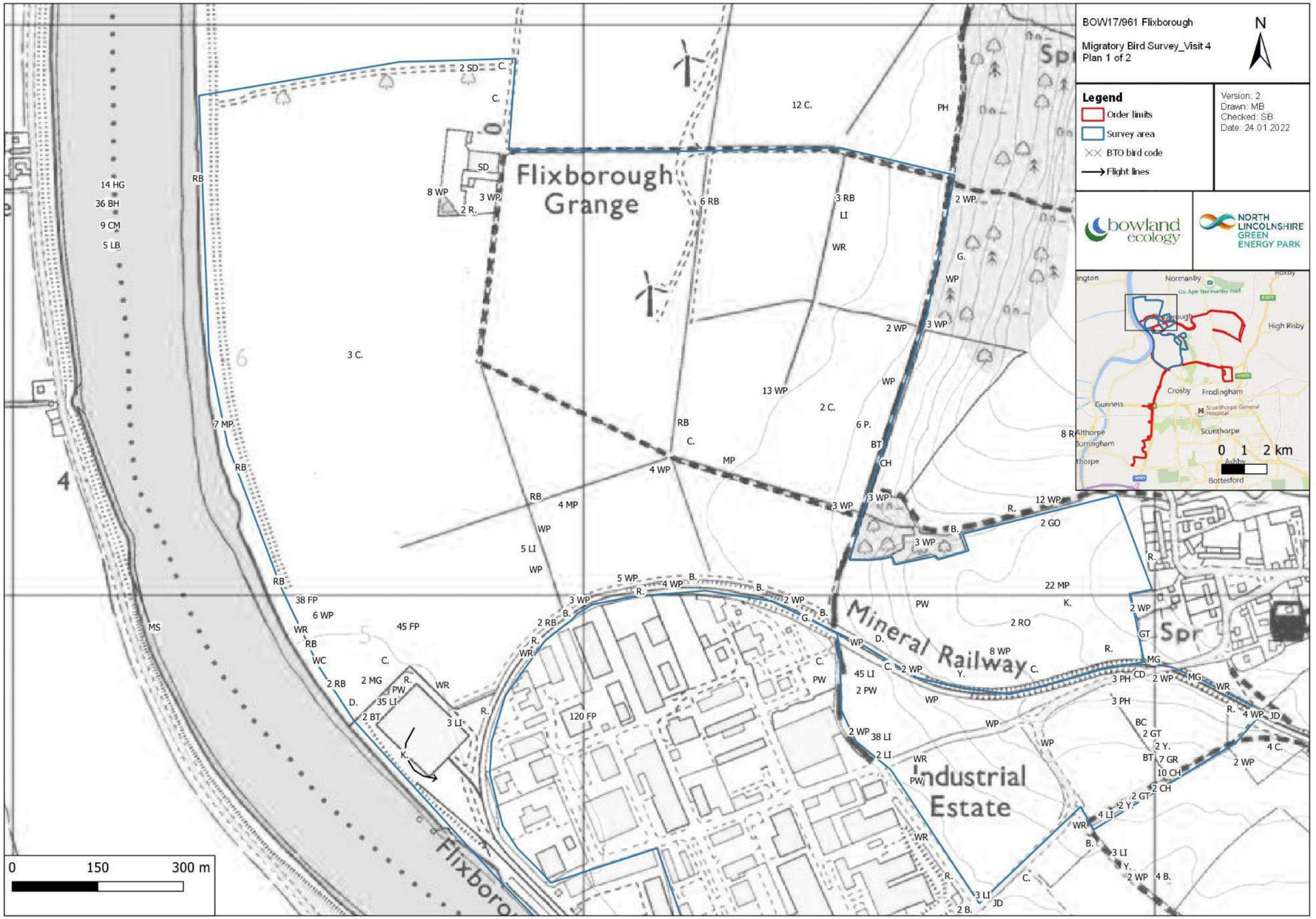
Drawn: MB
Checked: SB
Date: 24.01.2022
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK
Flixborough Stather
Willow Holt
Park Ings Farm
Park Ings Store
Lysaght's Drain
Neap House
Neap House Farm
Ferry Road West
Skippingdale Industrial Park
Foxhills Plantation
Atkinson's Warren
Normanby
High Risby
Crosby
Frodingham
Scunthorpe
Bottesford
0 1 2 km
0 150 300 m


BOW17/961 Flixborough
Migratory Bird Survey_Visit 4
Plan 1 of 2
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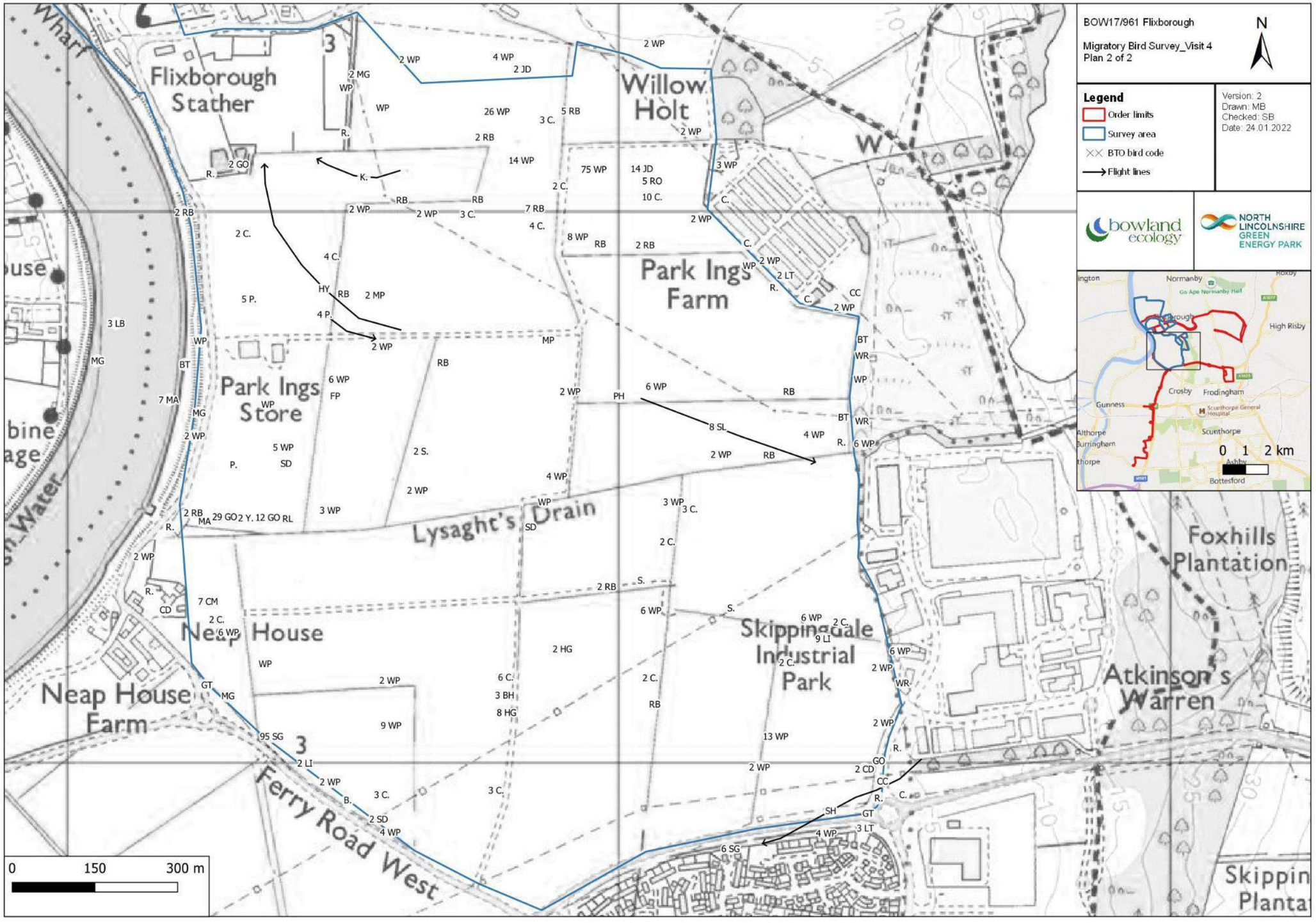
Legend
Order limits
Survey area
BTO bird code
Flight lines
Version: 2
Drawn: MB
Checked: SB
Date: 24.01.2022
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK
Flixborough Grange
Mineral Railway
Industrial Estate
Normanby
High Risby
Crosby
Frodingham
Gunness
Scunthorpe
Bottesford
0 1 2 km
0 150 300 m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Migratory Bird Survey_Visit 4
Plan 2 of 2
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Order limits
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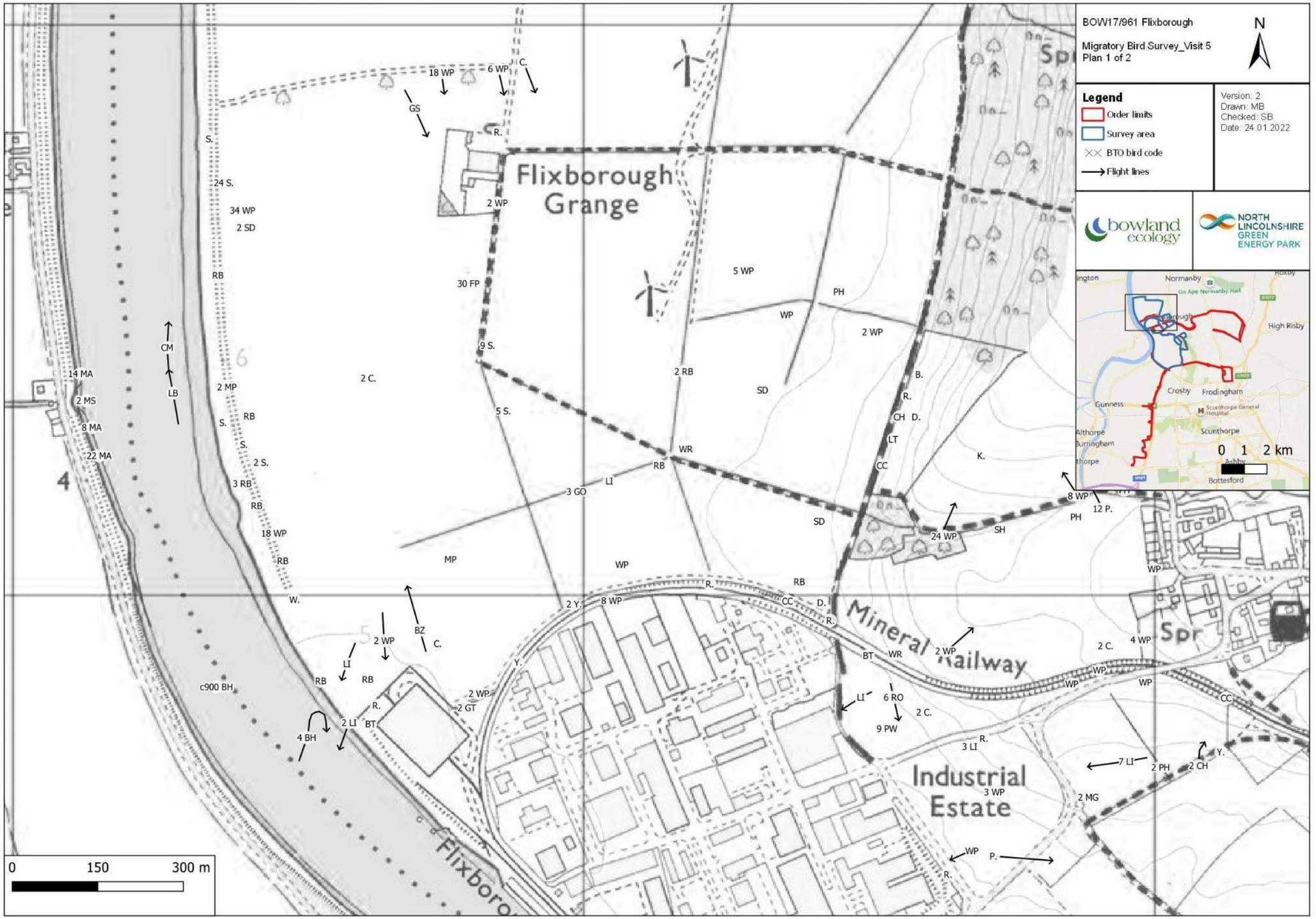
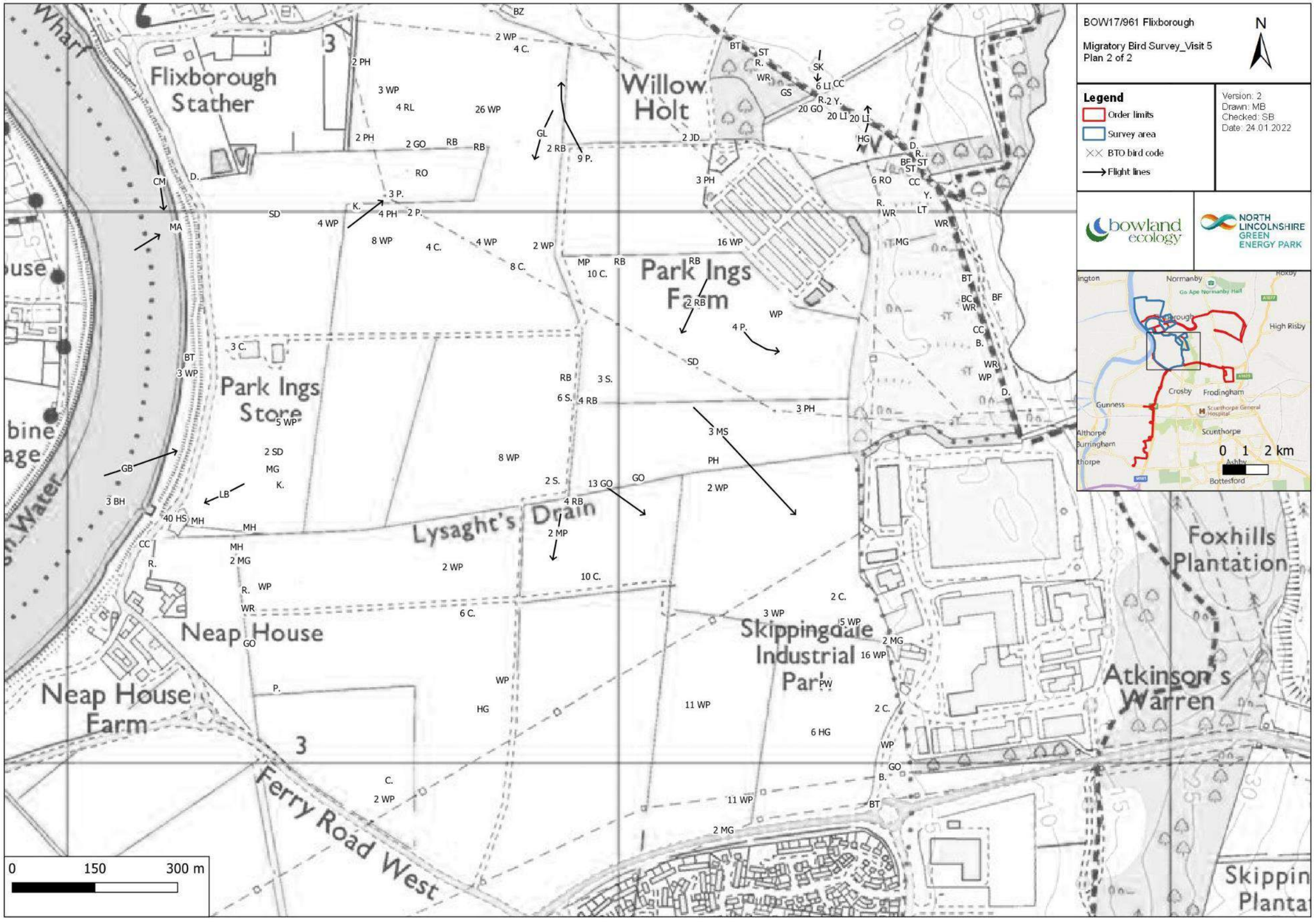
Flight lines
Version: 2
Drawn: MB
Checked: SB
Date: 24.01.2022
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK
Normanby
High Risby
Crosby
Frodingham
Gunness
Scunthorpe
Bottesford
0 1 2 km
Flixborough Stather
Willow Holt
Park Ings Farm
Park Ings Store
Lysaght's Drain
Neap House
Neap House Farm
Skippingdale Industrial Park
Foxhills Plantation
Atkinson's Warren
Ferry Road West
0 150 300 m


BOW17/961 Flixborough
Migratory Bird Survey_Visit 5
Plan 1 of 2
N
Legend
Order limits
Survey area
BTO bird code
Flight lines
Version: 2
Drawn: MB
Checked: SB
Date: 24.01.2022
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK
Flixborough Grange
Mineral Railway
Industrial Estate
Normanby
High Risby
Crosby
Frodingham
Gunness
Scunthorpe
Althorpe
Burringham
Ashby
Bottesford
0 1 2 km
0 150 300 m


BOW17/961 Flixborough
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Plan 2 of 2
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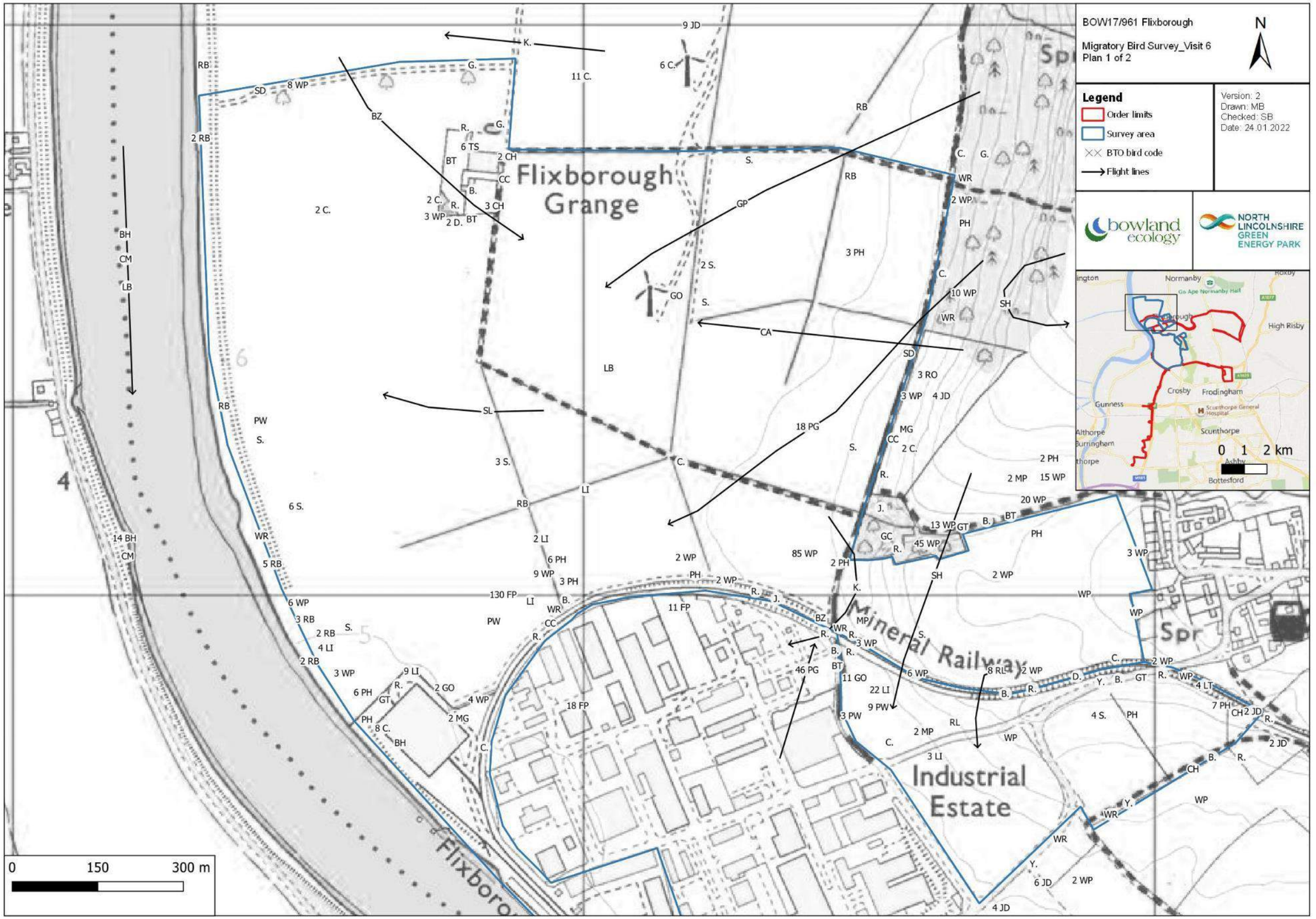
Order limits
Survey area
BTO bird code
Flight lines
Version: 2
Drawn: MB
Checked: SB
Date: 24.01.2022
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK
Flixborough Stather
Willow Holt
Park Ings Farm
Park Ings Store
Lysaght's Drain
Neap House
Neap House Farm
Skippingdale Industrial Park
Foxhills Plantation
Atkinson's Warren
Ferry Road West
Normanby
High Risby
Crosby
Frodingham
Gunness
Scunthorpe
Bottesford
0 1 2 km
0 150 300 m


BOW17/961 Flixborough
Migratory Bird Survey_Visit 6
Plan 1 of 2
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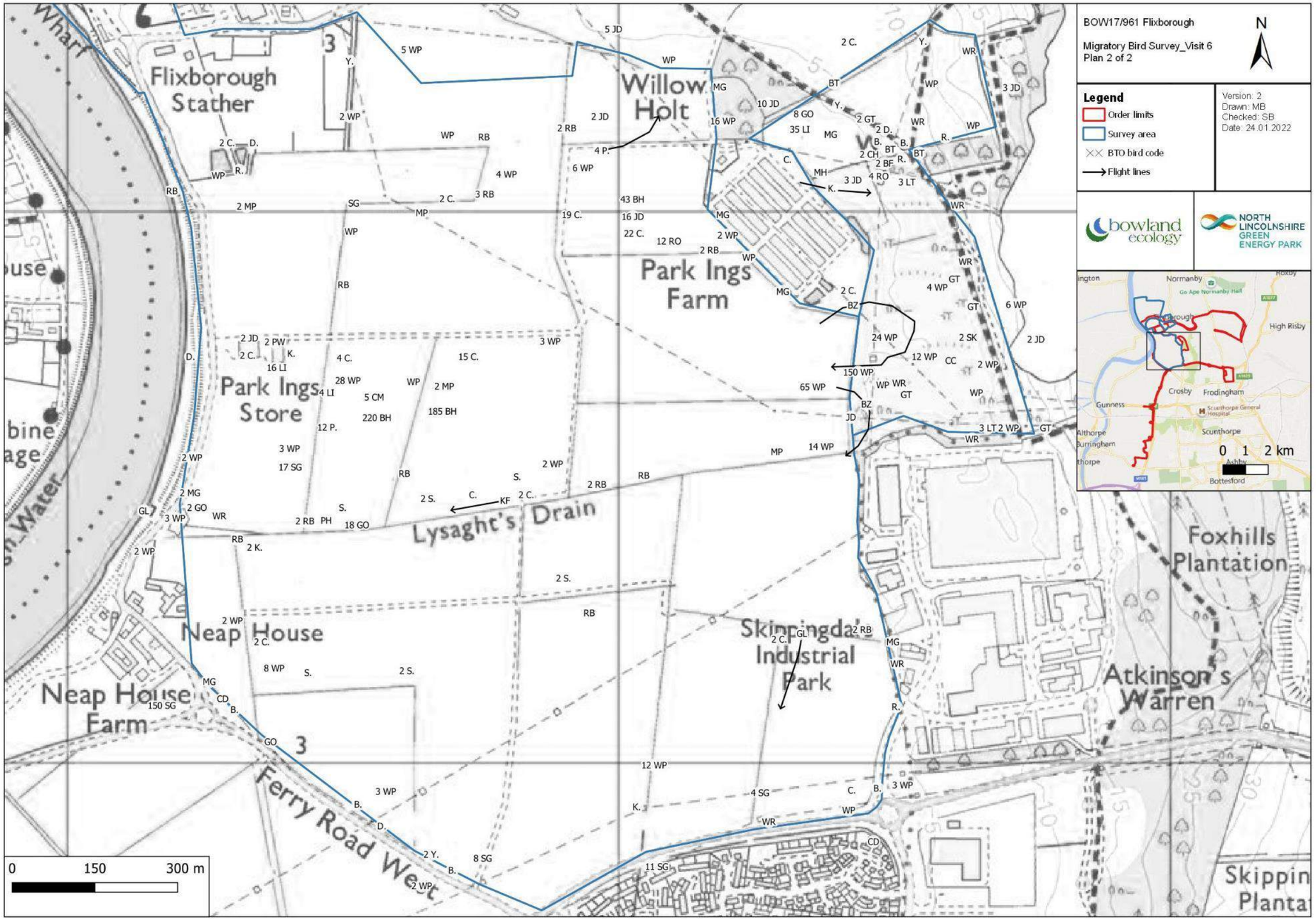
Order limits
Survey area
BTO bird code
Flight lines
Version: 2
Drawn: MB
Checked: SB
Date: 24.01.2022
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK
Flixborough Grange
Mineral Railway
Industrial Estate
Normanby
High Risby
Crosby
Frodingham
Gunness
Scunthorpe
Bottesford
0 1 2 km
0 150 300 m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Migratory Bird Survey_Visit 6
Plan 2 of 2
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Legend
Order limits
Survey area
BTO bird code
Flight lines
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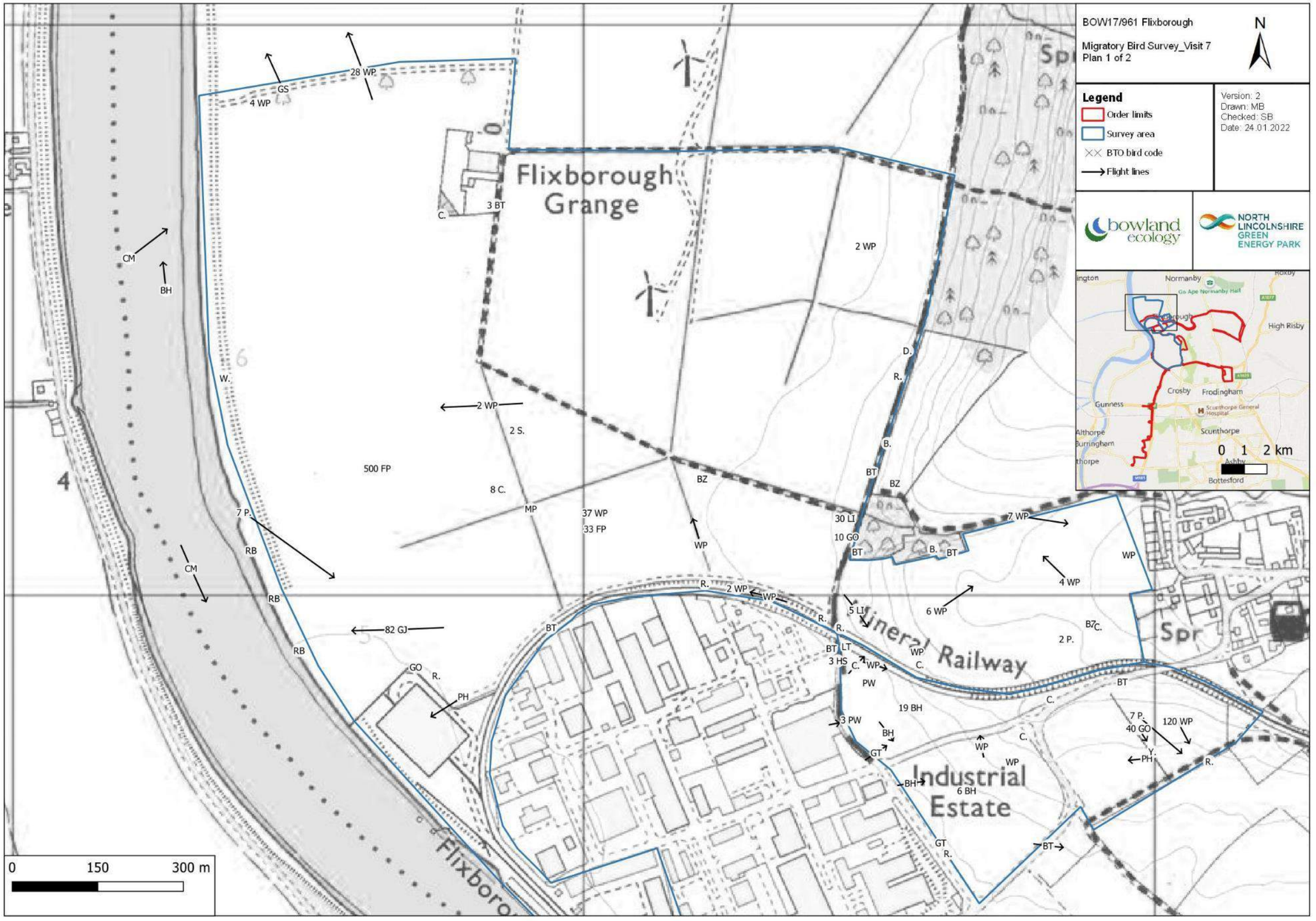
Drawn: MB
Checked: SB
Date: 24.01.2022
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK
Flixborough Stather
Willow Holt
Park Ings Farm
Park Ings Store
Lysaght's Drain
Neap House
Neap House Farm
Skippingdale Industrial Park
Foxhills Plantation
Atkinson's Warren
Ferry Road West
Normanby
High Risby
Crosby
Frodingham
Gunness
Scunthorpe
Bottesford
0 1 2 km
0 150 300 m


BOW17/961 Flixborough
Migratory Bird Survey_Visit 7
Plan 1 of 2
N
Legend
Order limits
Survey area
BTO bird code
Flight lines
Version: 2
Drawn: MB
Checked: SB
Date: 24.01.2022
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK
Flixborough Grange
Industrial Estate
Railway
Normanby
High Risby
Crosby
Frodingham
Scunthorpe
Gunness
Bottesford
0 1 2 km
0 150 300 m
28 WP
4 WP
GS
3 BT
2 WP
2 S.
500 FP
8 C.
MP
37 WP
33 FP
BZ
WP
7 P.
RB
CM
BH
82 GJ
GO
PH
30 LI
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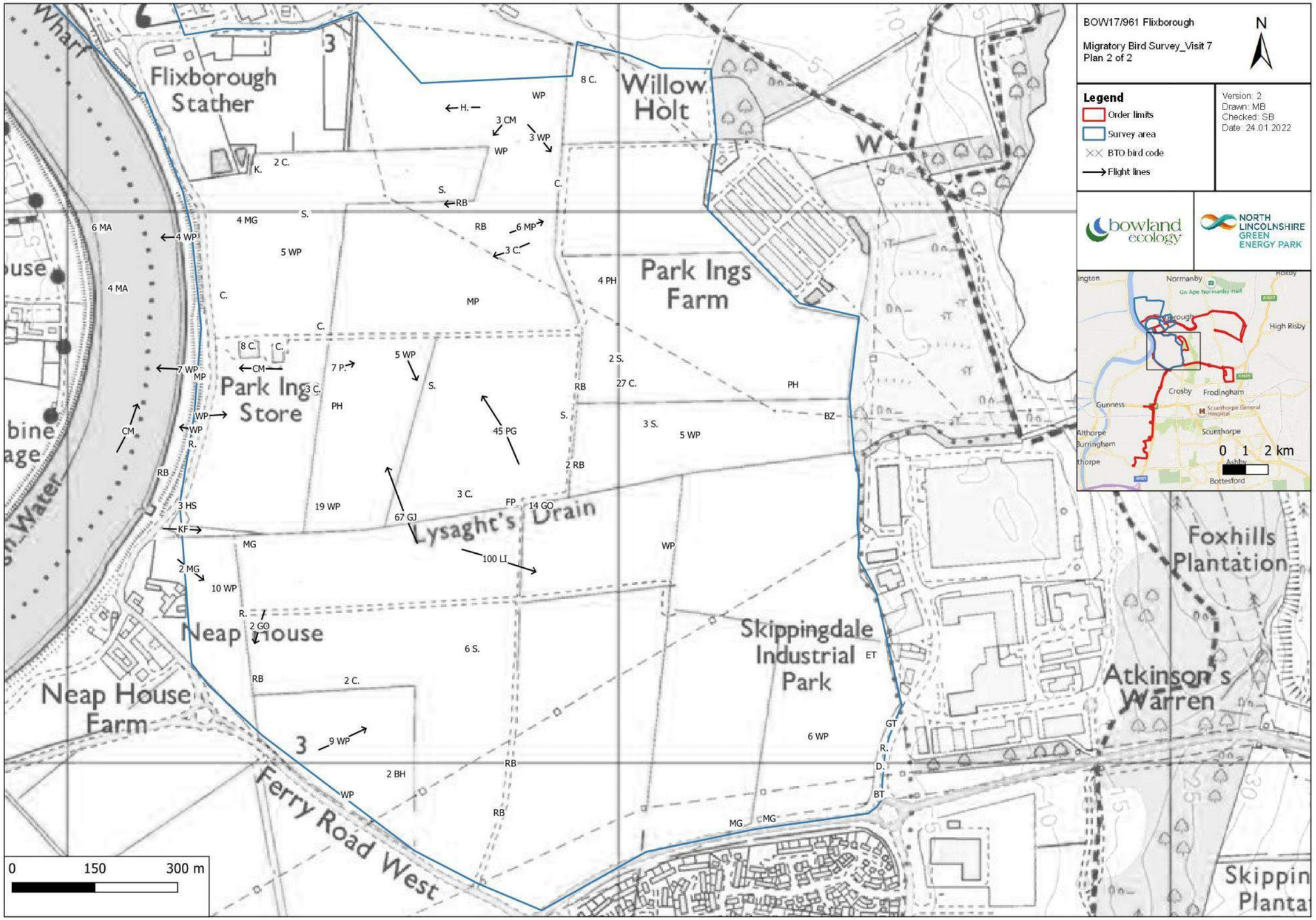
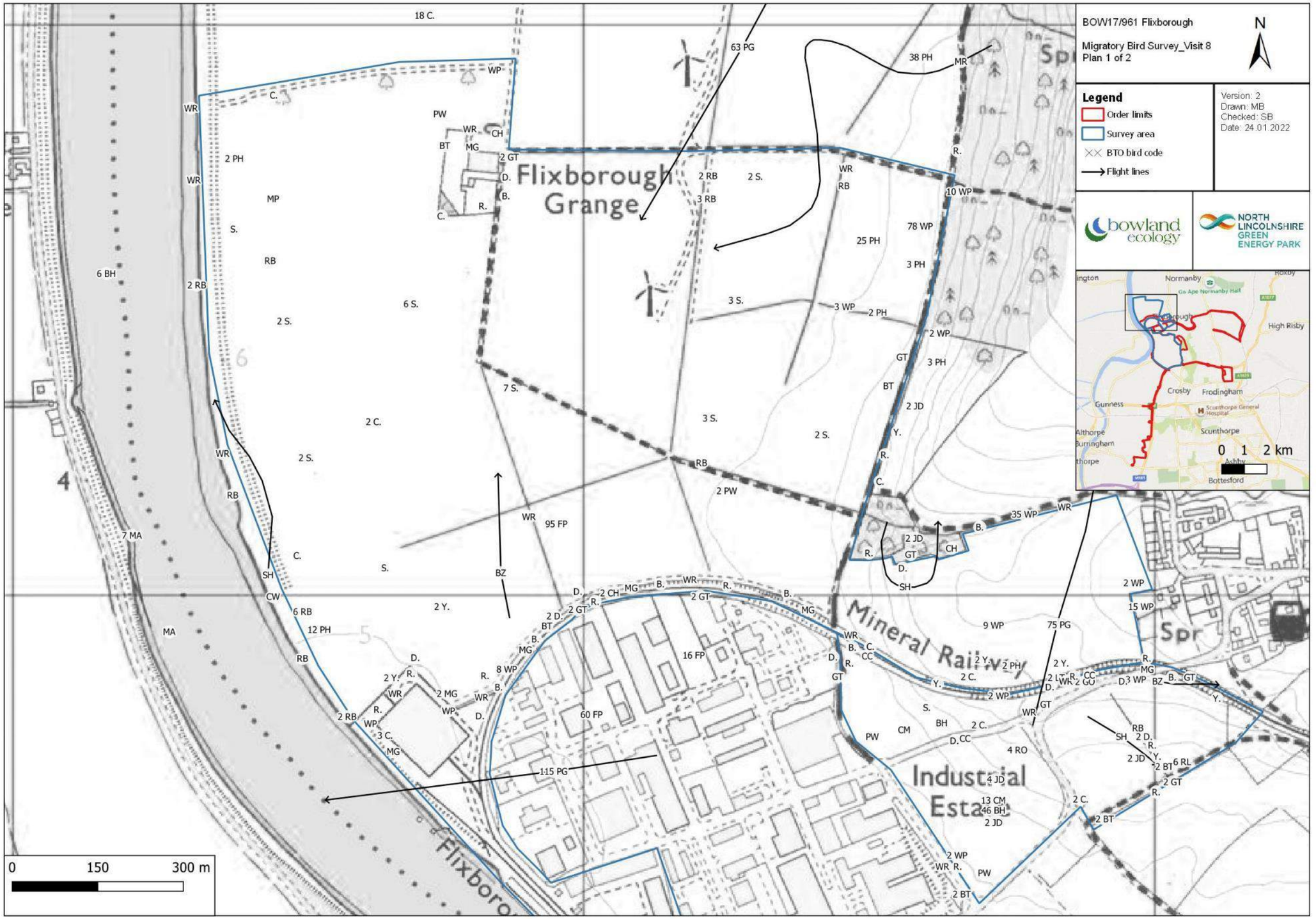
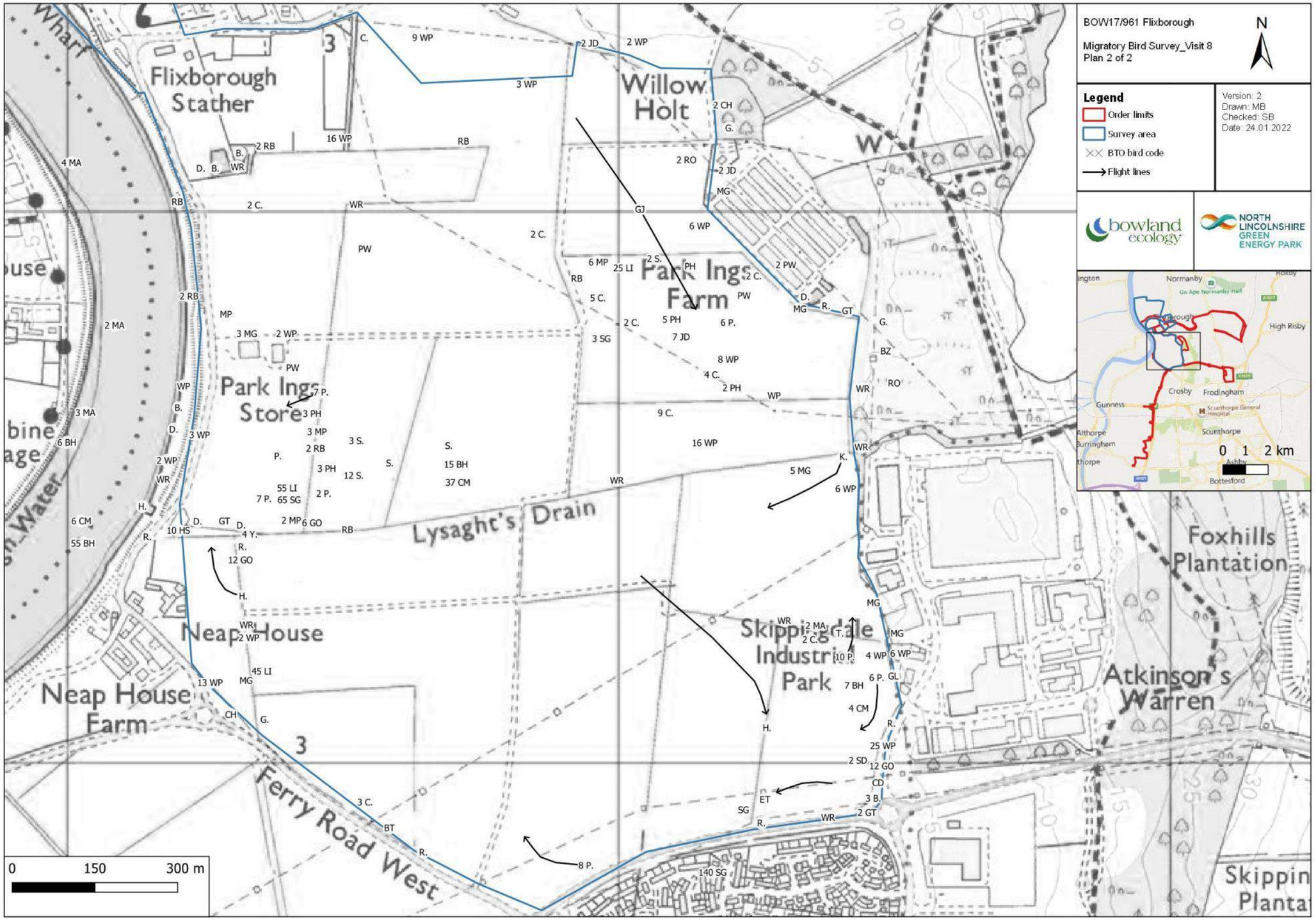
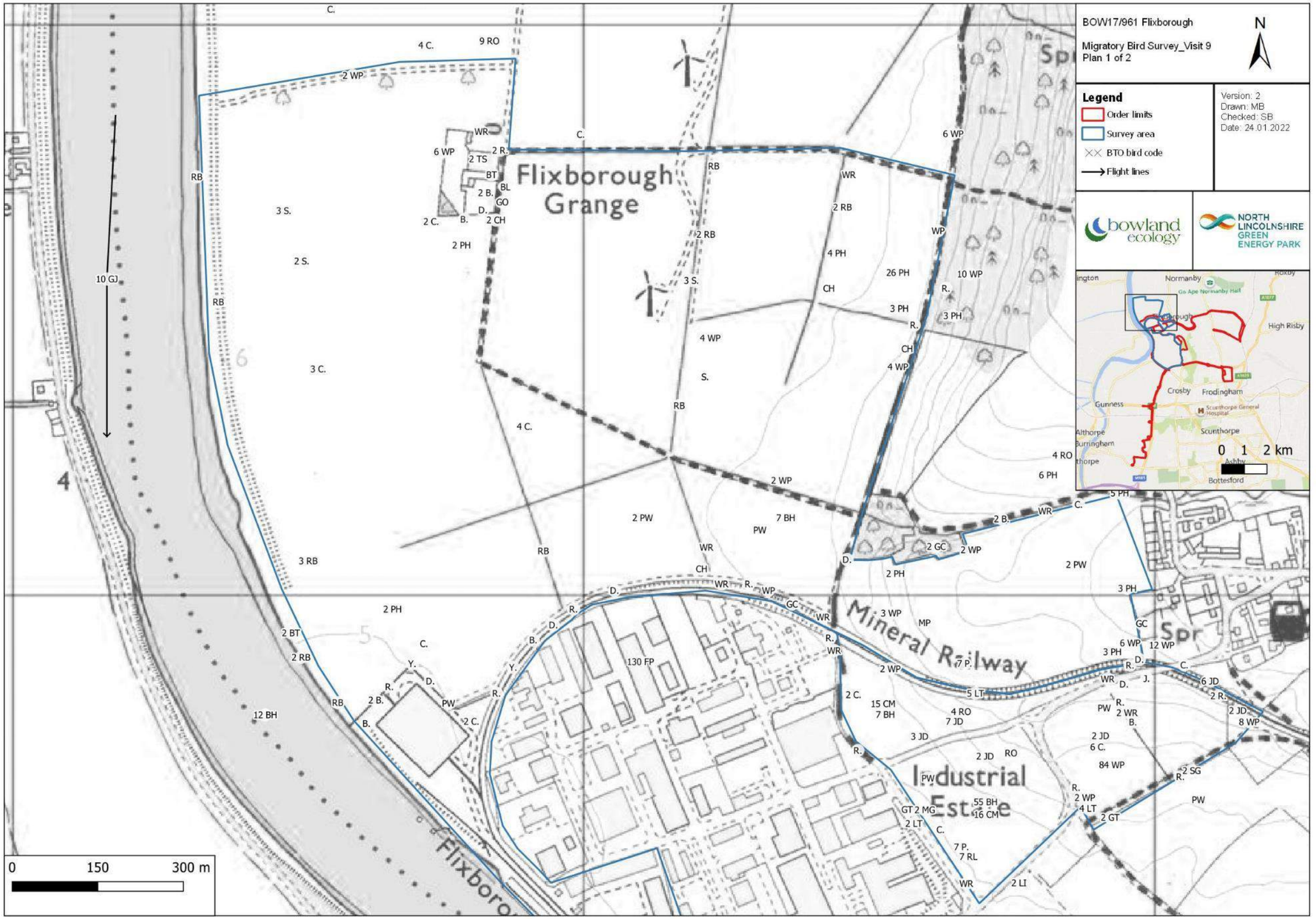
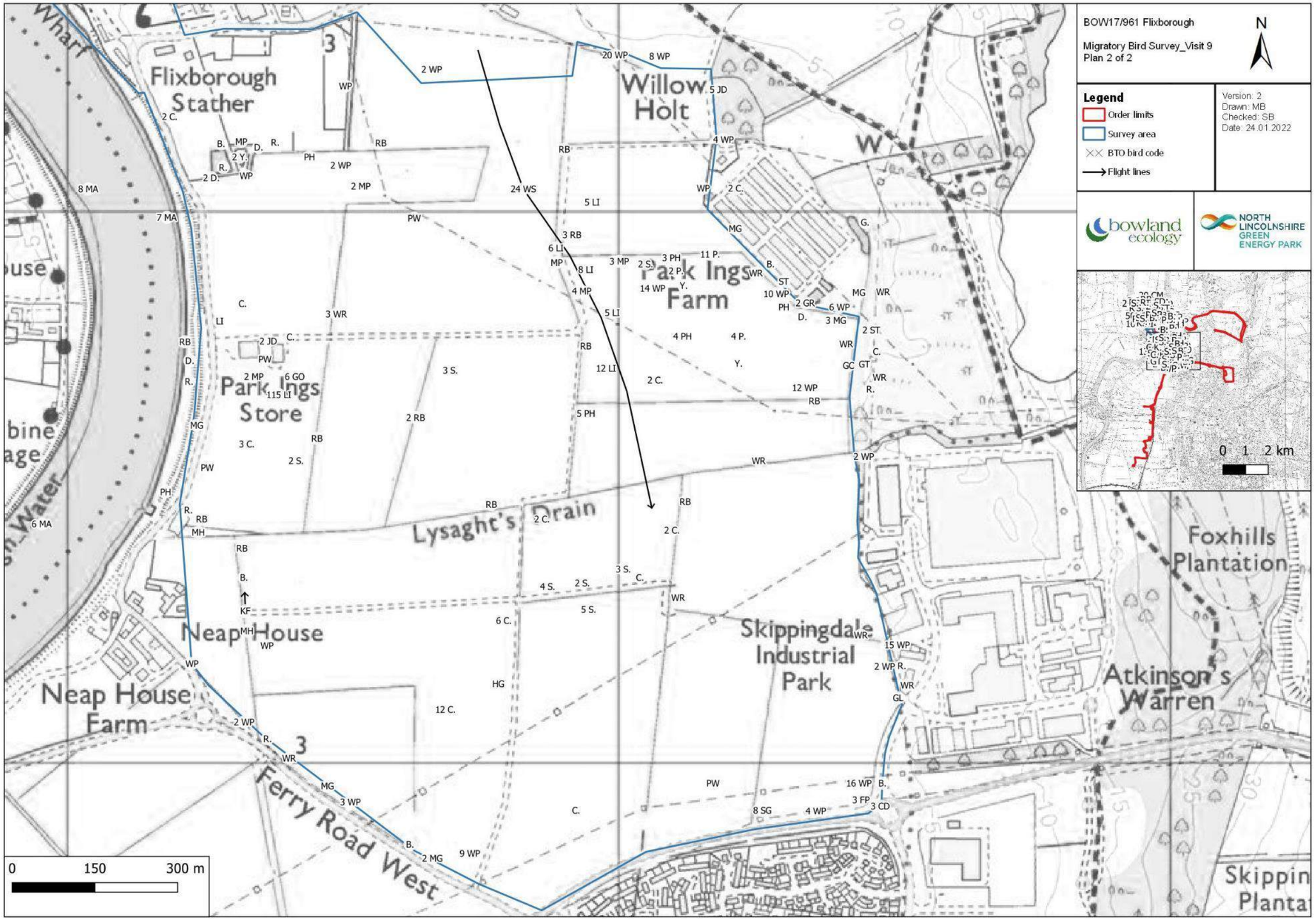
7 WP
4 WP
6 WP
5 LI
3 HS
PW
19 BH
3 PW
6 BH
2 P.
40 GO
120 WP


BOW17/961 Flixborough
Migratory Bird Survey_Visit 7
Plan 2 of 2
N
Legend
Order limits
Survey area
BTO bird code
Flight lines
Version: 2
Drawn: MB
Checked: SB
Date: 24.01.2022
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK
Normanby
High Risby
Crosby
Frodingham
Gunness
Scunthorpe
Bottesford
0 1 2 km
Flixborough Stather
Willow Holt
Park Ings Farm
Park Ing Store
Lysaght's Drain
Foxhills Plantation
Neap House
Skippingdale Industrial Park
Atkinson's Warren
Neap House Farm
Ferry Road West
0 150 300 m


BOW17/961 Flixborough
Migratory Bird Survey_Visit 8
Plan 1 of 2
N
Legend
Order limits
Survey area
BTO bird code
Flight lines
Version: 2
Drawn: MB
Checked: SB
Date: 24.01.2022
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK
Flixborough Grange
Mineral Railway
Industrial Estate
Normanby
High Risby
Crosby
Frodingham
Scunthorpe
Gunness
Althorpe
Burringham
Bottesford
0 1 2 km
0 150 300 m


BOW17/961 Flixborough
Migratory Bird Survey_Visit 8
Plan 2 of 2
N
Legend
Order limits
Survey area
BTO bird code
Flight lines
Version: 2
Drawn: MB
Checked: SB
Date: 24.01.2022
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK
Normanby
High Risby
Crosby
Frodingham
Gunness
Scunthorpe
Bottesford
0 1 2 km
Flixborough Stather
Willow Holt
Park Ings Farm
Park Ings Store
Lysaght's Drain
Neap House
Neap House Farm
Skippingdale Industrial Park
Foxhills Plantation
Atkinson's Warren
Ferry Road West
0 150 300 m


BOW17/961 Flixborough
Migratory Bird Survey_Visit 9
Plan 1 of 2
N
Legend
Order limits
Survey area
BTO bird code
Flight lines
Version: 2
Drawn: MB
Checked: SB
Date: 24.01.2022
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK
Flixborough Grange
Mineral Railway
Industrial Estate
Normanby
High Risby
Crosby
Frodingham
Scunthorpe
Gunness
Althorpe
Burringham
Ashby
Bottesford
0 1 2 km
0 150 300 m


BOW17/961 Flixborough
Migratory Bird Survey_Visit 9
Plan 2 of 2
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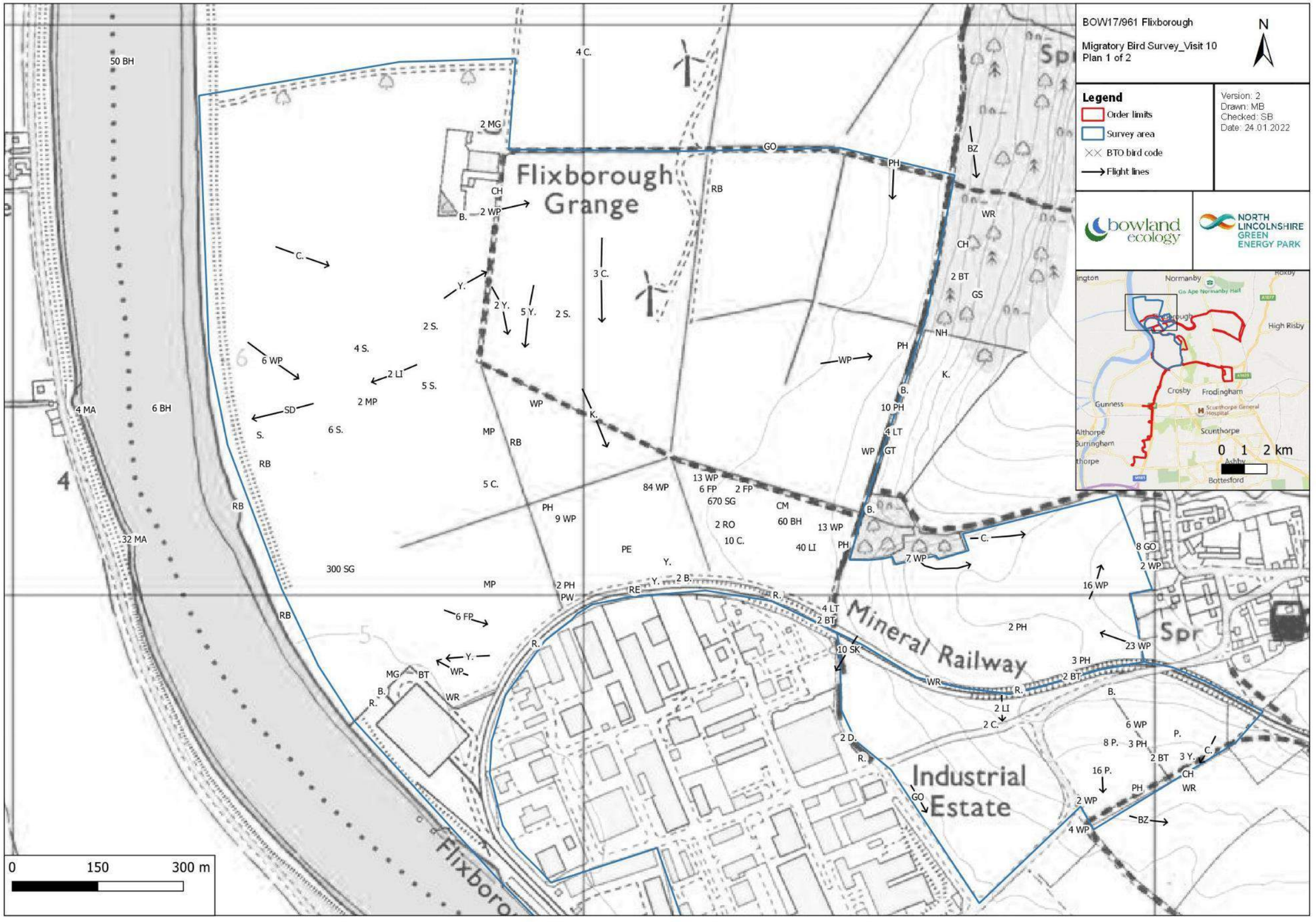
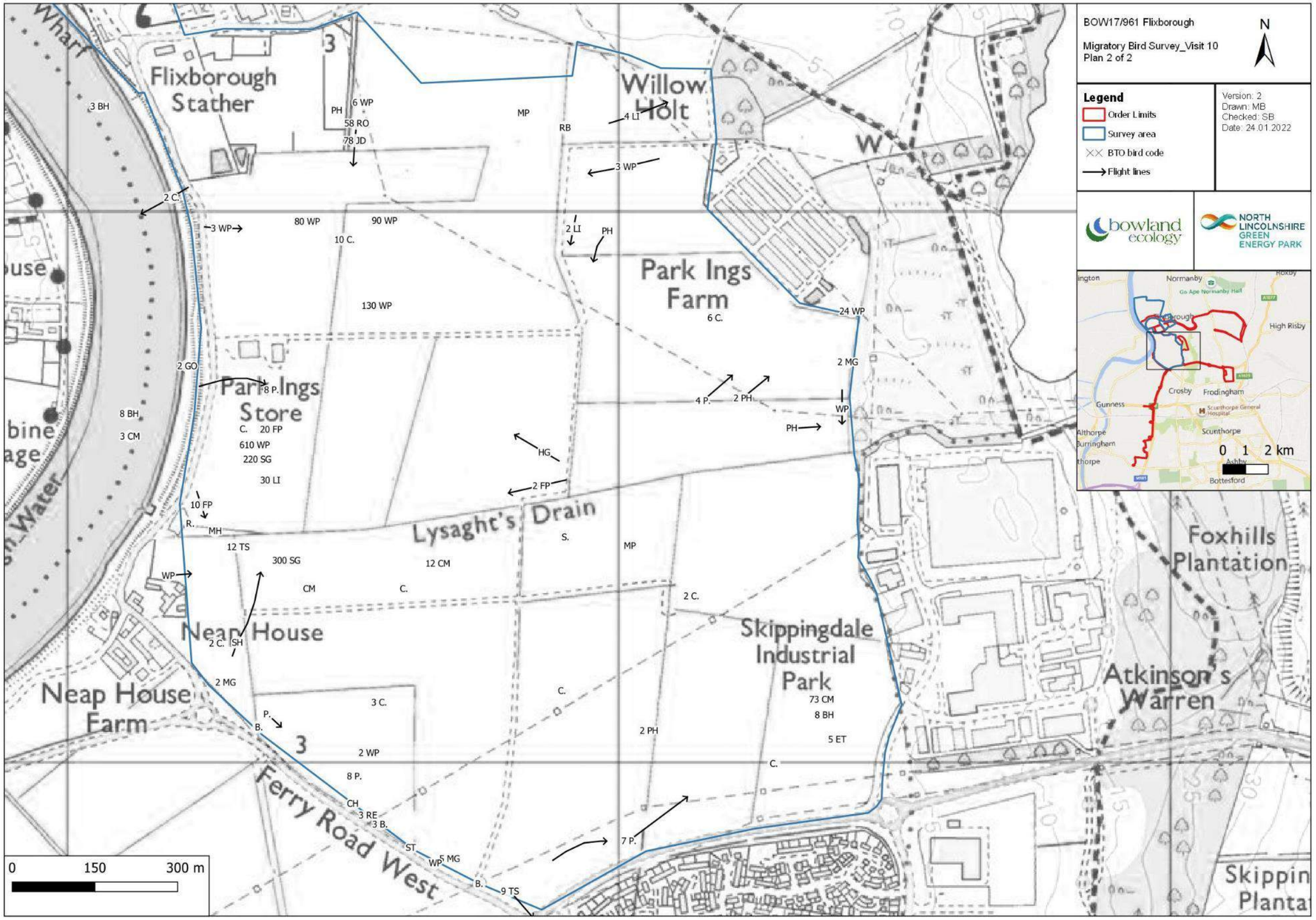
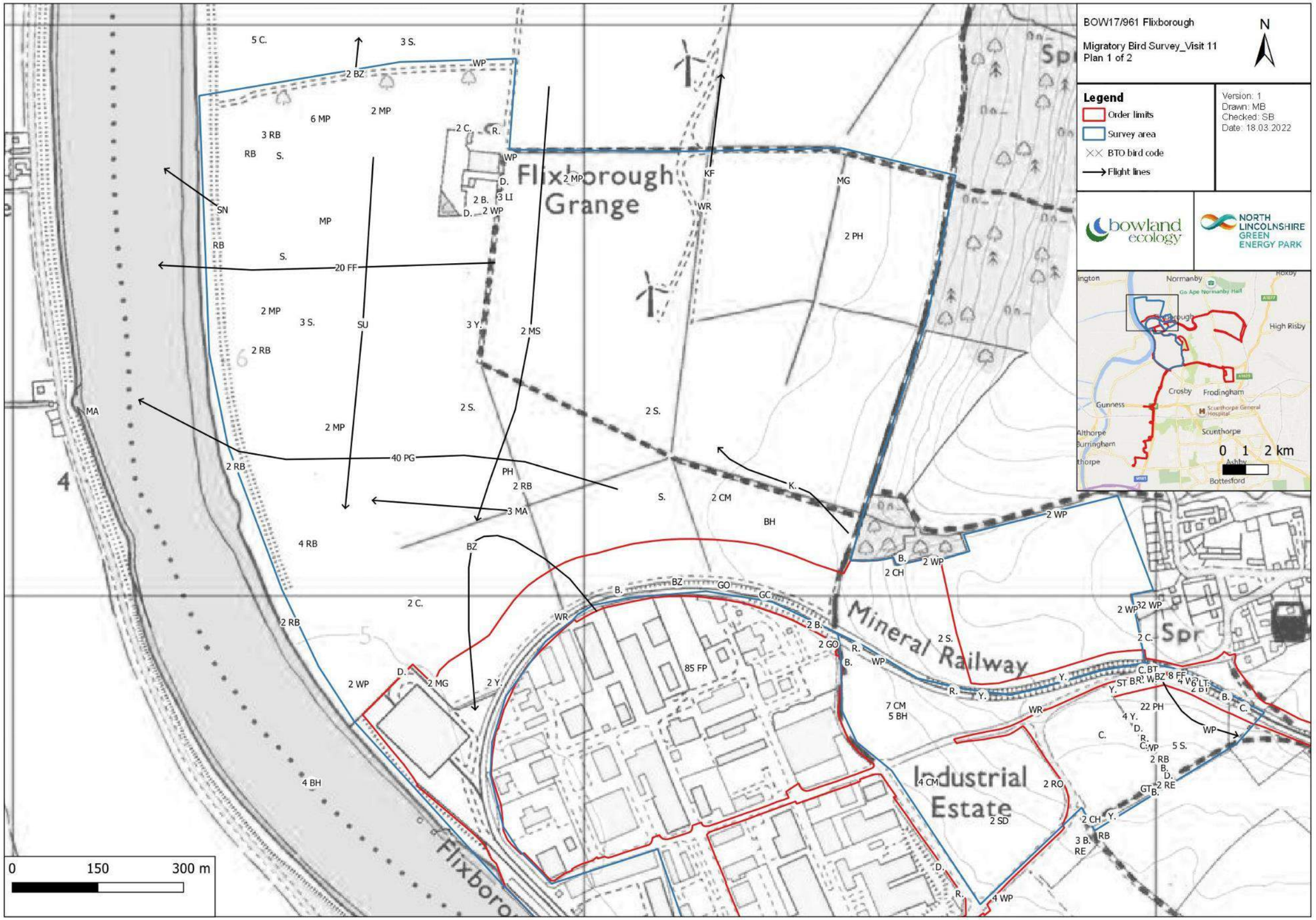
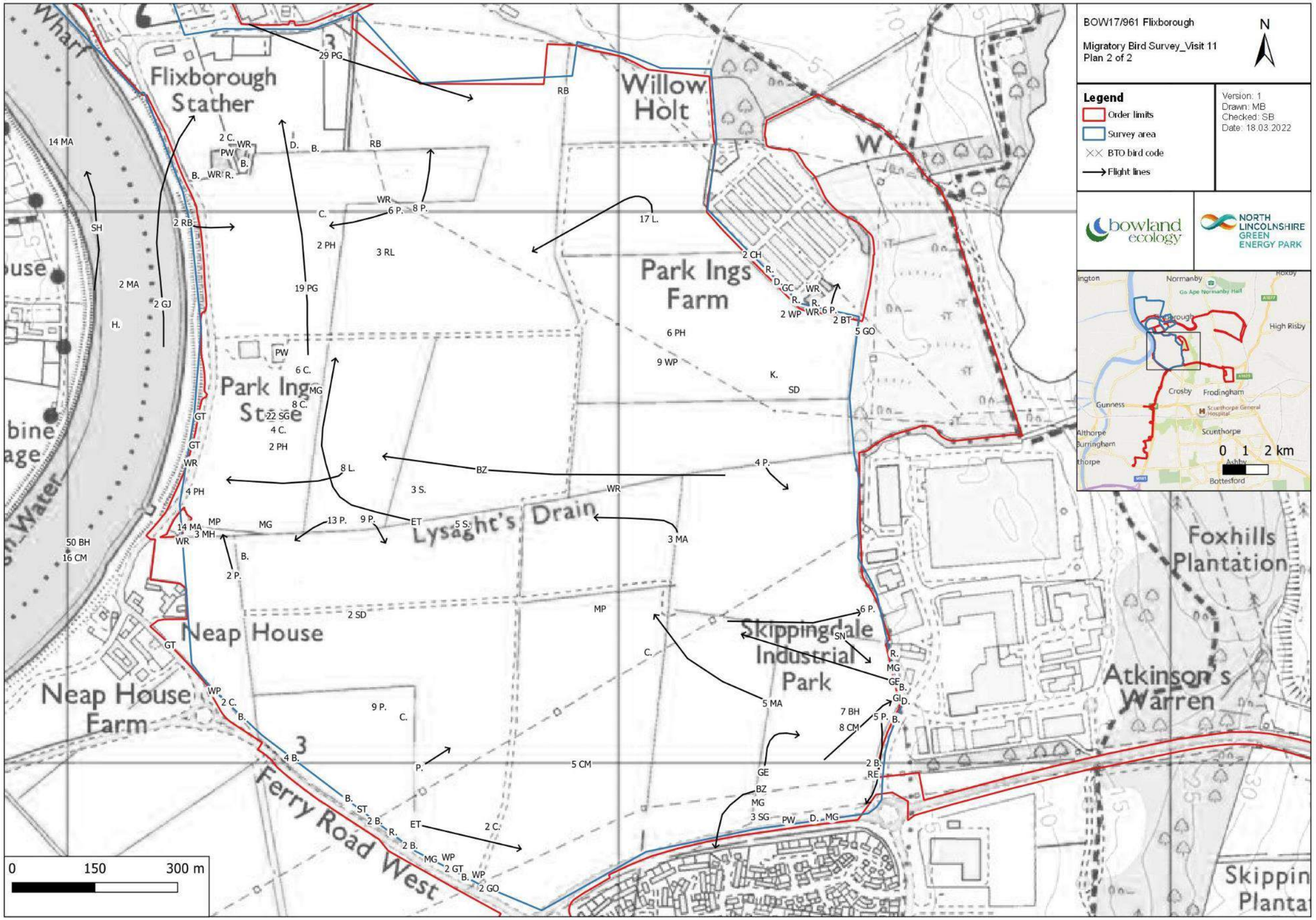
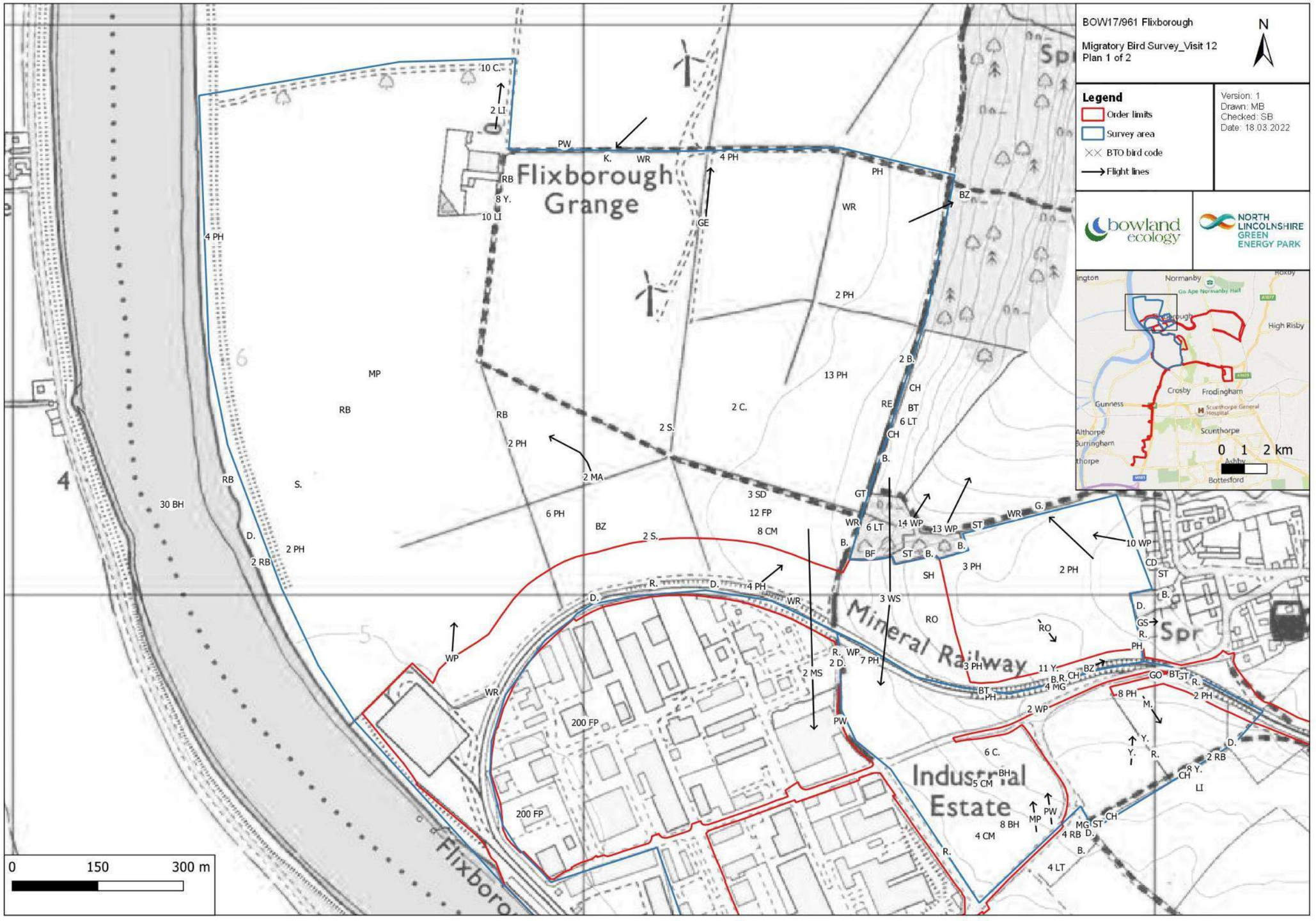
Legend
Order limits
Survey area
BTO bird code
Flight lines
Version: 2
Drawn: MB
Checked: SB
Date: 24.01.2022
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK
0 1 2 km
Flixborough Stather
Willow Holt
Park Ings Farm
Park Ings Store
Lysaght's Drain
Neap House
Neap House Farm
Skippingdale Industrial Park
Foxhills Plantation
Atkinson's Warren
Ferry Road West
0 150 300 m

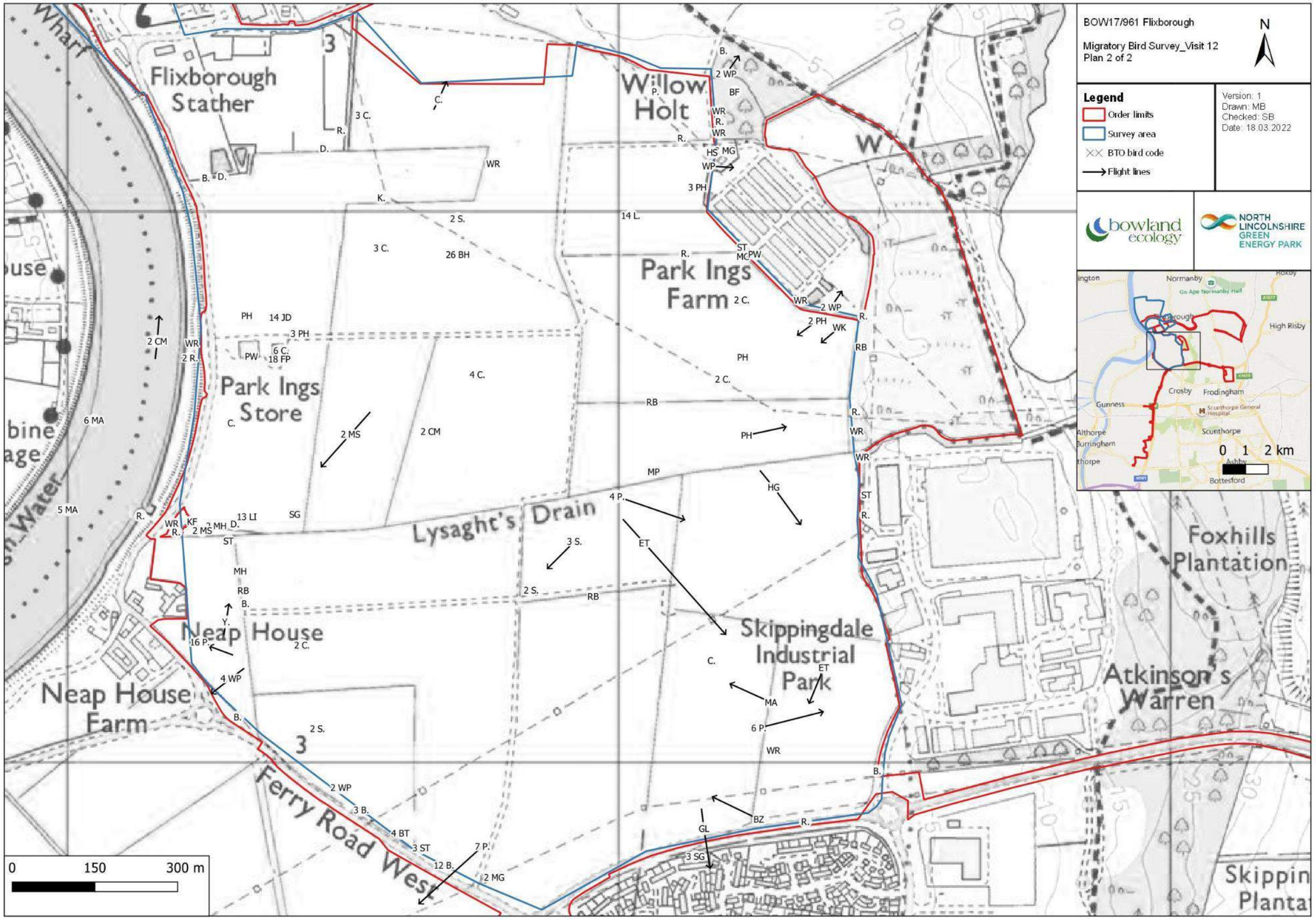

BOW17/961 Flixborough
Migratory Bird Survey_Visit 10
Plan 1 of 2
N
Legend
Order limits
Survey area
BTO bird code
Flight lines
Version: 2
Drawn: MB
Checked: SB
Date: 24.01.2022
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK
Flixborough Grange
Mineral Railway
Industrial Estate
Normanby
High Risby
Crosby
Frodingham
Gunness
Scunthorpe
Althorpe
Burringham
Ashby
Bottesford
0 1 2 km
0 150 300 m

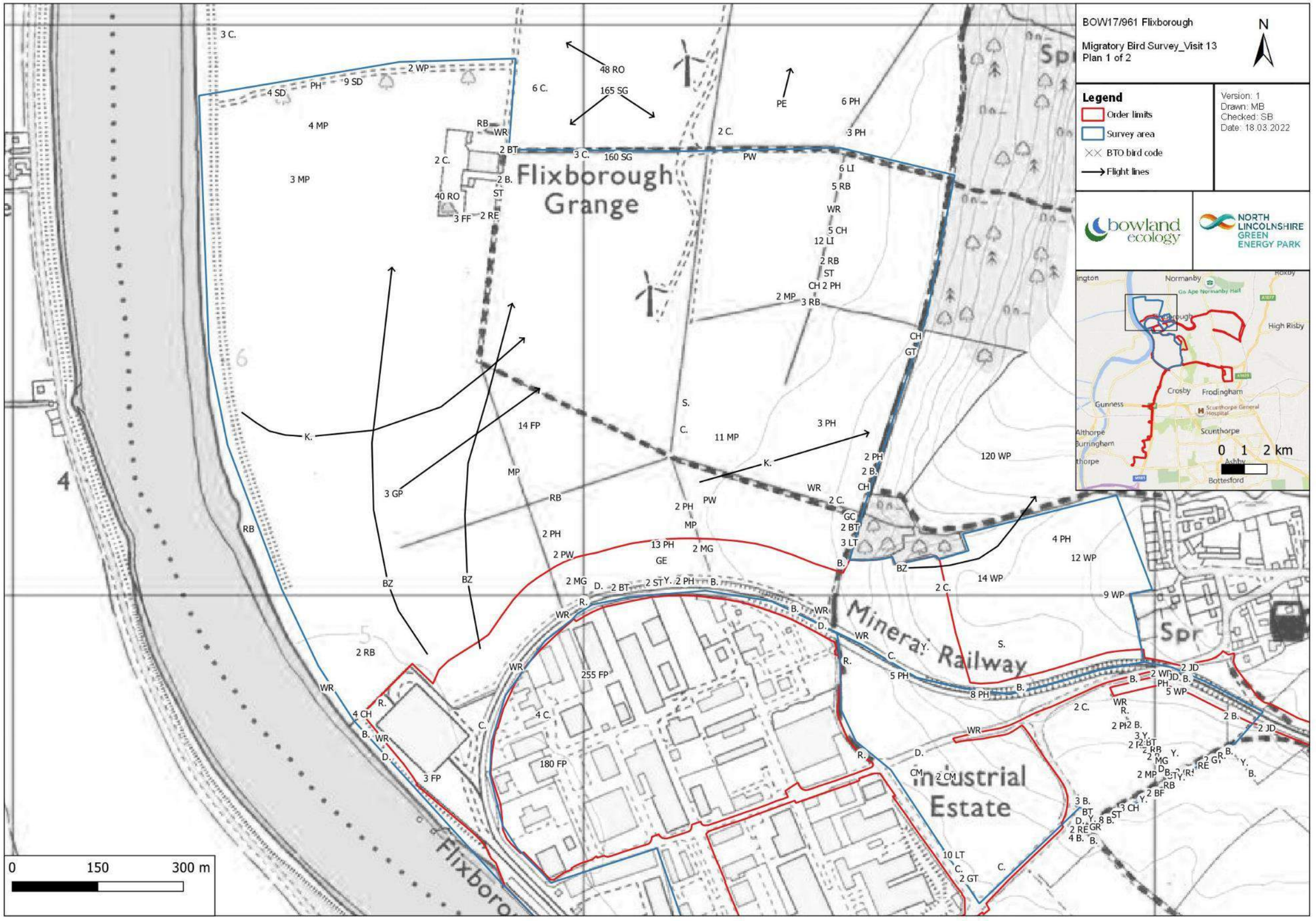

BOW17/961 Flixborough
Migratory Bird Survey_Visit 10
Plan 2 of 2
N
Legend
Order Limits
Survey area
BTO bird code
Flight lines
Version: 2
Drawn: MB
Checked: SB
Date: 24.01.2022
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK
Flixborough Stather
Willow Holt
Park Ings Farm
Park Ings Store
Neap House
Neap House Farm
Skippingdale Industrial Park
Foxhills Plantation
Atkinson's Warren
Lysaght's Drain
Ferry Road West
Normanby
High Risby
Crosby
Frodingham
Gunness
Scunthorpe
Bottesford
0 1 2 km
0 150 300 m


BOW17/961 Flixborough
Migratory Bird Survey_Visit 11
Plan 1 of 2
N
Legend
Order limits
Survey area
BTO bird code
Flight lines
Version: 1
Drawn: MB
Checked: SB
Date: 18.03.2022
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK
Flixborough Grange
Mineral Railway
Industrial Estate
Normanby
High Risby
Crosby
Frodingham
Scunthorpe
Gunness
Althorpe
Burringham
Bottesford
0 1 2 km
0 150 300 m


BOW17/961 Flixborough
Migratory Bird Survey_Visit 11
Plan 2 of 2
N
Legend
Order limits
Survey area
BTO bird code
Flight lines
Version: 1
Drawn: MB
Checked: SB
Date: 18.03.2022
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK
Flixborough Stather
Willow Holt
Park Ings Farm
Park Ings Stone
Lysaght's Drain
Neap House
Neap House Farm
Ferry Road West
Skippingdale Industrial Park
Foxhills Plantation
Atkinson's Warren
Normanby
High Risby
Crosby
Frodingham
Scunthorpe
Bottesford
0 1 2 km
0 150 300 m


BOW17/961 Flixborough
Migratory Bird Survey_Visit 12
Plan 1 of 2
N
Legend
Order limits
Survey area
BTO bird code
Flight lines
Version: 1
Drawn: MB
Checked: SB
Date: 18.03.2022
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK
Flixborough Grange
Mineral Railway
Industrial Estate
Normanby
High Risby
Crosby
Frodingham
Gunness
Scunthorpe
Althorpe
Burringham
Ashby
Bottesford
0 1 2 km
0 150 300 m


BOW17/961 Flixborough
Migratory Bird Survey_Visit 12
Plan 2 of 2
N
Legend
Order limits
Survey area
BTO bird code
Flight lines
Version: 1
Drawn: MB
Checked: SB
Date: 18.03.2022
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK
Flixborough Stather
Willow Holt
Park Ings Farm
Park Ings Store
Lysaght's Drain
Neap House
Neap House Farm
Skippingdale Industrial Park
Foxhills Plantation
Atkinson's Warren
Ferry Road West
Normanby
High Risby
Crosby
Frodingham
Gunness
Scunthorpe
Bottesford
0 1 2 km
0 150 300 m


BOW17/961 Flixborough
Migratory Bird Survey_Visit 13
Plan 1 of 2
N
Legend
Order limits
Survey area
BTO bird code
Flight lines
Version: 1
Drawn: MB
Checked: SB
Date: 18.03.2022
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK
Flixborough Grange
Mineral Railway
Industrial Estate
Normanby
High Risby
Crosby
Frodingham
Gunness
Scunthorpe
Althorpe
Burringham
Ashby
Bottesford
0 1 2 km
0 150 300 m

BOW17/961 Flixborough

Migratory Bird Survey_Visit 13
Plan 2 of 2

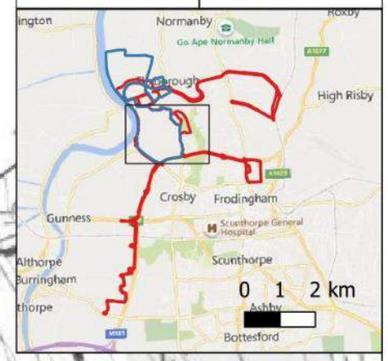
N

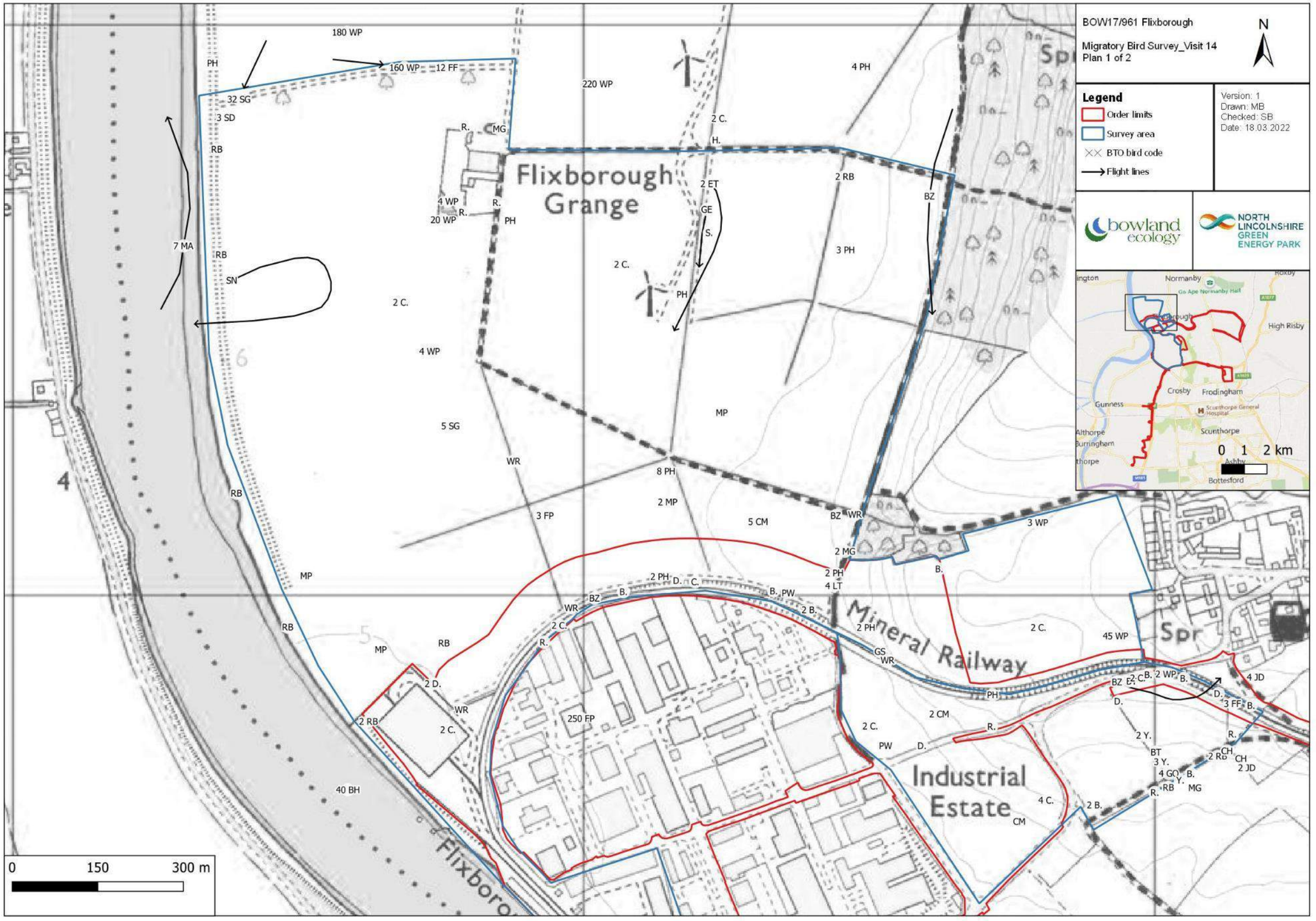
Legend
- Order limits
- Survey area
- BTO bird code
- Flight lines

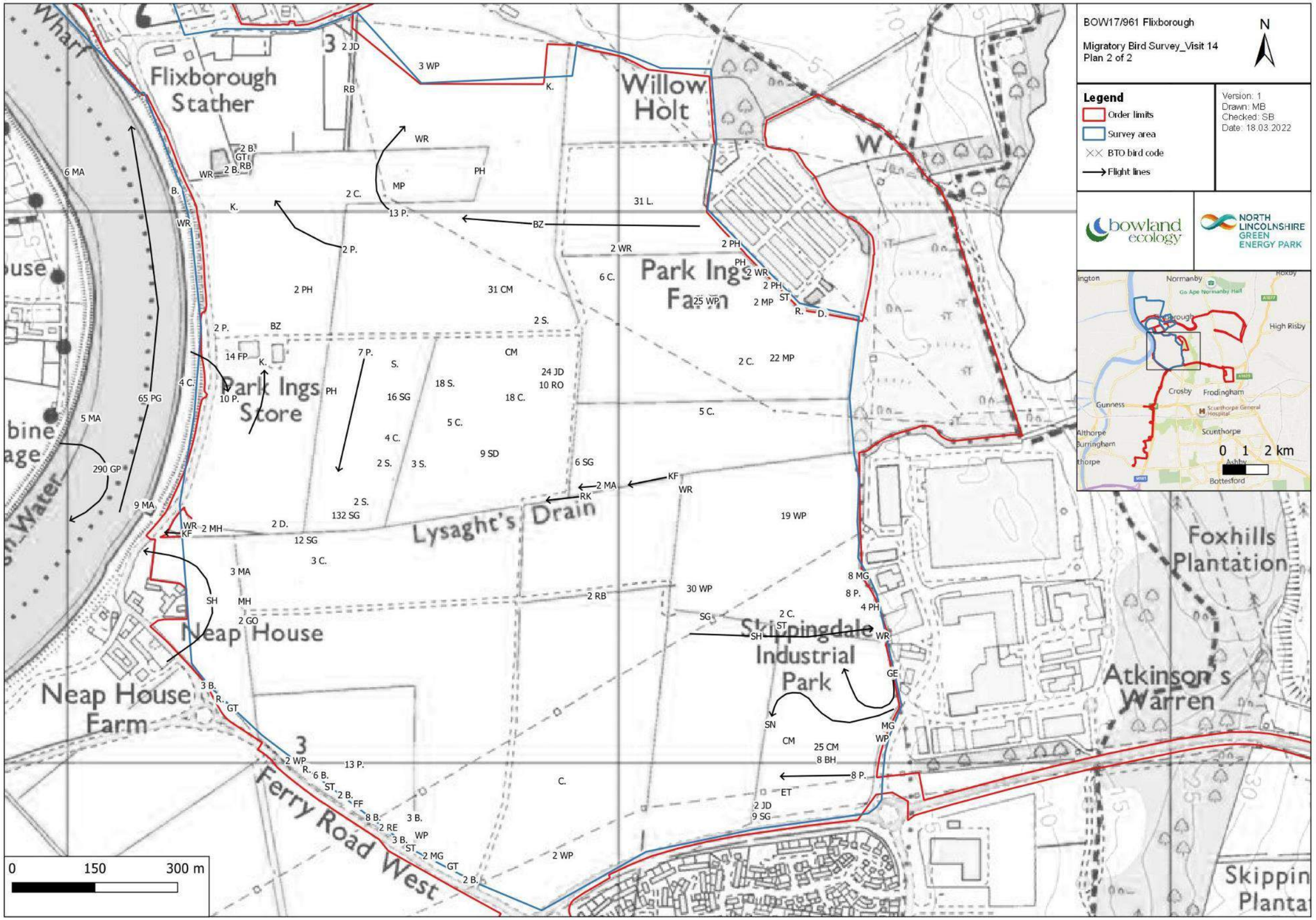
Version: 1
Drawn: MB
Checked: SB
Date: 18.03.2022

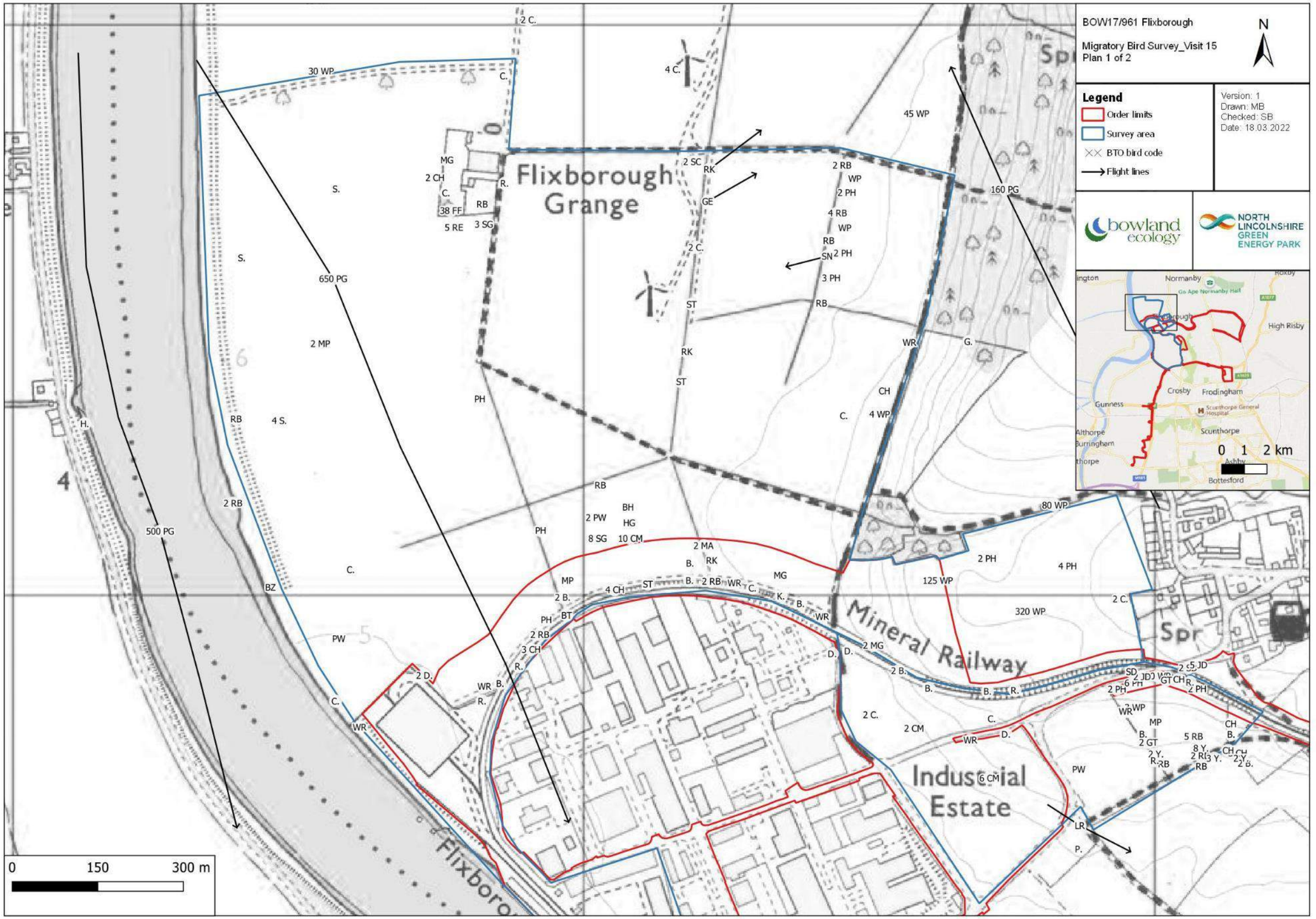
bowland ecology

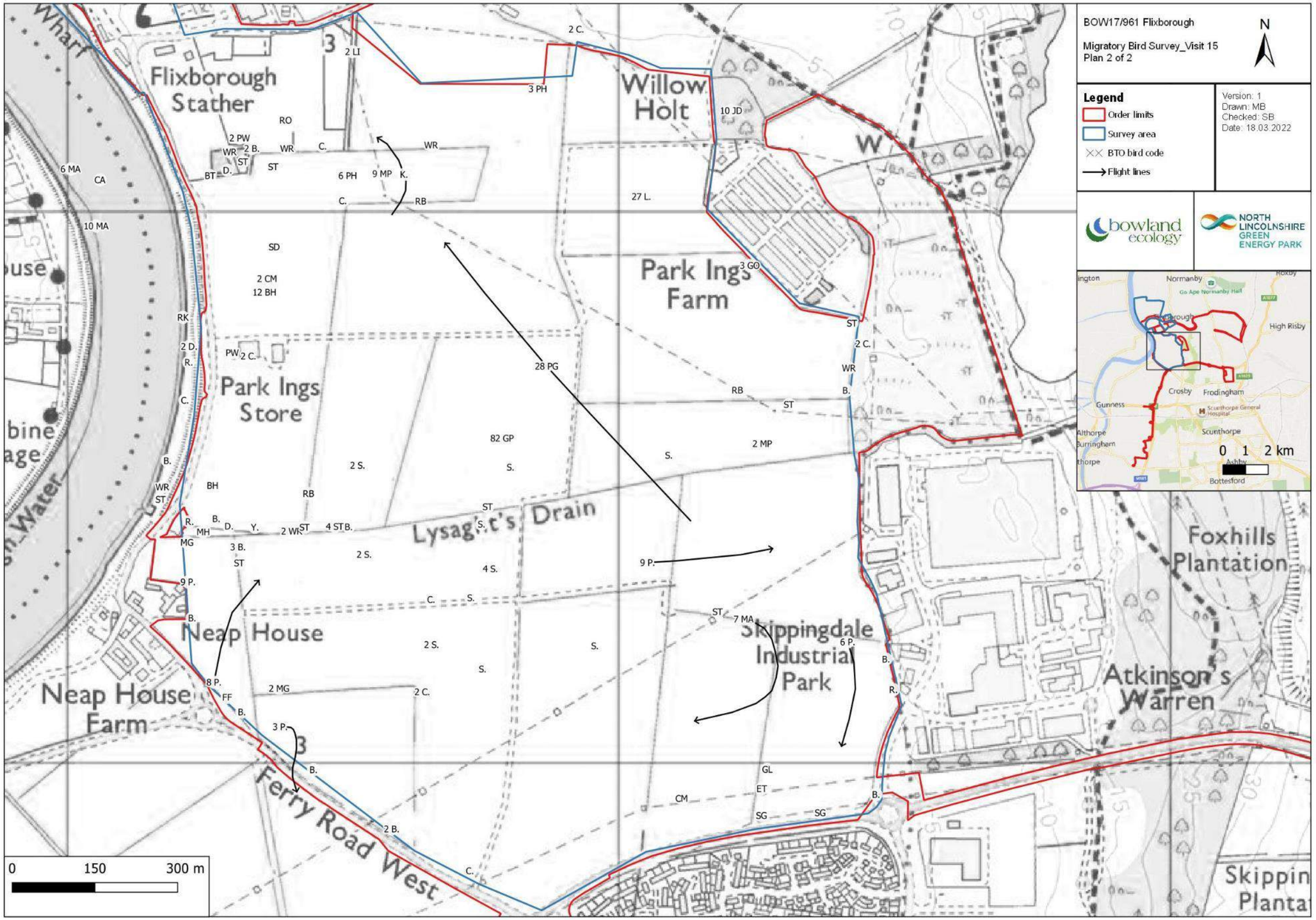
NORTH LINCOLNSHIRE GREEN ENERGY PARK

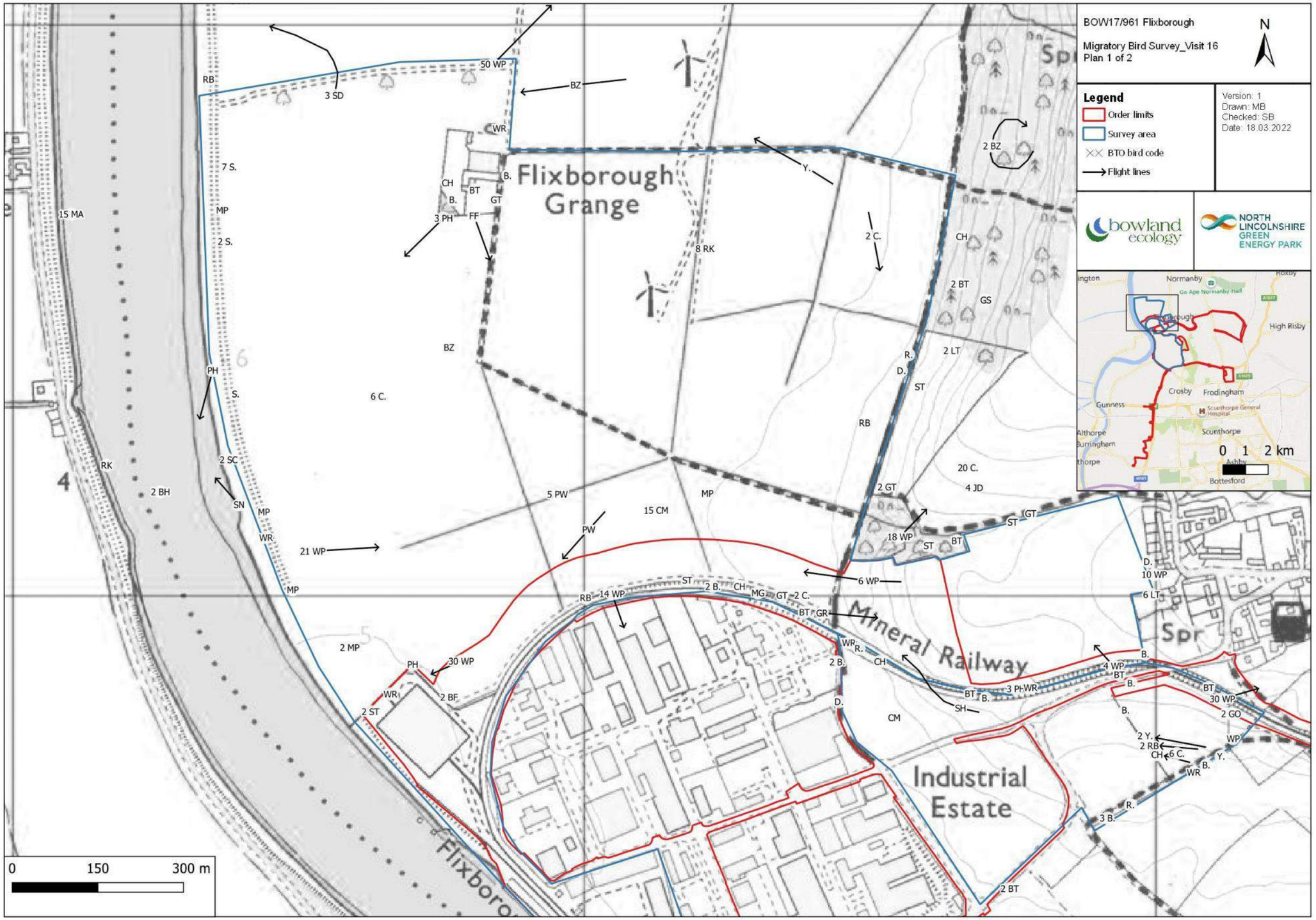


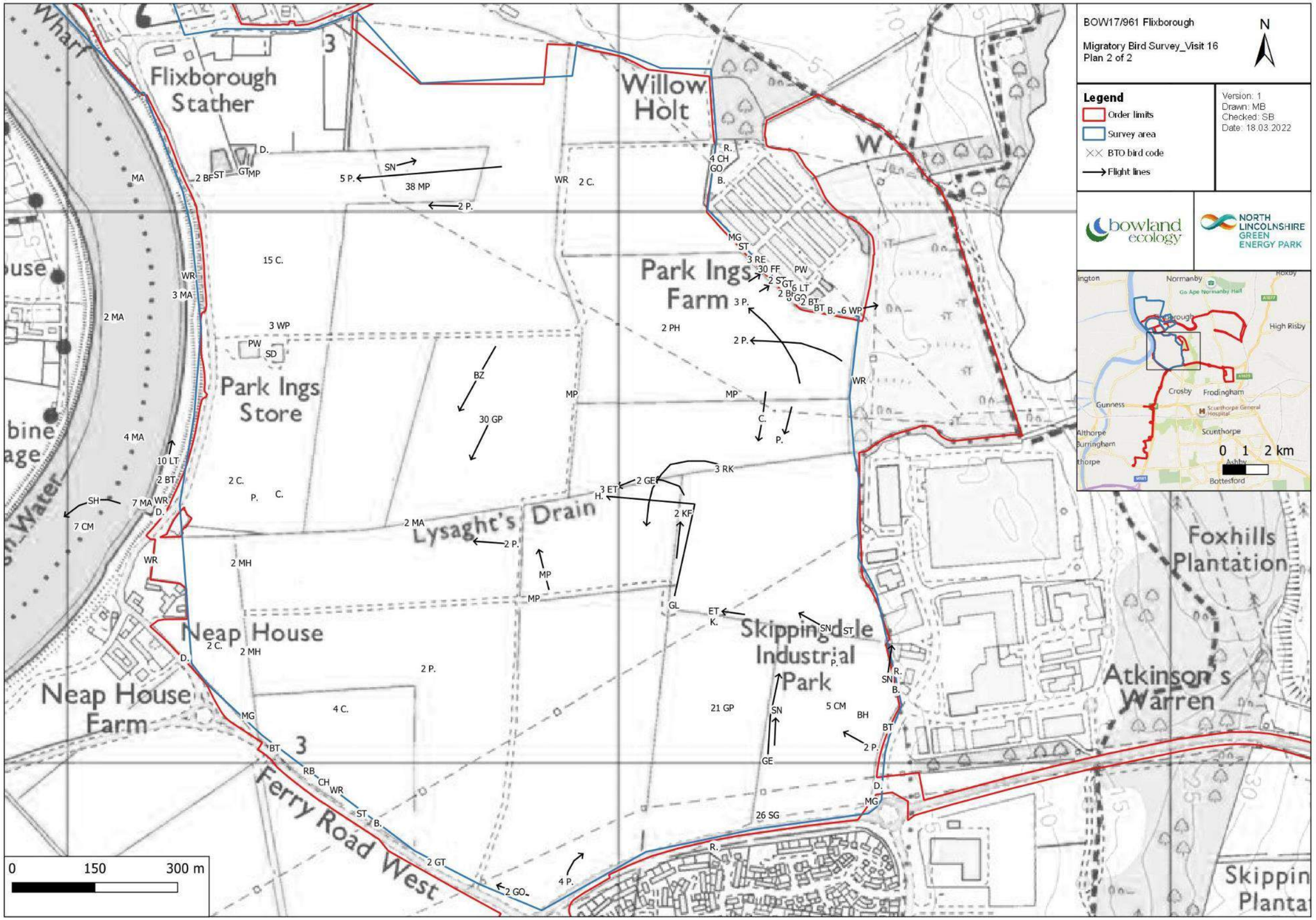

BOW17/961 Flixborough
Migratory Bird Survey_Visit 14
Plan 1 of 2
N
Legend
Order limits
Survey area
BTO bird code
Flight lines
Version: 1
Drawn: MB
Checked: SB
Date: 18.03.2022
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK
Flixborough Grange
Mineral Railway
Industrial Estate
Normanby
High Risby
Crosby
Frodingham
Gunness
Scunthorpe
Althorpe
Burringham
Ashby
Bottesford
0 1 2 km
0 150 300 m
180 WP
160 WP
12 FF
220 WP
32 SG
3 SD
RB
7 MA
SN
4 WP
20 WP
2 C.
4 PH
3 PH
2 RB
BZ
2 ET
GE
S.
H.
2 MG
2 PH
4 LT
5 SG
WR
8 PH
2 MP
3 FP
5 CM
MP
40 BH
250 FP
2 CM
45 WP
3 WP
2 B.
2 D.
2 Y.
4 JD
2 JD
3 FF
4 C.
CM

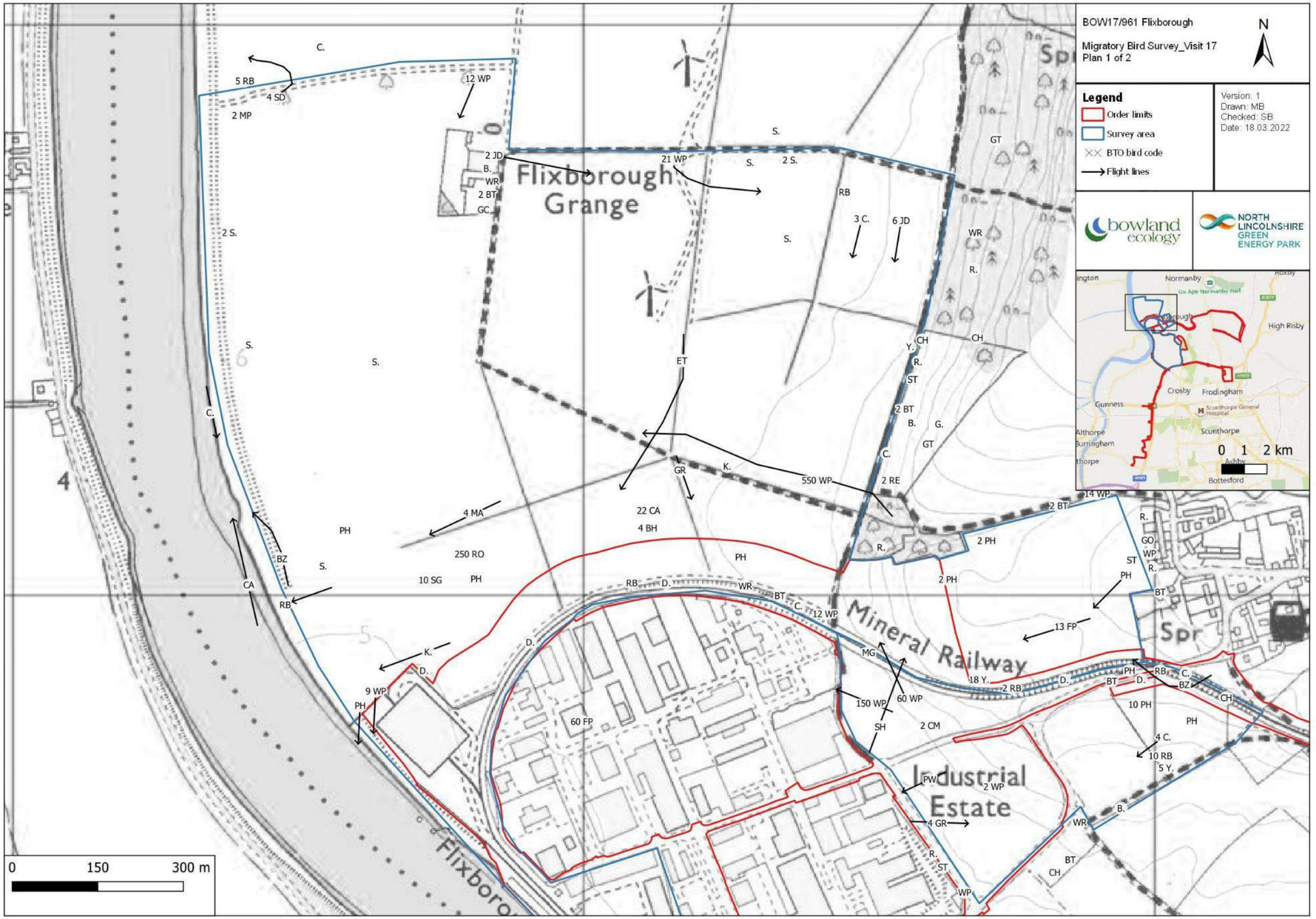

BOW17/961 Flixborough
Migratory Bird Survey_Visit 14
Plan 2 of 2
N
Legend
Order limits
Survey area
BTO bird code
Flight lines
Version: 1
Drawn: MB
Checked: SB
Date: 18.03.2022
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK
Flixborough Stather
Willow Holt
Park Ings Farm
Park Ings Store
Lysaght's Drain
Neap House
Neap House Farm
Skippingdale Industrial Park
Foxhills Plantation
Atkinson's Warren
Ferry Road West
Normanby
High Risby
Crosby
Frodingham
Gunness
Scunthorpe
Bottesford
0 1 2 km
0 150 300 m

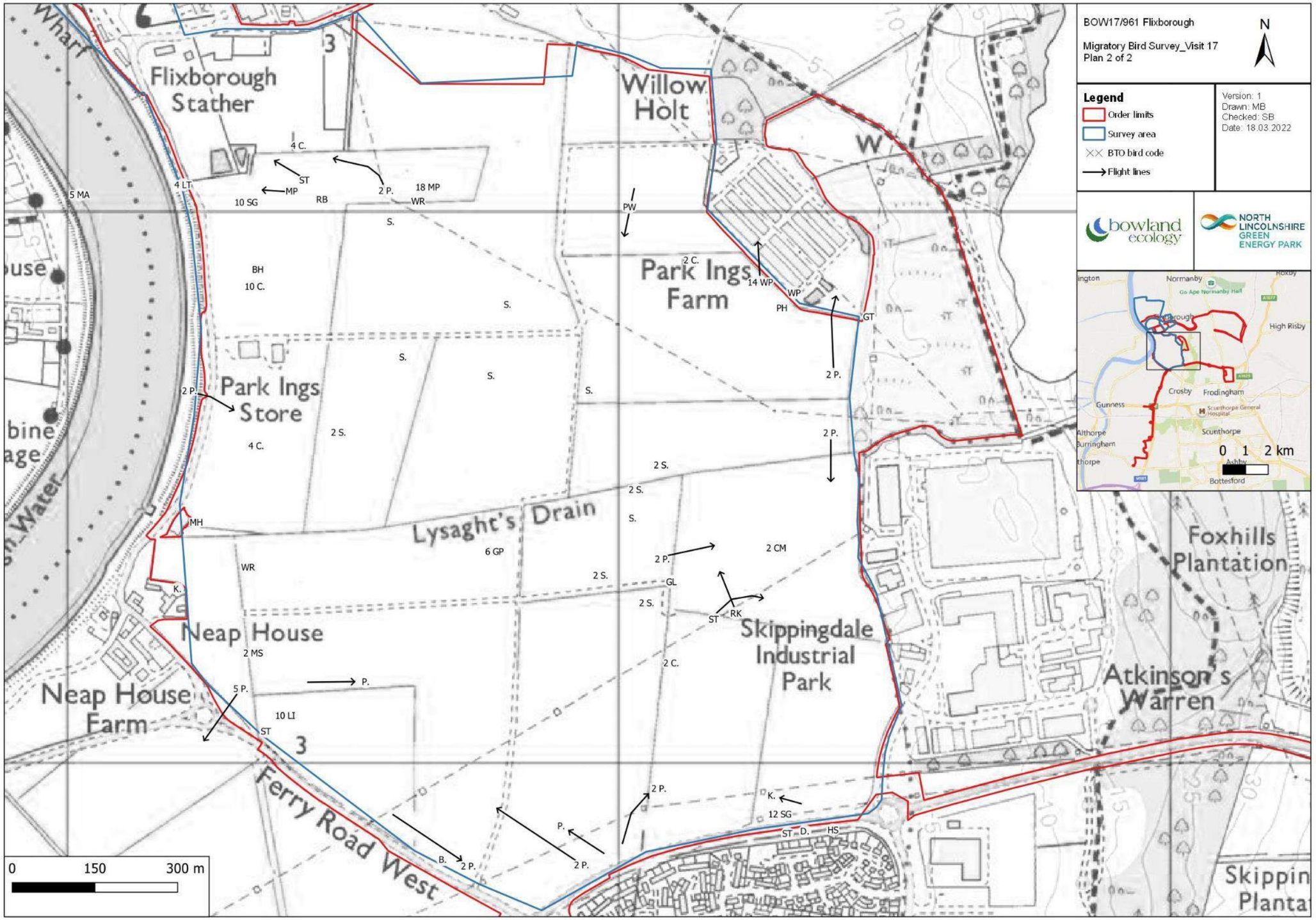

BOW17/961 Flixborough
Migratory Bird Survey_Visit 15
Plan 1 of 2
N
Legend
Order limits
Survey area
BTO bird code
Flight lines
Version: 1
Drawn: MB
Checked: SB
Date: 18.03.2022
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK
Flixborough Grange
Mineral Railway
Industrial Estate
Flixboro
Normanby
High Risby
Crosby
Frodingham
Gunness
Scunthorpe
Althorpe
Burringham
Ashby
Bottesford
0 1 2 km
0 150 300 m

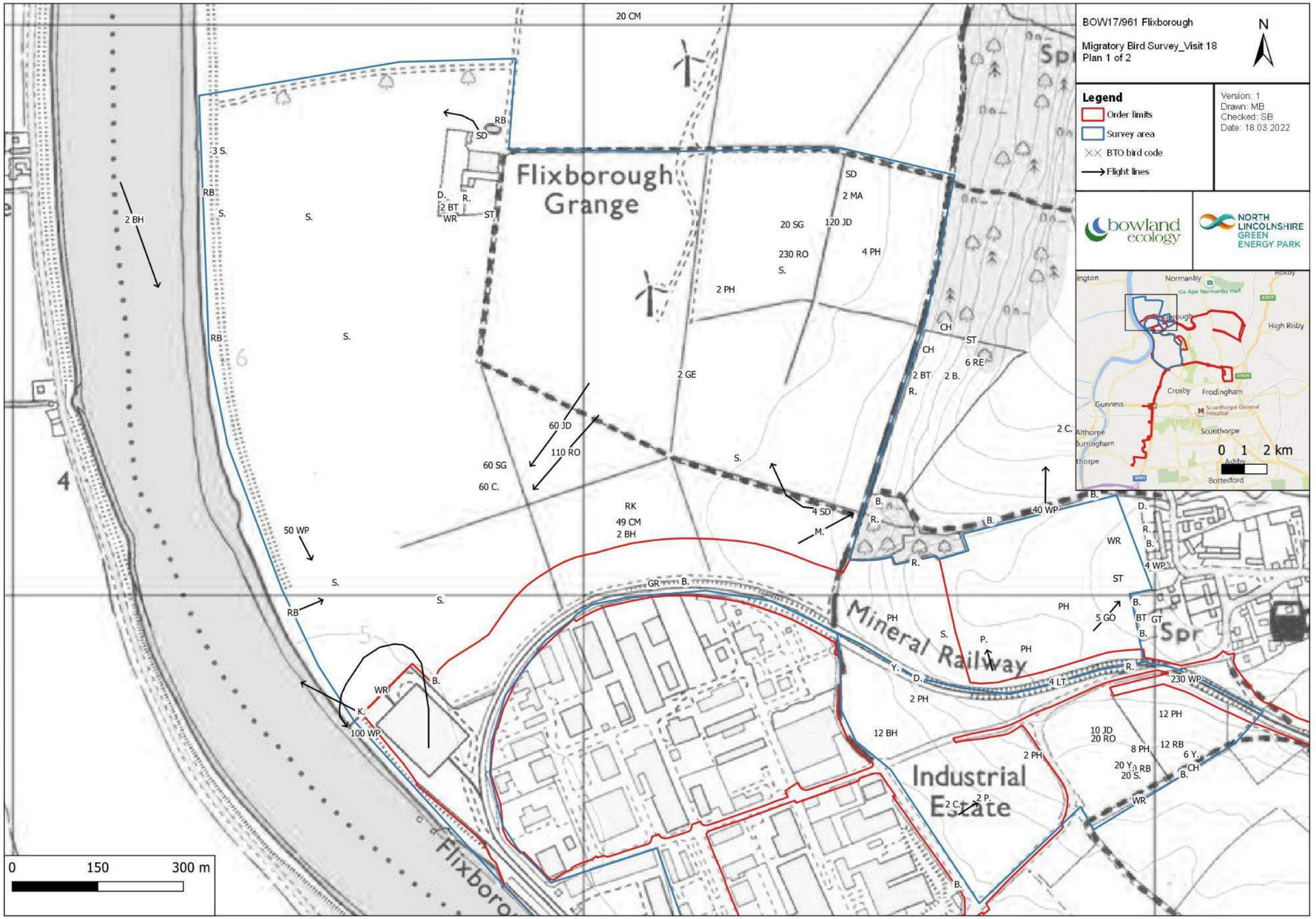

BOW17/961 Flixborough
Migratory Bird Survey_Visit 15
Plan 2 of 2
N
Legend
Order limits
Survey area
BTO bird code
Flight lines
Version: 1
Drawn: MB
Checked: SB
Date: 18.03.2022
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK
Flixborough Stather
Willow Holt
Park Ings Farm
Park Ings Store
Neap House
Neap House Farm
Skippingdale Industrial Park
Foxhills Plantation
Atkinson's Warren
Ferry Road West
Lysaght's Drain
Normanby
High Risby
Crosby
Frodingham
Gunness
Scunthorpe
Bottesford
0 1 2 km
0 150 300 m

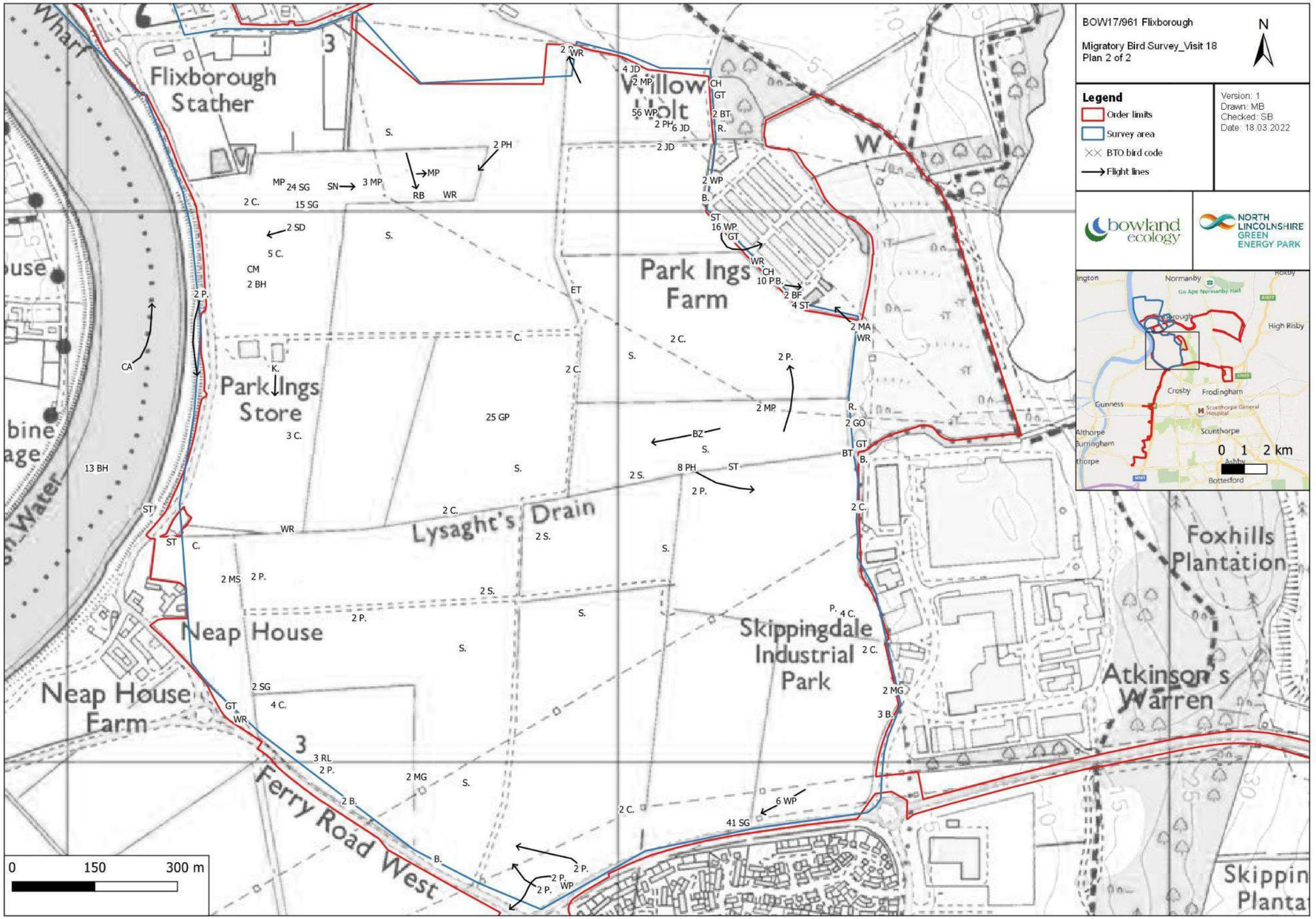

BOW17/961 Flixborough
Migratory Bird Survey_Visit 16
Plan 1 of 2
N
Legend
Order limits
Survey area
BTO bird code
Flight lines
Version: 1
Drawn: MB
Checked: SB
Date: 18.03.2022
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK
Flixborough Grange
Mineral Railway
Industrial Estate
Normanby
High Risby
Crosby
Frodingham
Scunthorpe
Gunness
Althorpe
Burringham
Bottesford
0 1 2 km
0 150 300 m

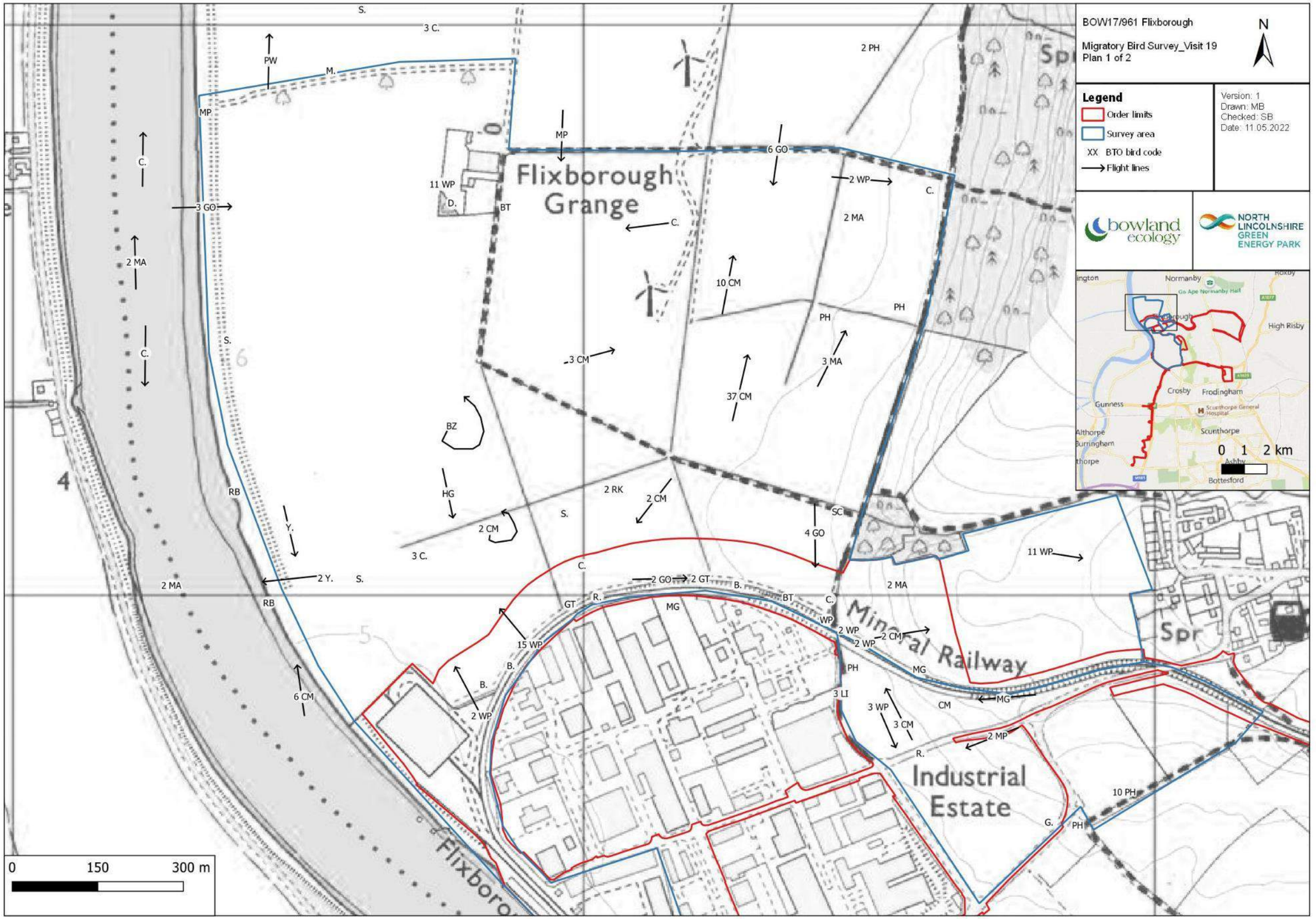

BOW17/961 Flixborough
Migratory Bird Survey_Visit 16
Plan 2 of 2
N
Legend
Order limits
Survey area
BTO bird code
Flight lines
Version: 1
Drawn: MB
Checked: SB
Date: 18.03.2022
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK
Flixborough Stather
Willow Holt
Park Ings Farm
Park Ings Store
Lysaght's Drain
Neap House
Neap House Farm
Skippingdale Industrial Park
Foxhills Plantation
Atkinson's Warren
Ferry Road West
Normanby
High Risby
Crosby
Frodingham
Gunness
Scunthorpe
Bottesford
0 1 2 km
0 150 300 m

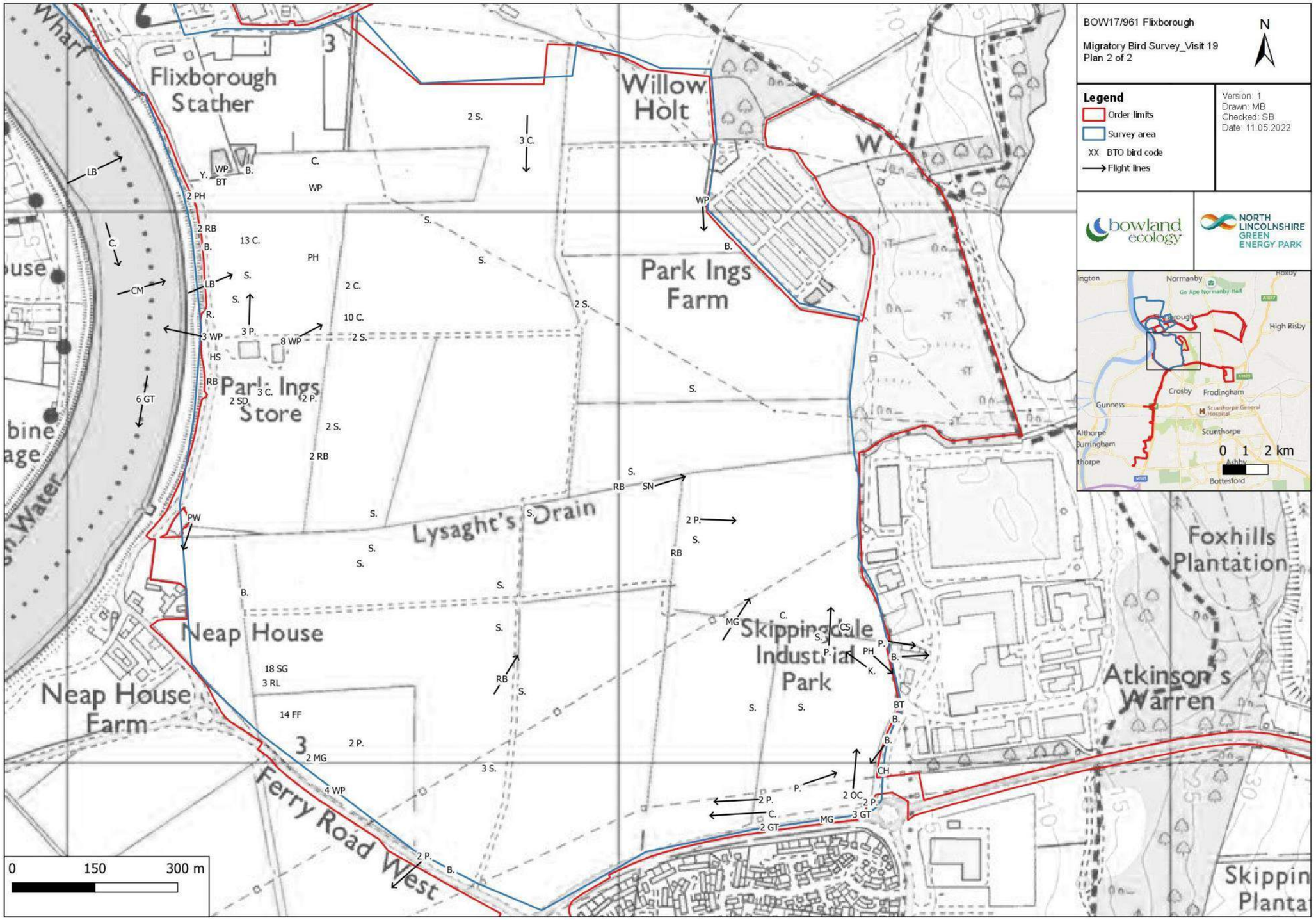

BOW17/961 Flixborough
Migratory Bird Survey_Visit 17
Plan 1 of 2
N
Legend
Order limits
Survey area
BTO bird code
Flight lines
Version: 1
Drawn: MB
Checked: SB
Date: 18.03.2022
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK
Flixborough Grange
Mineral Railway
Industrial Estate
Normanby
High Risby
Crosby
Frodingham
Scunthorpe
Gunness
Althorpe
Burringham
Bottesford
0 1 2 km
0 150 300 m

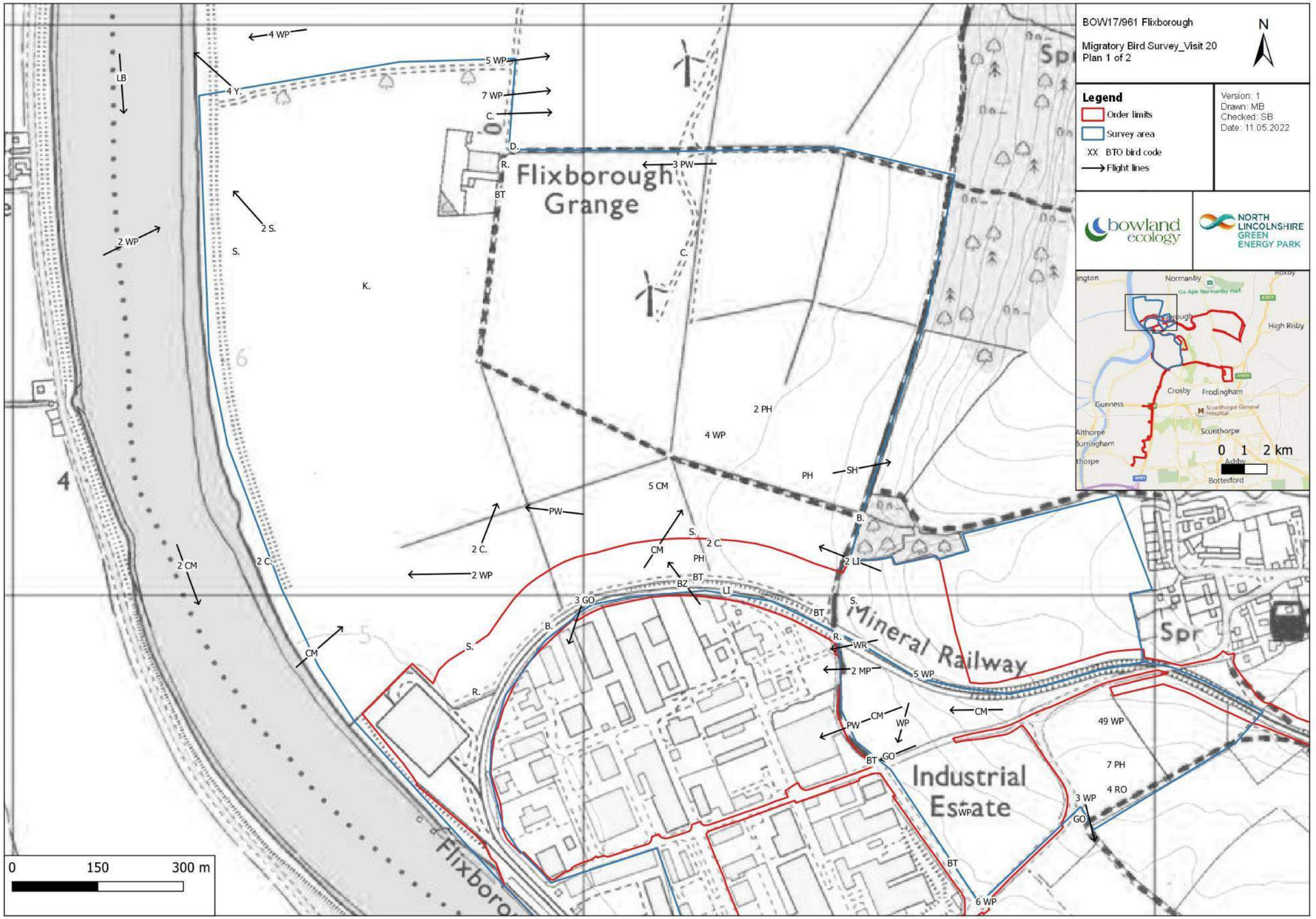

BOW17/961 Flixborough
Migratory Bird Survey_Visit 17
Plan 2 of 2
N
Legend
Order limits
Survey area
BTO bird code
Flight lines
Version: 1
Drawn: MB
Checked: SB
Date: 18.03.2022
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK
Flixborough Stather
Willow Holt
Park Ings Farm
Park Ings Store
Neap House
Neap House Farm
Skippingdale Industrial Park
Foxhills Plantation
Atkinson's Warren
Lysaght's Drain
Ferry Road West
Normanby
High Risby
Crosby
Frodingham
Scunthorpe
Bottesford
0 1 2 km
0 150 300 m

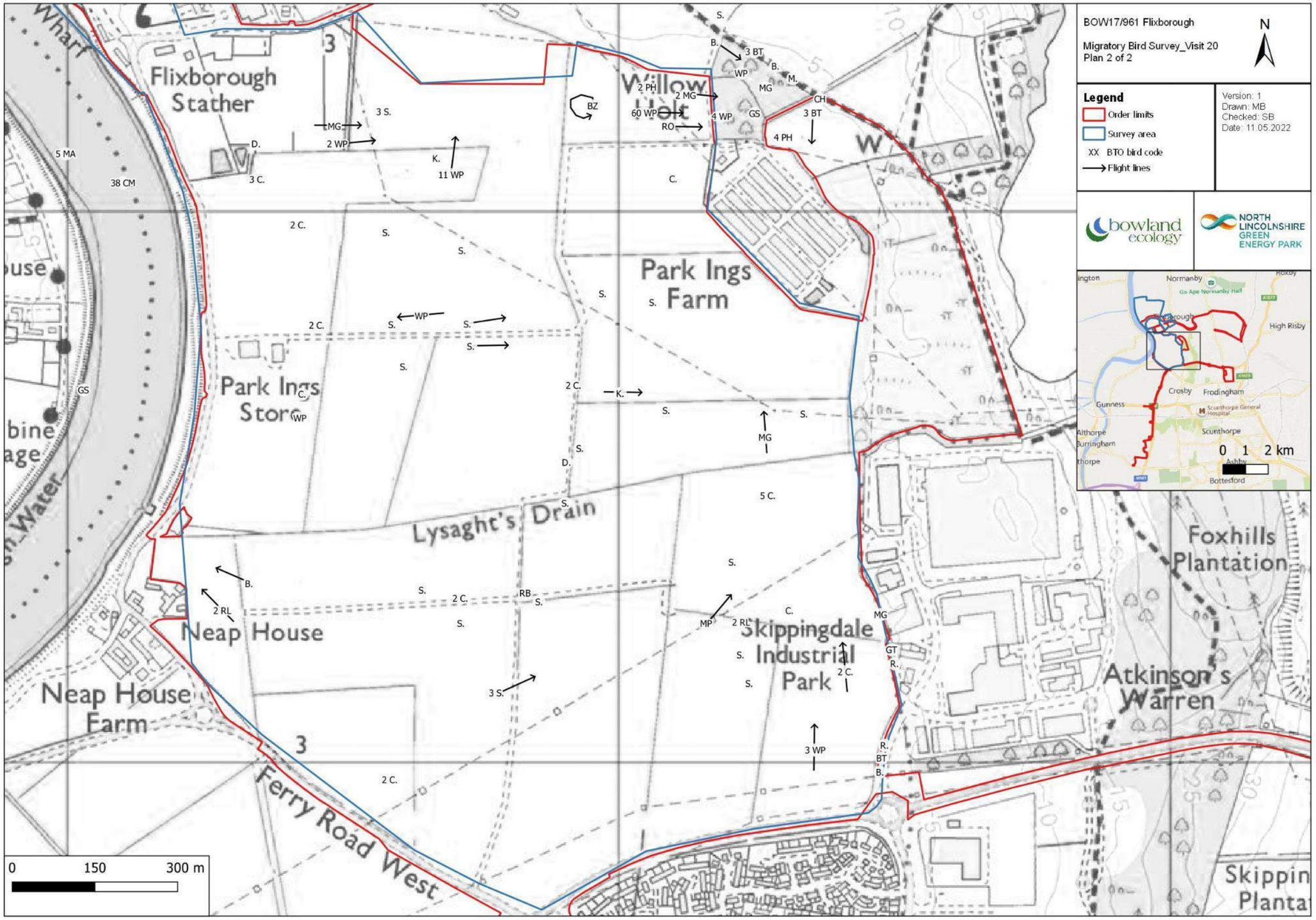

BOW17/961 Flixborough
Migratory Bird Survey_Visit 18
Plan 1 of 2
N
Legend
Order limits
Survey area
BTO bird code
Flight lines
Version: 1
Drawn: MB
Checked: SB
Date: 18.03.2022
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK
Flixborough Grange
Mineral Railway
Industrial Estate
Normanby
High Risby
Crosby
Frodingham
Scunthorpe
Bottesford
0 1 2 km
0 150 300 m


BOW17/961 Flixborough
Migratory Bird Survey_Visit 18
Plan 2 of 2
N
Legend
Order limits
Survey area
BTO bird code
Flight lines
Version: 1
Drawn: MB
Checked: SB
Date: 18.03.2022
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK
Flixborough Stather
Park Ings Farm
Park Ings Store
Willow Holt
Lysaght's Drain
Neap House
Neap House Farm
Skippingdale Industrial Park
Foxhills Plantation
Atkinson's Warren
Ferry Road West
Normanby
High Risby
Crosby
Frodingham
Gunness
Scunthorpe
Scunthorpe General Hospital
Althorpe
Burringham
Ashby
Bottesford
0 1 2 km
0 150 300 m


BOW17/961 Flixborough
Migratory Bird Survey_Visit 19
Plan 1 of 2
N
Legend
Order limits
Survey area
XX BTO bird code
Flight lines
Version: 1
Drawn: MB
Checked: SB
Date: 11.05.2022
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK
Flixborough Grange
Mineral Railway
Industrial Estate
Normanby
High Risby
Crosby
Frodingham
Gunness
Scunthorpe
Bottesford
0 1 2 km
0 150 300 m


BOW17/961 Flixborough
Migratory Bird Survey_Visit 19
Plan 2 of 2
N
Legend
Order limits
Survey area
XX BTO bird code
Flight lines
Version: 1
Drawn: MB
Checked: SB
Date: 11.05.2022
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK
Flixborough Stather
Willow Holt
Park Ings Farm
Parl. Ings Store
Lysaght's Drain
Neap House
Neap House Farm
Skippingdale Industrial Park
Foxhills Plantation
Atkinson's Warren
Ferry Road West
Normanby
High Risby
Crosby
Frodingham
Gunness
Scunthorpe
Bottesford
0 1 2 km
0 150 300 m


BOW17/961 Flixborough
Migratory Bird Survey_Visit 20
Plan 1 of 2
N
Legend
Order limits
Survey area
XX BTO bird code
Flight lines
Version: 1
Drawn: MB
Checked: SB
Date: 11.05.2022
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK
Flixborough Grange
Mineral Railway
Industrial Estate
Normanby
High Risby
Crosby
Frodingham
Gunness
Scunthorpe
Althorpe
Burringham
Ashby
Bottesford
0 1 2 km
0 150 300 m
4 WP
5 WP
7 WP
3 PW
2 WP
2 S.
2 PH
5 CM
2 C.
2 CM
2 LI
3 GO
2 MP
49 WP
7 PH
4 RO
3 WP
6 WP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Normanby
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Crosby
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Flixborough Stather
Park Ings Farm
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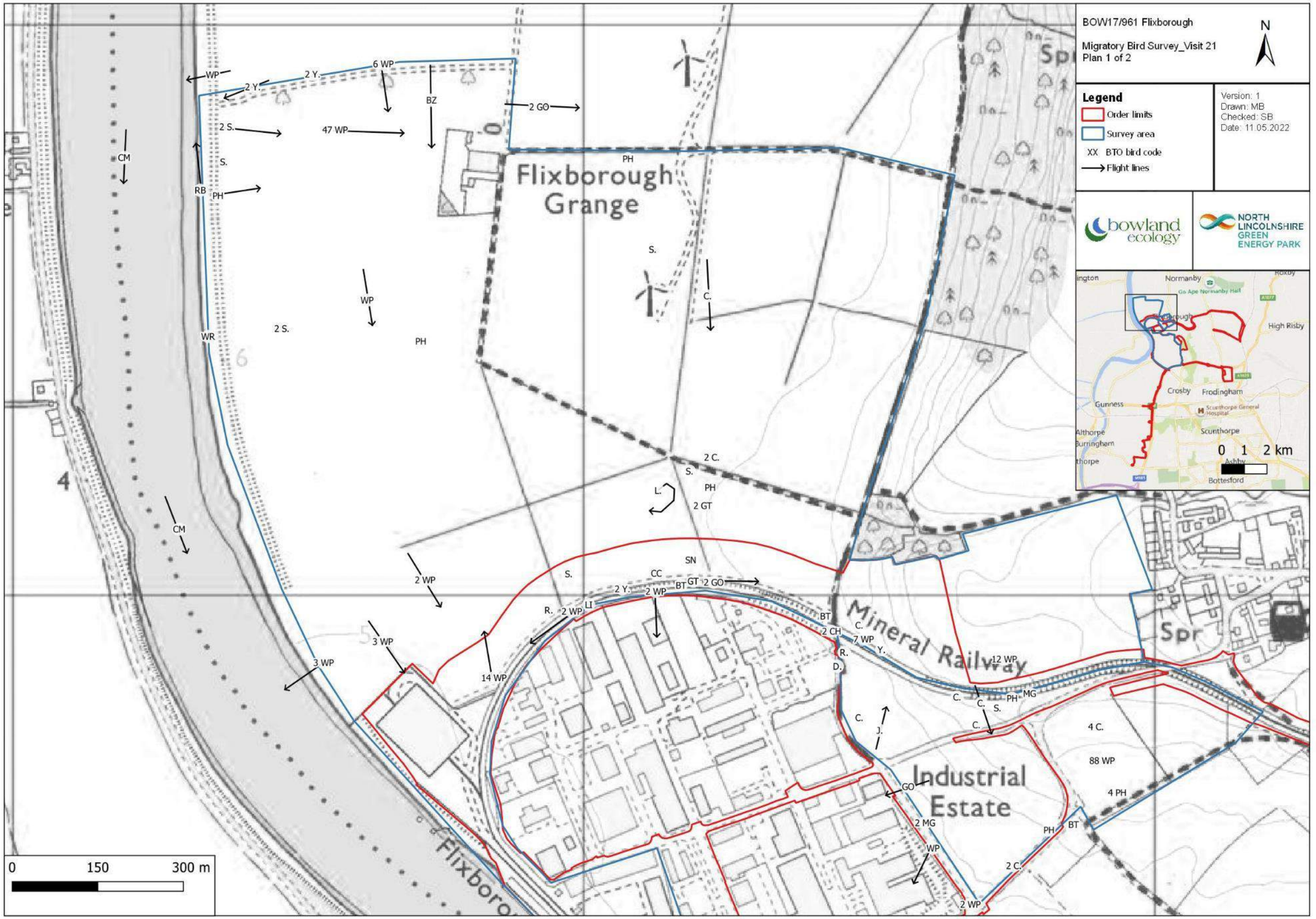
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Flixborough Grange
Mineral Railway
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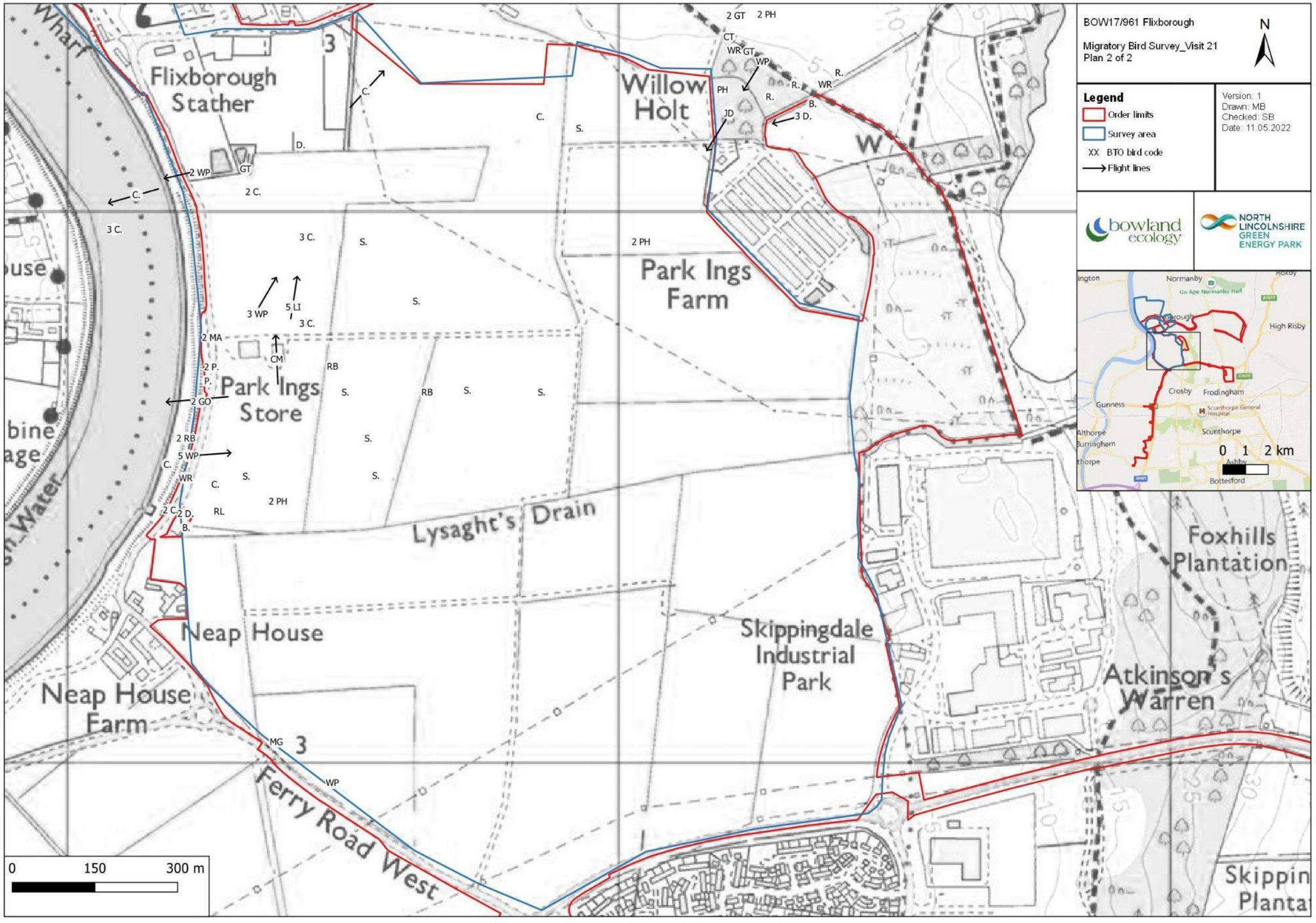
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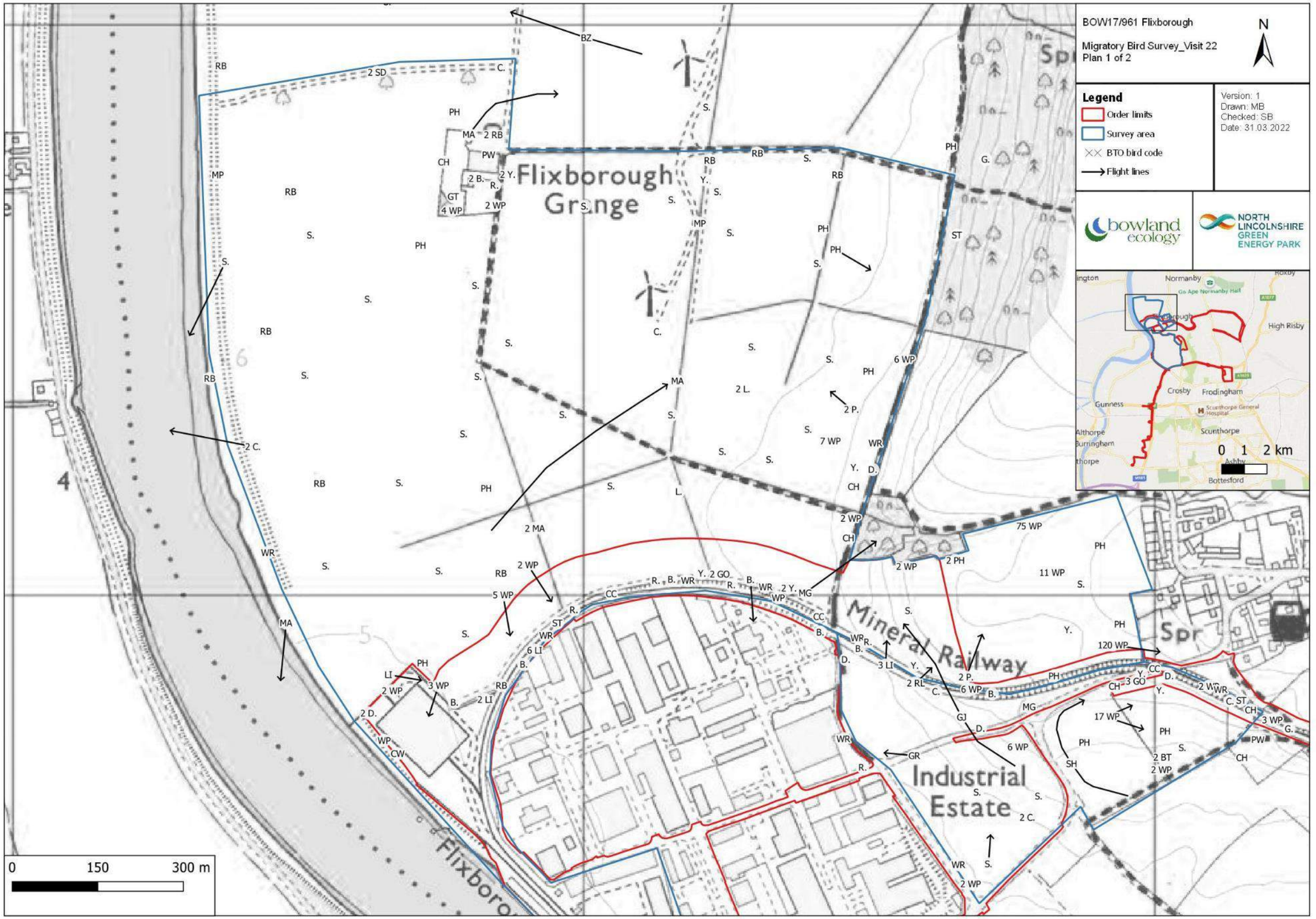
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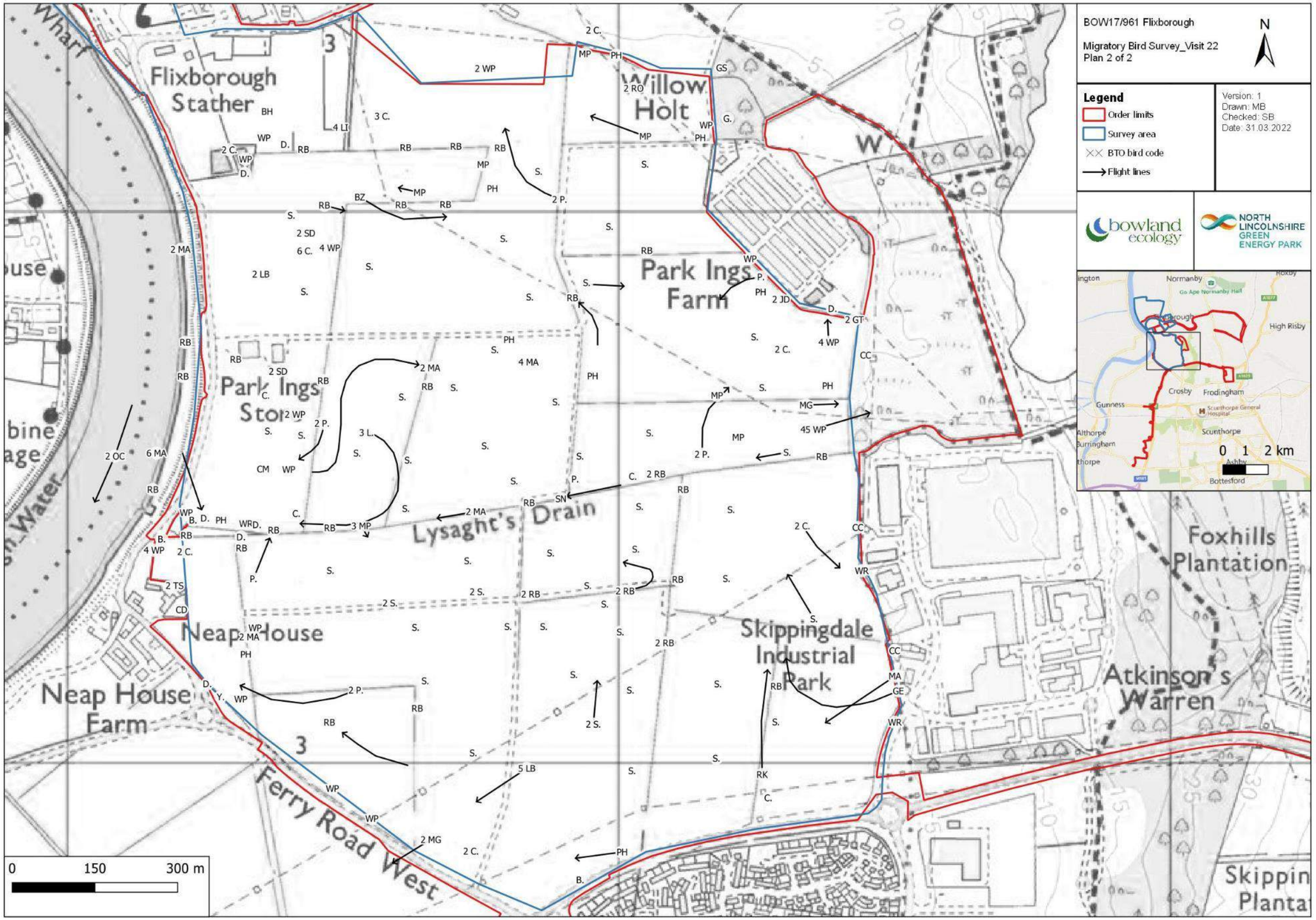
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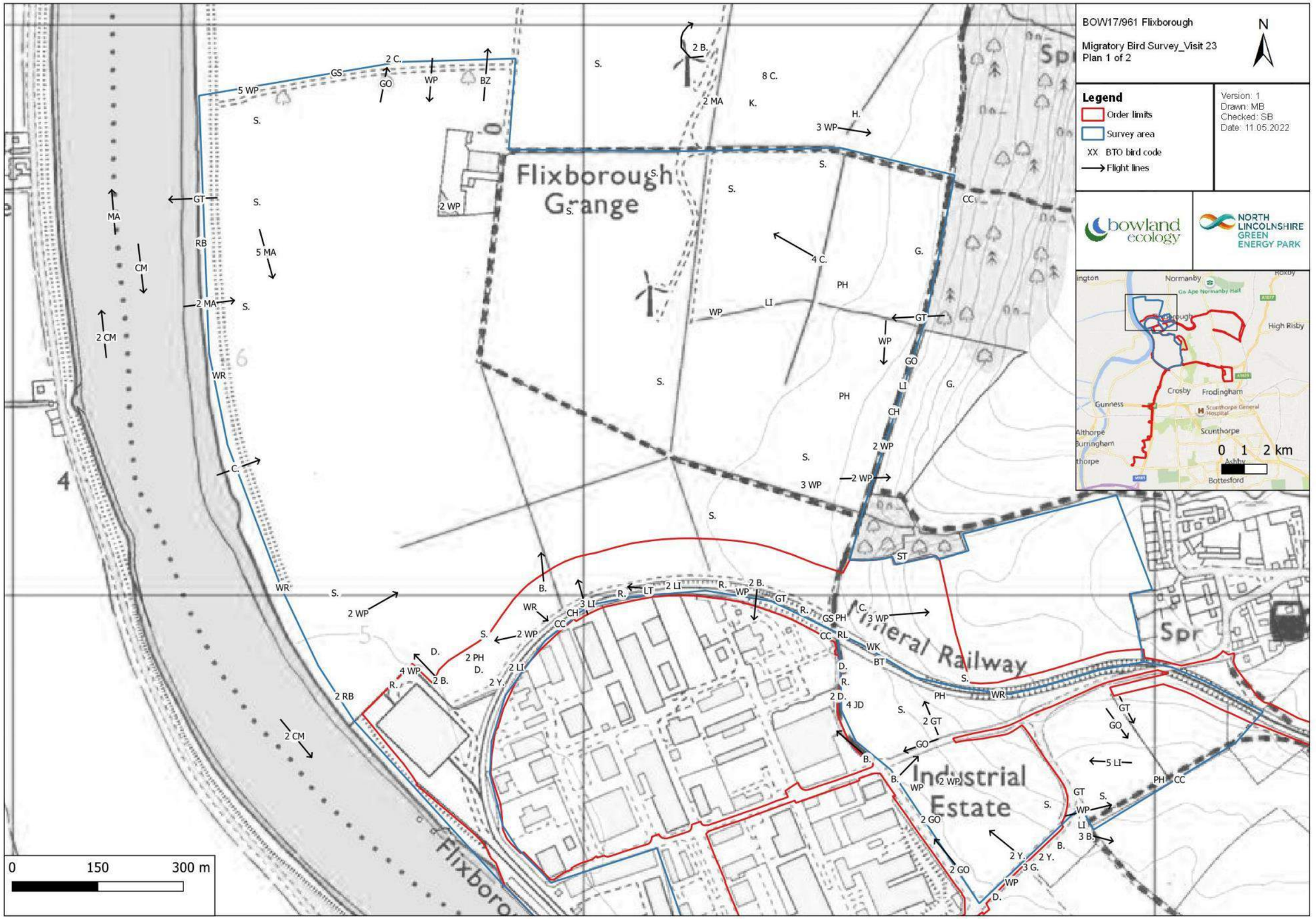
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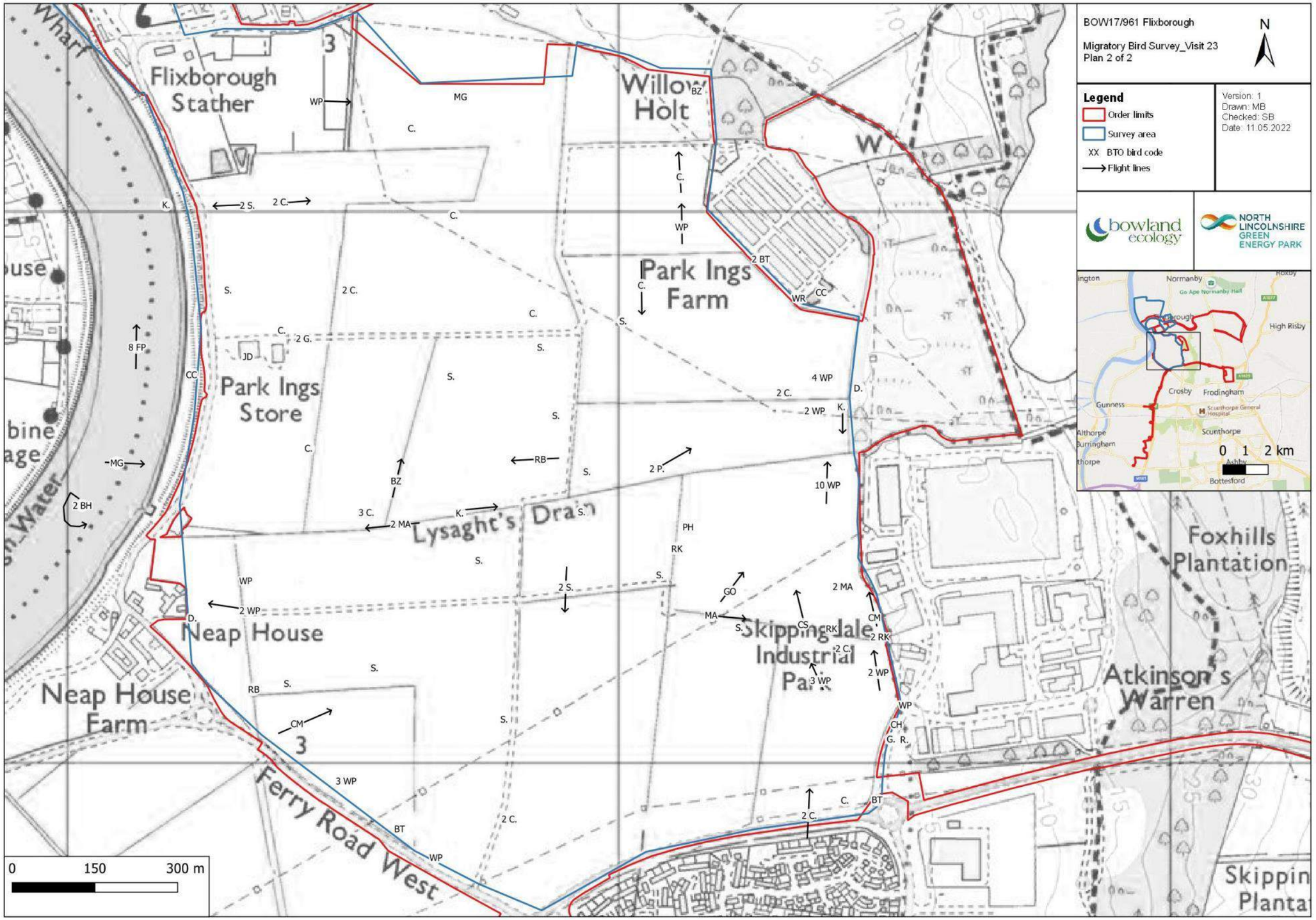
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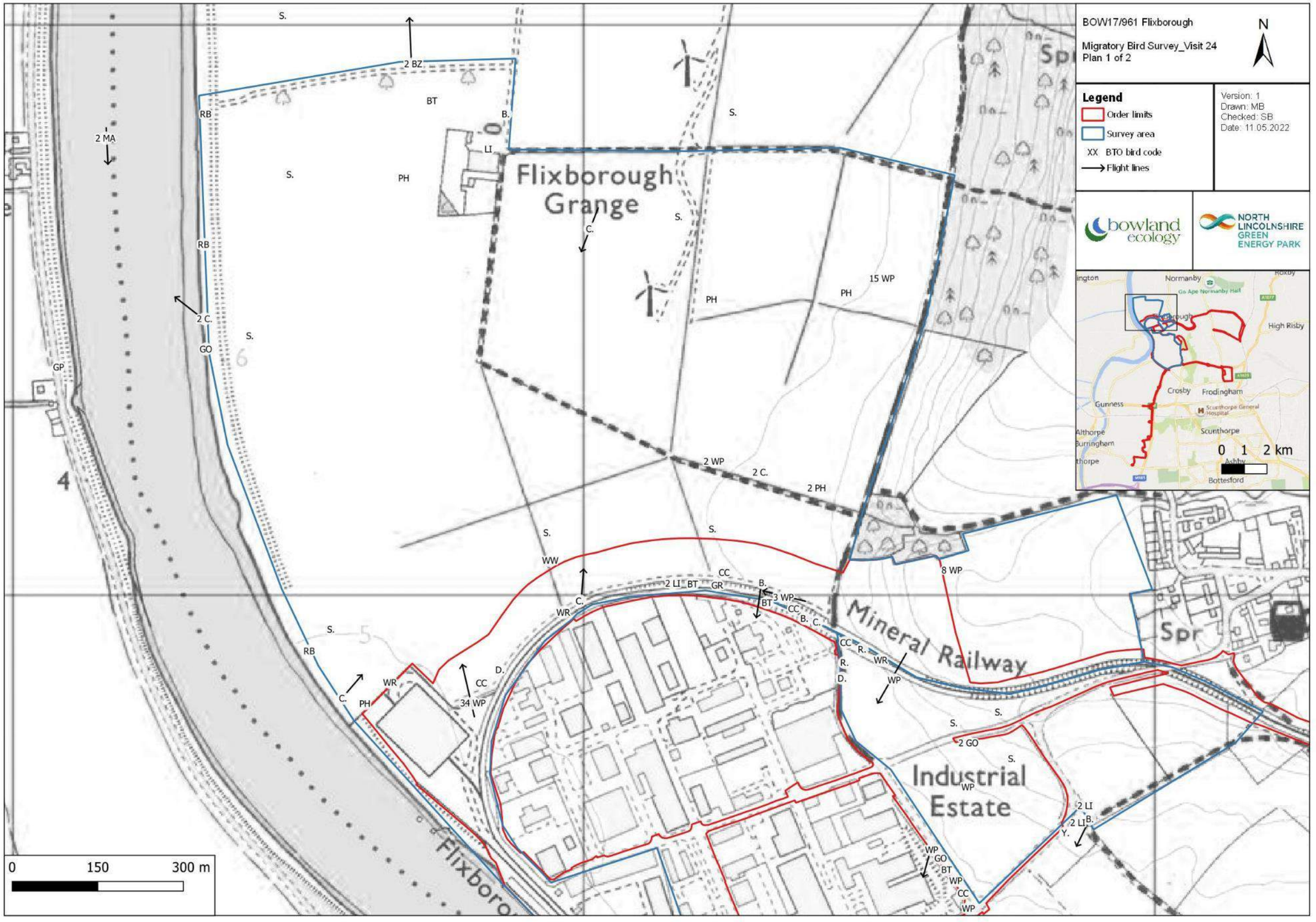
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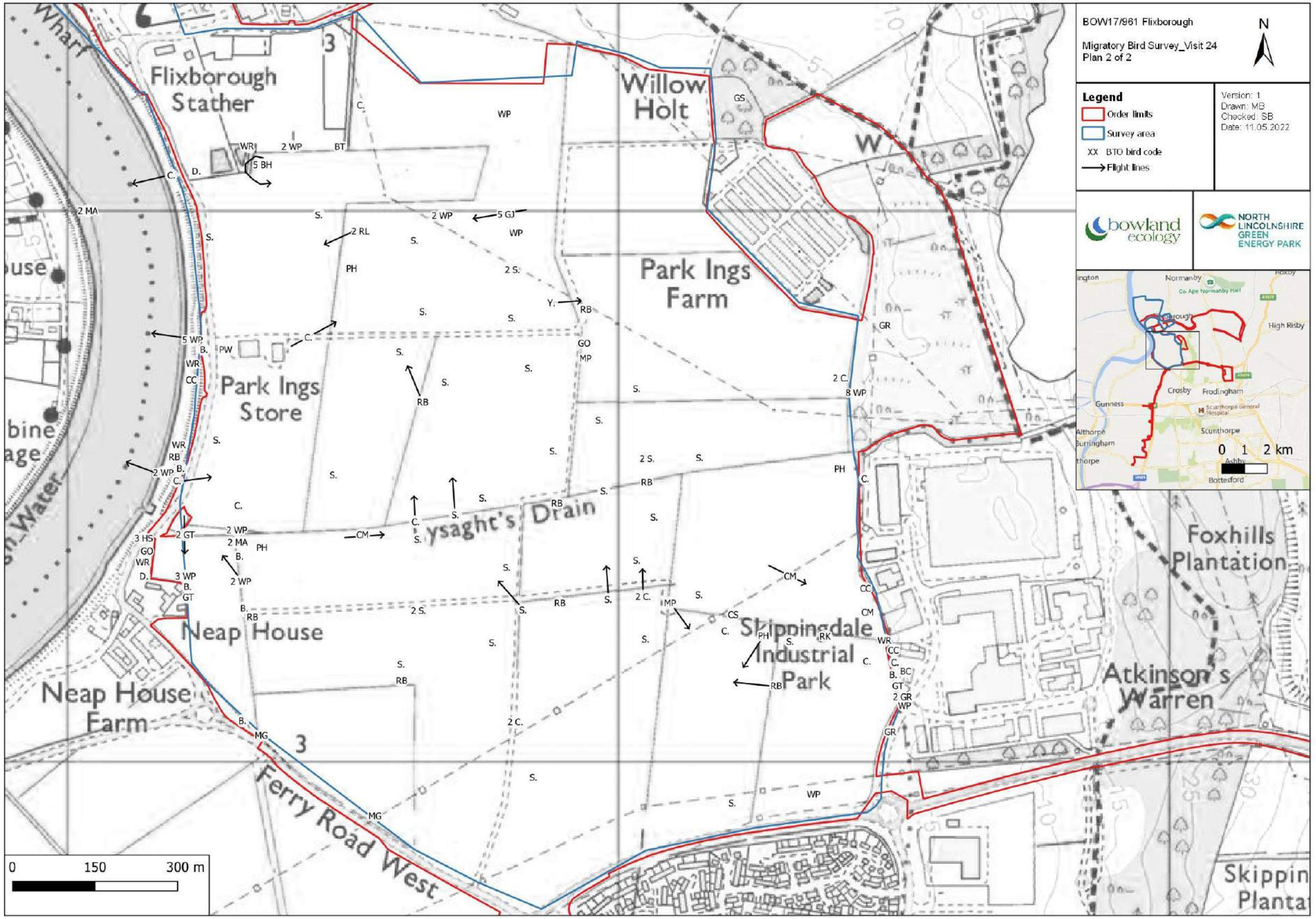
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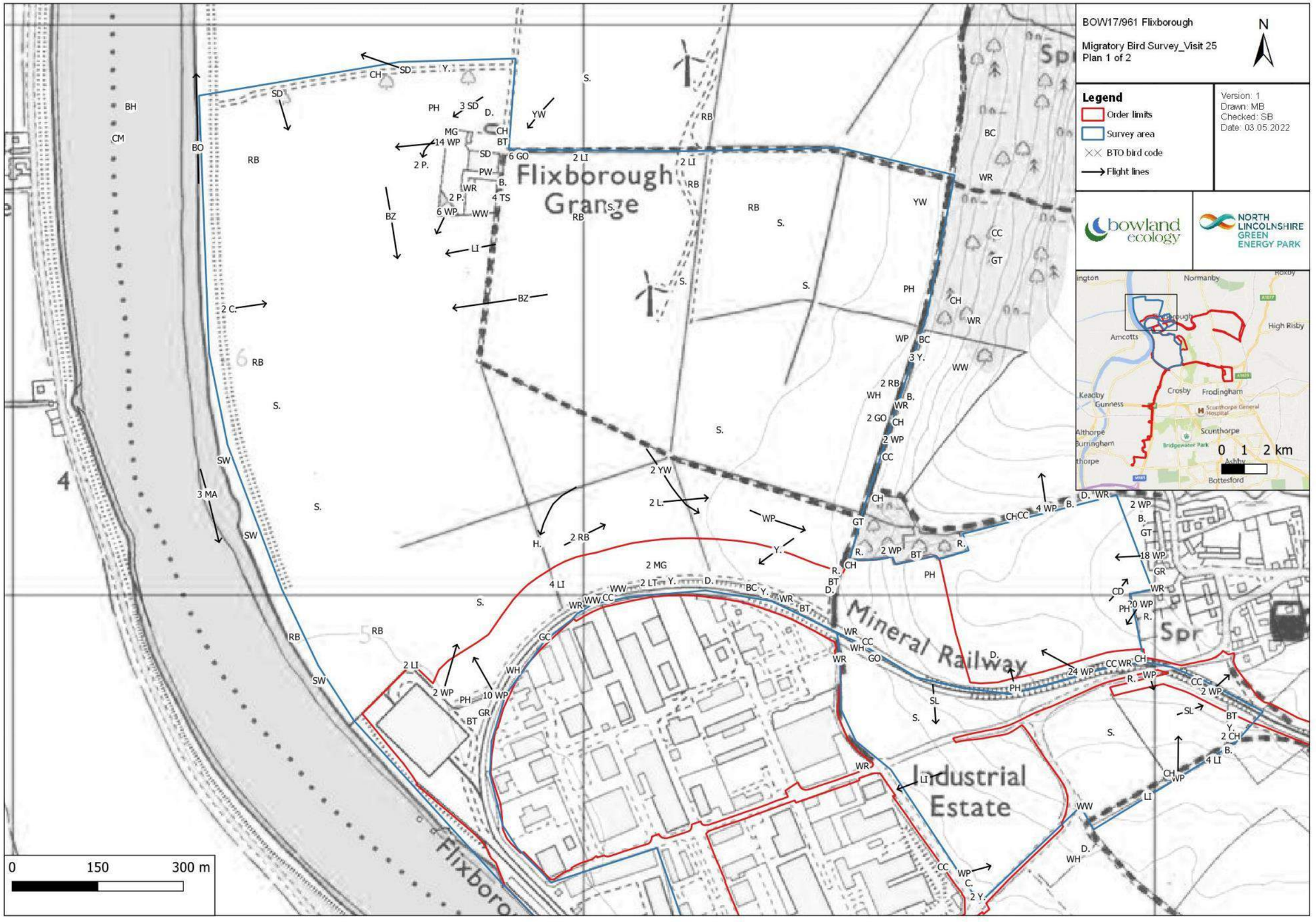
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Flixborough Grange
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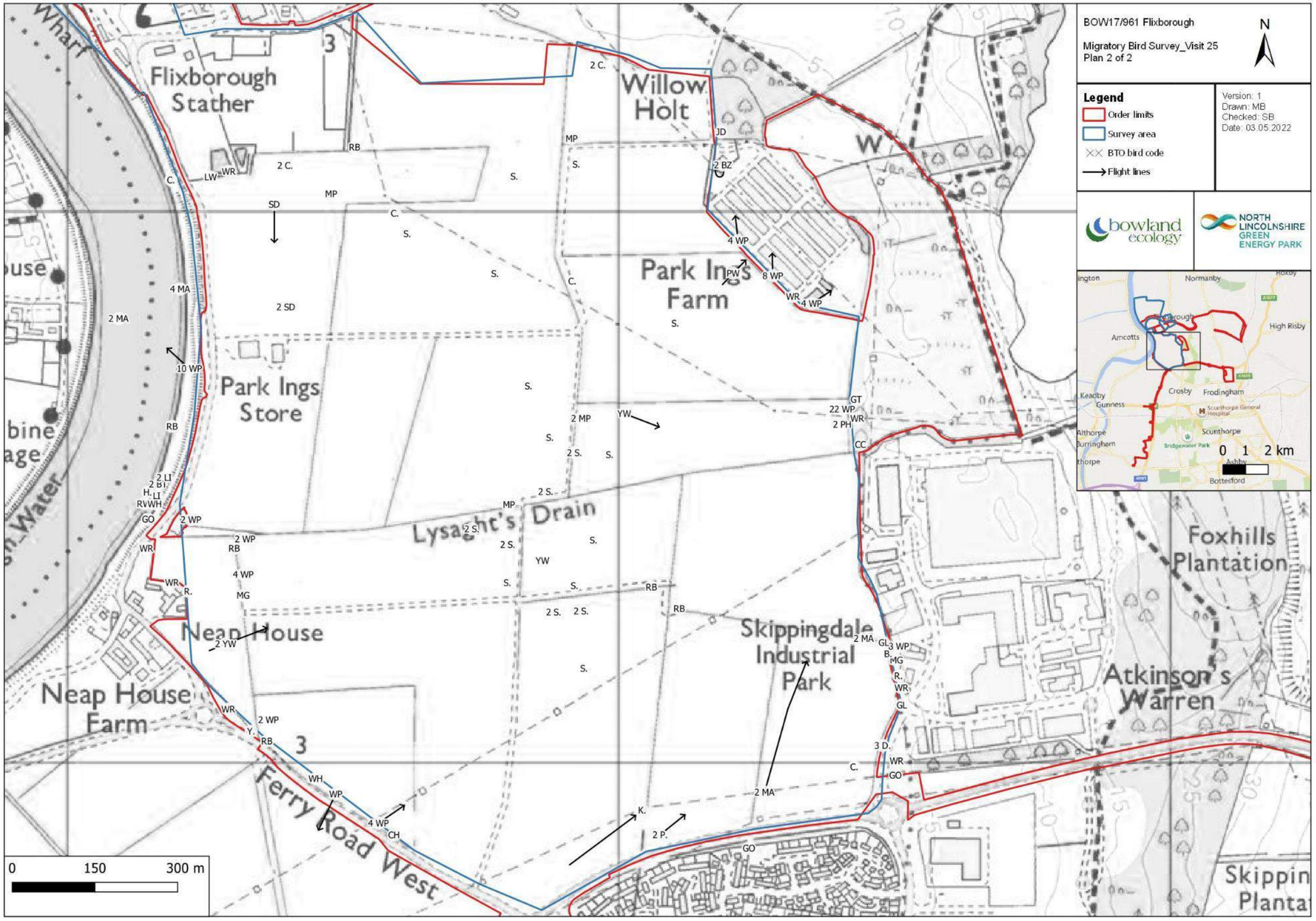
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Flixborough Stather
Willow Holt
Park Ings Farm
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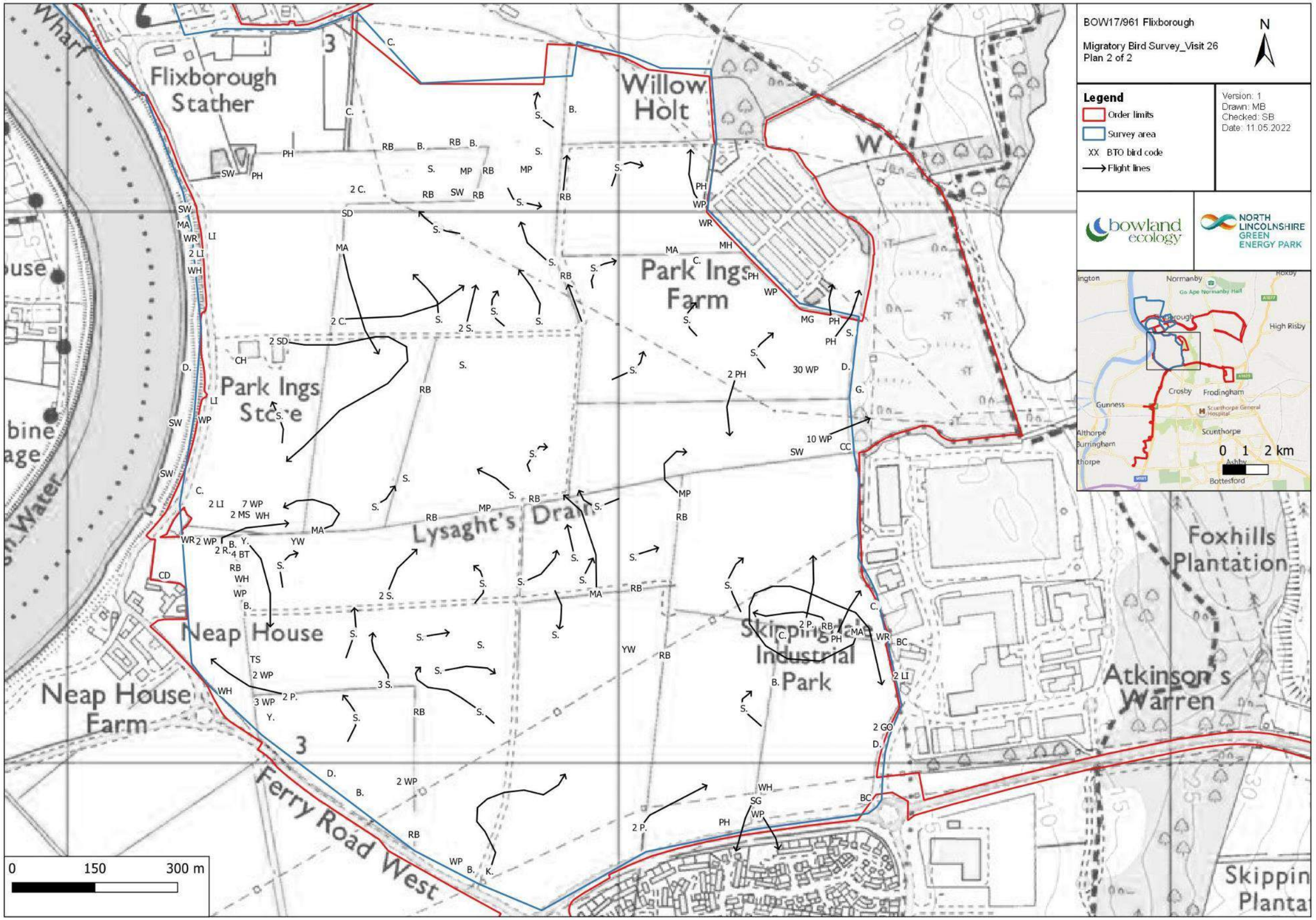
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bowland ecology
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Willow Holt
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Park Ings Store
Lysaght's Drain
Neap House
Neap House Farm
Skippingdale Industrial Park
Foxhills Plantation
Atkinson's Warren
Ferry Road West
Normanby
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Crosby
Frodingham
Gunness
Scunthorpe
Bottesford
0 1 2 km
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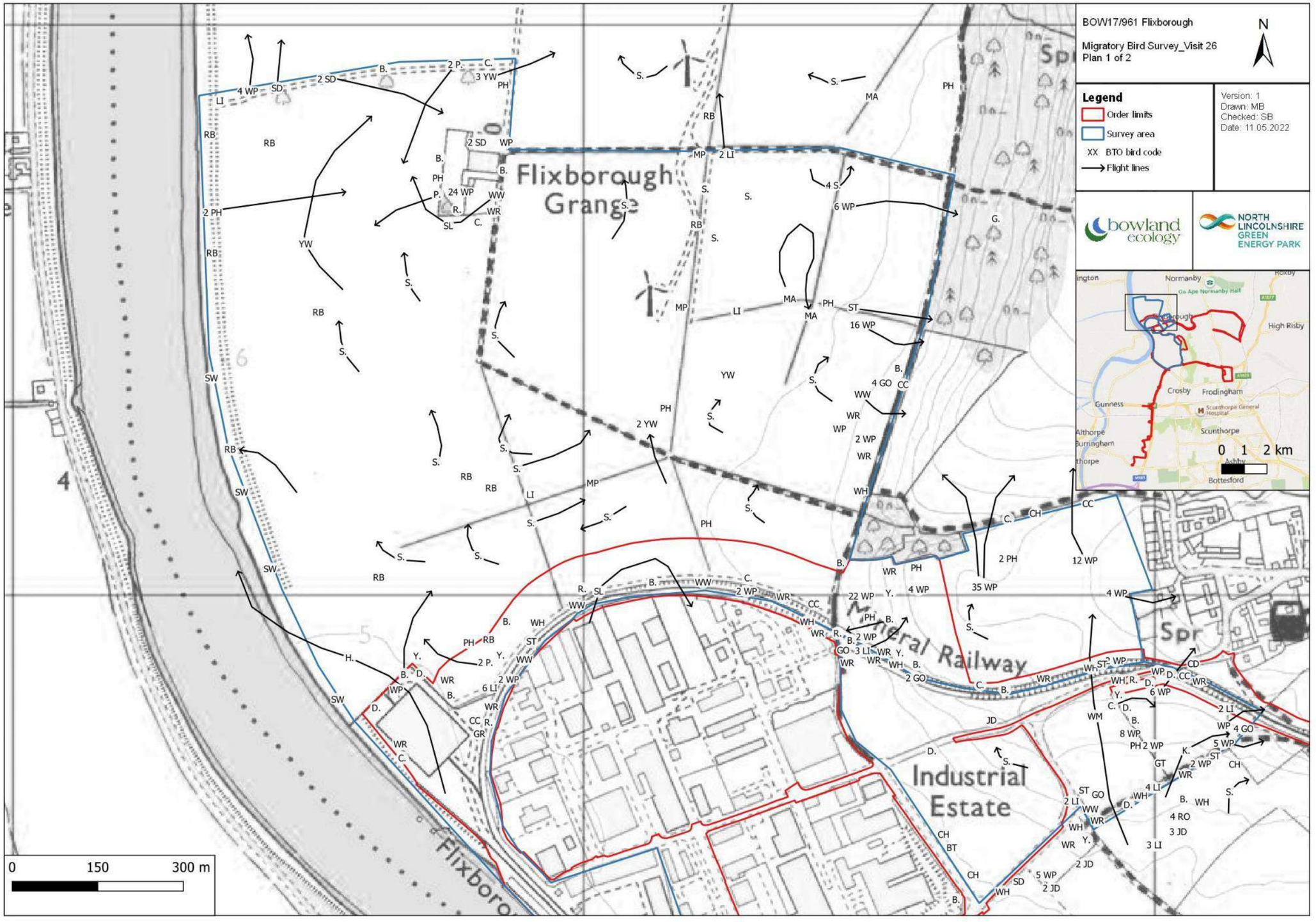
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Migratory Bird Survey_Visit 26
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Version: 1
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Date: 11.05.2022
bowland ecology
NORTH LINCOLNSHIRE GREEN ENERGY PARK
Flixborough Grange
Mineral Railway
Industrial Estate
Normanby
High Risby
Crosby
Frodingham
Gunness
Scunthorpe
Bottesford
0 1 2 km
0 150 300 m

APPENDIX F BAT SURVEY REPORT

Date: March 2022

APPENDIX F BAT SURVEY REPORT

Date: May 2022

North Lincolnshire Green Energy Park

Technical Appendix F - Bat Survey Report

November 2021

Control sheet

 [redacted]	Unit 8, Second Floor Holmes Mill, Greenacre Street Lancashire, BB7 1EB. 01200 446777 Unit 2 Dye Works, New Lanark, ML11 9DB. 01555 438880
Job number:	BOW17.961
Title:	NLGEP Technical Appendix F - Bat Survey Report
Client:	North Lincolnshire Green Energy Park Ltd
Prepared by:	Lucy Pocock *Assistant Ecologist* Sophie King, *Ecologist*
Checked by:	Alice Helyar *Principal Ecologist*
Date of Issue:	November 2021
Version:	3
Revisions:	Update plans and text where relevant to changes in the Order Limits
Status:	FINAL

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This report has been prepared by an ecological specialist and does not purport to provide legal advice. You may wish to take separate legal advice.

The information which we have prepared and provided is true and has been prepared and provided in accordance with the BS42020:2013 and the Chartered Institute of Ecology and Environmental Management's Code of Professional Conduct. We confirm that the opinions expressed are our true and professional bona fide opinions.

Bowland Ecology is accredited to Quality Guild (QG) standards in respect of our Quality, Environmental and Health and Safety procedures. The QG is an independent externally audited and accredited system that has been developed according to the principles of ISO9001, ISO14001 and OHAS18001.

Signed (Author)	Signed (QA)
[redacted]	[redacted]

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1. Introduction

1.1 Bowland Ecology Ltd was commissioned to undertake bat surveys to inform the North Lincolnshire Green Energy Park (NLGEP) ('the Project'), a Nationally Significant Infrastructure Project (NSIP) located at Flixborough, North Lincolnshire.

1.2 For the purpose of this report, the survey area is split into four zones;

- Zone A, this survey area is broadly representative of the Railway Reinstatement Land. The survey area includes Flixborough Wharf, Flixborough Industrial Estate and the disused railway spur that runs from the Flixborough Industrial Estate to Dragonby Rail Sidings;
- Zone B comprises the arable farmland directly north of the Railway Reinstatement Land and Flixborough Industrial Estate;
- Zone C captures the Energy Park Land, comprising the large area of farmland to the south of Flixborough Industrial Estate, alongside an area of semi-natural habitats close to the Phoenix Parkway Local Nature Reserve (LNR); and
- Zone D covers the Southern District Heat and Private Wire Network (DHPWN) Land and runs from the southern edge of Zone C, along the A1077 and M181, up to Junction 3 of the M181; and
- Zone E covers the Northern DHPWN Land which runs from the southern section of the Zone C towards Scunthorpe city centre along several roads. It is understood that no buildings and very limited areas of habitat along this route will be impacted by the Project, as such this area was not taken forward for further assessment.

1.3 Zone A comprises a variety of habitats along its length, including calcareous grassland and bare earth, with occasional areas of scrub and woodland. Flixborough Wharf and Flixborough Industrial Estate consist primarily of bare earth, with several buildings and bodies of standing water.

1.4 Zone B comprises largely of arable fields with sporadic scrub and trees, along with areas of poor semi-improved grassland, broadleaved woodland, and native species-rich hedgerows.

1.5 Zone C is a network of arable fields and associated field drains, with areas of broadleaved woodland, poor and semi-improved acidic grassland, swamp, several ponds, and farm outbuildings. The River Trent is located directly adjacent to the western boundary of zones A-C, where dense marginal inundation and tall ruderal vegetation dominate the banks.

1.6 Zone D is a linear feature, comprising mostly of bare ground and arable fields, with small sections of broadleaved and coniferous woodland, scattered trees/scrub, poor semi-improved grassland, several ponds, and buildings in the form of retail and leisure parks along the boundary.

1.7 The survey aimed to record the presence of bats within and surrounding the Order Limits and assess the habitats for their potential to support roosting, foraging and commuting bats. This report includes a description of assessment methods and describes survey results together with associated plans/figures. All bats in England and Wales are protected by the conservation of habitats and species regulations 2017 (as amended) and the wildlife and countryside act 1981 (as amended).

2. Methodology

Desk Study

2.1 The Multi-Agency Geographic Information for the Countryside (MAGIC) website (www.magic.gov.uk) was used to identify the presence of Special Areas of Conservation (SAC) within 30 km which have bat species as a qualifying feature for designation. As no such sites were returned by the search, a 5 km search radius of local records was considered appropriate for the desk study.

2.2 To inform the desk study, local records on and within 5 km of the Order Limits were obtained following a data search with Lincolnshire Environmental Records Network (GLNP) in April 2021.

Ground Based Tree Inspection Surveys

2.3 Ground based preliminary roost inspection of trees were undertaken on the 18th, 19th and 20th of November 2019 and the 20th and 21st of July 2020 by Claire Wilson MSc, BSc (Hons), ACIEEM, and Sophie King MSc, BSc. The weather conditions during the survey are presented in Table 1 below. Close focusing binoculars and high-powered torches were used to aid the survey. The inspection was undertaken in accordance with Collins, 2016.

Table 1: Survey dates and weather conditions

Date	***Weather***
18.11.2019	Cool (approximately 8°C), occasional scattered showers, with 50% cloud cover and a gentle breeze (Beaufort Scale 3).
19.11.2019	Cool (approximately 6°C) and dry, with 10% cloud cover and a gentle breeze (Beaufort Scale 2).
20.11.2019	Cool (approximately 8°C) and dry, with 20% cloud cover and a gentle breeze (Beaufort Scale 3).
20.07.2020	Mild (approximately 16°C) and dry, with 30% cloud cover and a gentle breeze (Beaufort Scale 3).
14.10.2010	Mild (approximately 13°C), dry, with 60% cloud cover and a gentle breeze (Beaufort Scale No. 3).
18.04.2021	Mild (approximately 14°C), dry, with 10% cloud cover and a light breeze (Beaufort Scale No. 1).

2.4 Potential Roosting Features (PRFs) assessed from ground level included; natural holes, woodpecker holes, cracks and splits in major limbs, hollows and cavities, bat/bird boxes, loose bark, dead wood, thinning in crown, damaged branch ends, dense ivy and epicormic growth. An assessment of the connecting habitats was also made. Trees were assessed in accordance with Collins (2016; Appendix C) as either: negligible, low, moderate, or high potential risk for supporting a bat roost according to the features present; or a confirmed bat roost.

2.5 The timing of the ground-based tree inspection during early spring was within the optimal period to assess trees for potential bat usage. During this period, foliage is limited, allowing a clear view of the tree and associated features. When a roost is not actively inhabited in the winter/spring period, staining, droppings, and scratches can be found on the tree, giving an indication of use by bats.

Aerial Tree Inspection Surveys

2.6 Aerial based roost inspection of trees which were identified following the preliminary surveys and assessment of impacts of the scheme, were undertaken on the 18th April 2021 by Helena Davies BSc, and Sam Robinson BA. The weather conditions during the survey are presented in Table 1 above. An endoscope, close focusing binoculars and high-powered torches were used to aid the survey. The inspection was undertaken in accordance with Collins, 2016.

Bat Activity Surveys

2.7 Following the initial Phase 1 habitat surveys for each area and an assessment of the potential impacts of the proposed development, Zones A, B and C (comprising the Energy Park Land and the Railway Reinstatement Land) were taken forward to bat activity assessment.

Zone A

2.8 Initial bat activity surveys were completed in 2019, between April and October (Transect A). A walked transect encompassing the survey boundary of Zone A (approximately 8.8 km) was undertaken on seven occasions, alternating directions between each survey visit. The surveys followed standard methodology as outlined in Collins (2016), recording bat species, time, and activity type (foraging/commuting). The transect route incorporated areas of trees and scrub along with a small patch of deciduous woodland. Several listening stops (12) were integrated into the transect route, transect routes, and associated listening stops are displayed in Appendix D. At each stop, surveyors halted for a three-minute interval, continuing to record all bat activity detected. The aim of the transect surveys was to determine the bat species along the Railway Reinstatement Land, the activity types and levels exhibited by different species and to provide information on the temporal and spatial distribution of bat species across the survey area.

Zones B and C

2.9 Bat surveys of Zones B and C were undertaken in 2020 between June and September. A walked transect of 5 km for Zone B and 5 km for Zone C was undertaken three times, alternating directions between each visit. The surveys followed standard methodology as outlined in section 2.4. Transect route B (Zone B, 6 listening stops) and Transect route C (Zone C, 7 listening stops) encompassed the Order Limits, incorporating areas of arable fields with a network of ditches, along with hedgerows, areas of scrub and deciduous woodland. Transect routes and associated listening stops are displayed in Appendix D.

2.10 The surveyors comprised; Claire Wilson MSc, BSc (Hons), MCIEEM (Natural England Bat Licence No. 2018-38274-CLS-CLS) (CW), Sophie King MSc, BSc (SK), Chris Piner BSc (Hons) (CP), Fiona Shuttle BSc (Hons) (FS), Lucy Pocock BSc (Hons) (LP), Luke Hall BSc (Hons) (LH) and Sam Robinson (SR). Batbox Duet, Peersonic, Pettersson, EM Touch and Anabat Express detectors were used during the surveys, providing a combination of heterodyne, frequency division and time expansion sampling methods. Dates, start and end times, and weather conditions including; temperature, cloud cover (CC) and wind Beaufort Scale (BF) during each survey are provided in Table 2 below.

Table 2: Bat transect survey dates, times, and weather conditions.

Transect	Visit (Date)	Surveyors	Start/Finish times	Temperature	Weather conditions
A	Visit 1: 11.04.2019	SK/CP	Start: 20:30 Finish: 23:30 Sunset: 19:55	Start: 6°C Finish: 4°C	Cool evening, 0/8 CC, BF 1-2
A	Visit 2: 28.05.2019	CW/SK	Start: 21:00 Finish: 23:06 Sunset: 21:17	Start: 10°C Finish: 8°C	Cool evening with 6/8 CC, BF 0-1
A	Visit 3: 20.06.2019	CW/CP	Start: 21:20 Finish: 23:26 Sunset: 21:36	Start: 13.5°C Finish: 9°C	Dry and mild evening, 0/8 CC, BF 0
A	Visit 4: 18.07.2019	CW/CP	Start: 21:04 Finish: 23:46 Sunset: 21:21	Start: 17°C Finish: 13.5°C	Warm and dry evening, 0/8 CC, BF 1
A	Visit 5: 19.08.2019	CW/CP	Start: 21:10 Finish: 23:05 Sunset: 20:24	Start: 14°C Finish: 8.5°C	Dry and mild evening, 1/8 CC, BF 0

A	Visit 6: 17.09.2019	SK/JT	Start: 04:35 Finish: 6:37 Sunrise: 6:37	Start: 8°C Finish: 10.5°C	Dry morning, 1/8 CC, BF 1
A	Visit 7: 23.10.19	CW/SR	Start: 17:50 Finish: 19:42 Sunset 17:50	Start: 12°C Finish: 9°C	Dry and mild evening, 7/8 CC, BF 3
B	Visit 1: 16.06.2020	LP, SR	Start: 21:34 Finish: 23:08 Sunset: 21:34	Start: 13°C Finish: 11°C	Dry but humid evening, 7/8 CC, BF 1
B	Visit 2: 03.07.2020	SK, LH	Start: 21:34 Finish: 23:34 Sunset: 21:34	Start: 18°C Finish: 16°C	Warm and dry evening, 7/8 CC, BF 2-3
B	Visit 3: 26.08.2020	SK, FS	Start: 20:31 Finish: 22:01 Sunset: 20:06	Start: 14°C Finish: 10°C	Dry evening, 1/8 CC, BF 2
C	Visit 1: 23.06.2020	SK, LP	Start: 21:36 Finish: 23:36 Sunset: 21:36	Start: 18°C Finish: 15°C	Warm and dry evening, 1/8 CC, BF 1
C	Visit 2: 20.07.2020	SK, LH	Start: 21:18 Finish: 23:18 Sunset: 21:18	Start: 16°C Finish: 14°C	Dry humid evening, 1/8 CC BF 1
C	Visit 3: 01.09.2020	SK, FS	Start: 19:52 Finish: 21:33 Sunset: 19:52	Start: 16°C Finish: 12°C	Dry evening, 2/8 CC, BF 2-3

Deployment and Analysis of Static Bat Detectors

Zone A

2.11 Used in conjunction with bat transect surveys, ten Anabat Express static recording detectors were deployed on seven occasions from June to October 2019, and April to May 2020. The detectors were set to record bat calls between sunset and sunrise for a minimum of five nights. Locations were selected to sample activity from features that would be directly impacted to accommodate the Proposal, in order to further assess the bat species present, bat activity levels and the spatial distribution of bats. The locations are displayed in Appendix B and described below:

- Location 1: Situated within a deciduous tree and scrub lined corridor, adjacent to a patch of woodland with arable fields to the north (SE 90183 14751);
- Location 2: Situated within a deciduous tree and scrub lined corridor surrounded by arable fields (SE 90176 14828);
- Location 3: Situated within a small patch of woodland surrounded by arable fields (SE 89235 15285);
- Location 4: Situated on a track surrounded by woodland (SE 88672 15269);
- Location 5: Situated within a deciduous tree and scrub lined corridor, surrounded by arable fields, woodland, and species poor grassland (SE 88156 15089);
- Location 6: Situated within a deciduous tree and scrub lined corridor, surrounded by arable fields and a small patch of woodland (SE 87864 14520);
- Location 7: Situated within a deciduous tree and scrub lined corridor, surrounded by Flixborough village to the north and arable fields to the south (SE 87165 14804);
- Location 8: Situated within a deciduous tree and scrub lined corridor, surrounded by arable fields and Flixborough industrial estate (SE 86397 14966);

- Location 9: Situated on the edge of a deciduous woodland patch, with tall ruderal vegetation and dense scrub immediately opposite, surrounded by arable fields and Flixborough Industrial Estate (SE 85861 14836); and
- Location 10: Situated within a small patch of woodland, surrounded by Flixborough Industrial Estate to the north and arable fields to the south (SE 86512 14310).

Zones B and C

2.12 A further ten Anabat Express static recording detectors were deployed in Zones B and C on three occasions from June to August 2020, mirroring the settings described above. The deployment locations are displayed in Appendix B and described below:

Zone B:

- Location 1: Situated along a grassland corridor lined by marginal and tall ruderal vegetation. The River Trent is adjacent to the west, with expanses of arable fields directly east (SE 85423 15117);
- Location 2: Situated along a track, edged with a sparse mature tree line, and surrounded by expanses of arable fields (SE 85757 15925);
- Location 3: Situated within willow (Salix sp.) scrub, adjacent to a pond. The wider area contains farm outbuildings and expanses of arable fields (SE 85858 15812);
- Location 4: Situated within hawthorn, along a road lined with hedgerows. A large area of semi-mature broadleaved woodland lines the eastern side of the road, along with arable fields to the west (SE 8659115475); and
- Location 5: Situated along a hawthorn hedgerow, which divides arable fields (SE 87016 14689).

Zone C:

- Location 6: Situated within tall ruderal vegetation lining a large ditch, surrounded by arable fields intersected with a network of drains and ditches (SE 86231 13440);
- Location 7: Situated with willow scrub, alongside a steep sided ditch, surrounded by arable fields intersected with a network of drains and ditches (SE 8633113328);
- Location 8: Situated with a hedgerow along the zone boundary, which divides arable fields from the main road (SE 86739 12791);
- Location 9: Situated within tall ruderal and scrub vegetation, surrounded by poor semi-improved grassland (SE 876351 4258); and
- Location 10: Situated within dense scrub and continuous bracken, some ponds are present in the surrounding area (SE 8769813651).

2.13 On collection of the detectors, sonogram analysis of zero-crossing recordings was performed using Analook software (Titley Scientific) by Lucy Pocock BSc (Hons) and Abigail Hamer BSc (Hons). For each period of deployment at each location, up to five dates were selected for analysis, based on the most favourable weather conditions for bat activity. All selected dates had a minimum nightly temperature of 7°C or above, no precipitation and minimal wind speeds. This subset of recordings was analysed manually, identifying the species present and calculating the number of passes by each species on each selected recording date.

Limitations

2.14 Bat surveys can be limited by the time of year and weather conditions during the time of survey. The effect of weather conditions on active bats is likely to be different for different species (with differing flight capabilities) in different situations (e.g., open versus sheltered habitat) (Collins 2016). Therefore, surveys aimed to be undertaken during the optimal survey period of April – September, on dry evenings/mornings with temperatures no less than 7°C and minimal wind speeds.

2.15 During the extended Phase 1 habitat surveys, two buildings and trees; T1-T13 were assessed as having low-high potential for roosting bats. While the guidance (Collins, 2016) recommends that at least one emergence/re-entry survey and/or aerial tree inspection should be carried out, these buildings and trees were not taken forward for further survey as:

- It is understood that they will not be impacted by the Project; and
- As the Project has developed, areas have been removed the Order Limits and some of these features are no longer present within the Order Limits.

2.16 Transect survey 1, undertaken in Zone A on the 11th of April 2019, recorded low start and end temperatures of 6°C and 4°C, respectively. This may have impacted the levels of bat activity, but it is thought to not limit the overall results, as a comprehensive monitoring assessment was also undertaken with static monitoring devices over the same period.

2.17 During the bat activity surveys, two surveys were started later than the recommended by the guidance (Collins, 2016):

- Zone A; Visit 1, started 35 minutes after sunset; and
- Zone B; Visit 3, started 25 minutes after sunset.

2.18 In addition, during static monitoring surveys, there were instances of equipment failure. See Table 3 for details of equipment failure.

Table 3: Anabat Express Equipment Failure

Zone	Static No.	Description
A	2	No September 2019 recordings
A	4	No October 2019 recordings
A	5	No September 2019 recordings
A	6	No September 2019 recordings
A	7	No June or August 2019 recordings
A	8	No May 2020 recordings
A	9	Only 3 evenings of recordings in April 2020, only 3 evening recordings in October 2019, no July or September 2019 recordings
B	1	No August 2020 recordings
B	2	No July 2020 recordings
B	5	No June 2020 recordings
C	9	No August 2020 recordings

2.19 Overall, the delayed bat activity transect start times and the equipment failures of the Anabat Express static bat detectors are not considered a significant constraint to the study, due to the high levels of static bat detector deployment locations paired with multiple bat activity transect surveys of the areas. It is considered that the study provides a comprehensive assessment of bat activity.

3. Results

Data Search

3.1 Bat species returned from within 5 km of the Project comprise; two records of Brandt's bat (*Myotis brandtii*), 30 records of brown long-eared bat (Plecotus auritus), 304 records of common pipistrelle (Pipistrellus pipistrellus), 27 records of Daubenton's bat (*Myotis daubentonii*), two records of Nathusius's pipistrelle (*Pipistrellus nathusii*), three records of natterer's bat (*Myotis nattereri*), 37 records of noctule (*Nyctalus noctula*), 54 records of soprano pipistrelle (*Pipistrellus pygmaeus*), eight records of whiskered bat (*Myotis mystacinus*), 83 unidentified pipistrelle species (*Pipistrellus* sp.) and 228 unidentified bat species (*Chiropter* sp.).

3.2 Of these, 100 are records of hibernating bats, or roosts. Species recorded as hibernating or roosting within 5 km comprise brown long-eared bat, common pipistrelle, Daubenton's bat, natterer's bat, noctule, soprano pipistrelle, whiskered bat, and unidentified bat species. Most records returned have only a six-digit national grid reference, therefore an accurate estimate of the distance of roosts from the Order Limits is not attainable. Seven roost records had a minimum distance from the Order Limits of 0 m, however as spatial data is limiting, it is uncertain if they originate from within the Order Limits.

Habitat Assessment and Roost Potential of Trees

3.1 Potential foraging habitats within the Order Limits include hedgerows, scattered trees, small patches of broadleaved woodland, tall ruderal vegetation, ponds, ditches, and scrub. These habitats are abundant and have good connectivity to other areas of good quality bat foraging and commuting habitat. Overall, the Order Limits are considered to provide **moderate** value foraging and commuting habitat for bats (see Appendix C for Habitat Suitability Categories).

3.2 The aforementioned habitats provide suitable foraging and commuting habitat for bat species which show a preference for utilising 'edge' habitats. Such species include common pipistrelle and *Myotis* species, which are flexible when selecting foraging habitat. The surrounding arable fields potentially provide favourable foraging habitat for noctule bats which show a preference for feeding in 'open' habitats. However, the abundance of insects would influence the value of arable land as foraging habitat for bats, as methods used to cultivate land tend to incorporate high levels of herbicide and pesticide use which in turn, is linked with a decrease in insect diversity and abundance (Ewald *et al.* 2015).

3.3 22 buildings were surveyed as part of the bat roost assessment, comprising of corrugated metal warehouses, portacabins and redbrick buildings. PRFs are limited, with potential lowered due to the general openness and exposure of the area, along with a lack of immediate features connecting buildings to suitable foraging areas. Appendix E provides an overview of each building and its potential to support roosting bats. Only Building 2 in Zone A and Building 20 in Zone D were considered to have low potential for roosting bats, whilst the remaining structures were of negligible potential for roosting bats (see Appendix C for Bat Roost Potential Categories).

3.4 Whilst buildings within the Order Limits generally lack PRFs, there are several trees with PRFs located within the Order Limits. Appendix E provides an overview of each tree and its potential to support roosting bats. Tree 3 in Zone A was considered to have high potential for roosting bats, whilst Trees 5 and 9 in Zone B were considered to have moderate-high potential. Tree 4 in Zone B and Tree 12 in Zone C were determined as moderate potential, and Tree 2 in Zone A and Trees 6 and 7 in Zone B were deemed low-moderate. The remaining trees were assessed as being low or negligible potential for roosting bats (see Appendix C for Bat Roost Potential Categories).

Transect Surveys

Zone A

3.5 Bat species recorded during the transect surveys comprise common pipistrelle, soprano pipistrelle (*Pipistrellus pygmaeus*), *Myotis* sp. and noctule. Across the seven visits, common pipistrelle was the most frequently recorded species (total passes recorded = 53), followed by soprano pipistrelle (n = 10), noctule (n = 4), and *Myotis* sp. (n = 1). Common pipistrelle bats were recorded on six survey visits, soprano pipistrelle on five and noctule on three, whereas *Myotis* sp. was only recorded on one of the seven surveys. It should be noted that the first survey in April recorded no bat presence, though this is likely not indicative of bat presence due to cold weather. Bat activity levels throughout the surveys were generally as expected, given the habitats present. A peak number of 17 passes was recorded on two surveys (2nd & 4th visit), undertaken on the 28th of May 2019 and 18th July 2019. Activity type during the surveys was restricted to foraging passes along treelines and commuting from west-east and east-west; no social calling was recorded during any of the transect surveys. Common pipistrelle and soprano pipistrelle activity was concentrated around areas of scrub and treelines between the Railway Reinstatement Land and the adjacent arable fields. Further details regarding bat activity transect route and locations, can be found in Appendix D.

Zone B

3.6 Bat species recorded during the transect surveys comprise common pipistrelle, soprano pipistrelle and, *Myotis* sp. Across the three visits, common pipistrelle was the most frequently recorded species (total passes recorded = 25), followed by soprano pipistrelle (n = 2) and *Myotis* sp. (n = 1). Common pipistrelle bats were recorded on all survey visits and soprano pipistrelle on two, whereas *Myotis* sp. was only recorded on one of the three surveys. Bat activity levels throughout the surveys were as expected, given the openness of the habitats present. A peak number of 13 passes was recorded on visit one, undertaken on the 16th of June 2020. Activity during the surveys consisted largely of north-south commuting flight lines with foraging activity along tree lines, hedgerows, and field margins. No social calling was recorded during any of the transect surveys. Further details regarding bat activity transect route and locations, can be found in Appendix D.

Zone C

3.7 Bat species recorded during the transect surveys in Zone C comprise common pipistrelle, soprano pipistrelle, *Myotis* sp. and noctule. Across the three visits, common pipistrelle was the most frequently recorded species (total passes recorded = 22), followed by soprano pipistrelle (n = 5), *Myotis* sp. (n = 3) and noctule (n = 1). Common pipistrelle bats were recorded on all survey visits and soprano pipistrelle on two, whereas *Myotis* sp. and noctule were only recorded on one of the three surveys. Bat activity levels throughout the surveys were as expected, given the openness of the habitats present. A peak number of 13 passes was recorded on visit one, undertaken on the 23rd June 2020. Activity during the surveys was concentrated largely to commuting and foraging over the numerous ditches present within the Order Limits, along with parallel to hedgerows and along the edge of woodland patches. No social calling was recorded during any of the transect surveys. Further details regarding bat activity transect route and locations, can be found in Appendix D.

Static Detector Surveys

3.8 Results from the static detector surveys are presented in Appendix F and described below. A map showing the location points of the detectors is presented in Appendix B.

Zone A

3.9 Static monitoring analysis revealed the presence of *Myotis* sp., common pipistrelle, soprano pipistrelle and noctule bat species, in congruence with transect visits. Overall,

the most frequent species recorded was common pipistrelle (49%), followed by *Myotis* sp. (25%), soprano pipistrelle (22%) and noctule (4%). Deployment location 9 recorded the highest levels of bat activity (on average 148 passes per night), however it should be noted that due to equipment failures, the deployment period for this detector was limited to three days on two visits (October 2019 and April 2020), and failed to record on a further two visits (July 2019 and September 2019). However, the figures are likely indicative of bat activity in that area given the location and habitats present. Location 5 had consistently high levels of bat activity, with an average of 104 passes per night, followed by location 4 with 63 passes per night. Levels of high activity are concentrated around high-quality foraging habitat, specifically woodland edges and woodland corridors created by tracks, dense scrub, and tall ruderal vegetation. Location 9 and 5 recorded the highest levels of social activity (53% and 21% of all social calls, respectively).

3.10 Lowest levels of bat activity were witnessed at deployment locations 1 and 2, with 8 and 9 bat passes on average per night, respectively. There was one instance of equipment failure at location 2 (September 2019), however, as September recorded the second lowest number of average nightly bat passes from all deployment locations (n=24), this equipment failure is not thought to restrict the results.

3.11 Bat activity varied across the months, with August (n=109) and June (n=59) presenting the highest average bat passes per night when bats are most active, October (n=59) also presented high levels of activity with static location 5 and 9 contributing the most recordings. Static detector locations can be found in appendix B.

Zone B

3.12 Static monitoring analysis revealed the presence of *Myotis* sp., common pipistrelle, soprano pipistrelle and noctule bat species. Overall, the most frequent species recorded was common pipistrelle (59%), followed by soprano pipistrelle (30%), *Myotis* sp. (8%), and noctule (3%). Deployment location 2 recorded the highest levels of bat activity (on average 96 passes per night), with a total of 825 common pipistrelle passes for the deployment periods June and July 2020. It should be noted that due to equipment failures, the deployment period for this detector was limited to two months (June 2020 and July 2020). The figures are still likely indicative of bat activity in that area given the location and habitats present. Location 4 had consistently high levels of bat activity, with an average of 66 passes per night, followed by location 3 with 27 passes per night. Levels of high activity are concentrated around moderate foraging habitat, specifically mature tree lines, woodland edge, and hedgerows. Location 2 and 4 recorded the highest levels of social activity (60% and 33% of all social calls, respectively).

3.13 Lowest levels of bat activity were witnessed at deployment locations 1 and 5, with 11 and 9 bat passes on average per night, respectively. There was one instance of equipment failure at both locations (August for static 1 and June for static 5), however, given the consistently low number of passes throughout successfully recorded months, this equipment failure is not thought to restrict the results.

3.14 Bat activity varied across the months, with June (n=390) and August (n=141) presenting the highest average bat passes per night when bats are most active, July (n=74) also presented high levels of activity. Static locations 2 and 4 contributed the most recordings. Static detector locations can be found in appendix B.

Zone C

3.15 Static monitoring analysis revealed the presence of *Myotis* sp., common pipistrelle, soprano pipistrelle and noctule bat species. Overall, the most frequent species recorded was common pipistrelle (80%), followed by soprano pipistrelle (16%), *Myotis* sp. (3%), and noctule (2%). Deployment location 6 recorded the highest levels of bat activity (on average 175 passes per night), with a total of 1921 common pipistrelle passes over the

three deployment periods June - August 2020. Location 8 had consistently high levels of bat activity, with an average of 41 passes per night, followed by location 10 with 40 passes per night. Levels of high activity are concentrated around moderate foraging habitat, specifically ditches, hedgerows and scrub. Location 6 and 7 recorded the highest levels of social activity (89% and 10% of all social calls, respectively).

3.16 Lowest levels of bat activity were witnessed at deployment locations 7 and 9, with 28 and 16 bat passes on average per night, respectively. There was one instance of equipment failure at location 9 (August), however, given the consistently low number of passes throughout successfully recorded months, this equipment failure is not thought to restrict the results.

3.17 Bat activity varied across the months, with June (n=694) and July (n=246) presenting the highest average bat passes per night when bats are most active, August (n=79) presented moderate levels of activity in comparison. Static location 6 contributed the most recordings. Static detector locations can be found in appendix B.

Aerial tree inspection surveys

3.18 Two trees (13 and 14) were taken froward for aerial tree inspection. The results are as follows:

- Bat tree 13 - A mature willow tree which is approximately 11 m in height. Features recorded during the aerial assessment include a large tear out from the trunk with a splintered limb still attached. This has created a cavity in the trunk, which Is large and exposed to daylight, as well a smaller apex cavity, which is shallow and cluttered, with evidence of nesting birds. Occasional areas of lifted bark were recorded which have low potential for individual, cavity roosting bats. Overall, the tree was recorded as offering low potential for roosting bats; and
- Bat tree 14 – a mature willow tree, approximately 9 m in height. The inspected feature comprises a large split in the trunk which is covered by lifted bark. The assessment found the feature offered negligible for roosting bats. Overall, the tree was recorded as offering negligible potential for roosting bats.

References

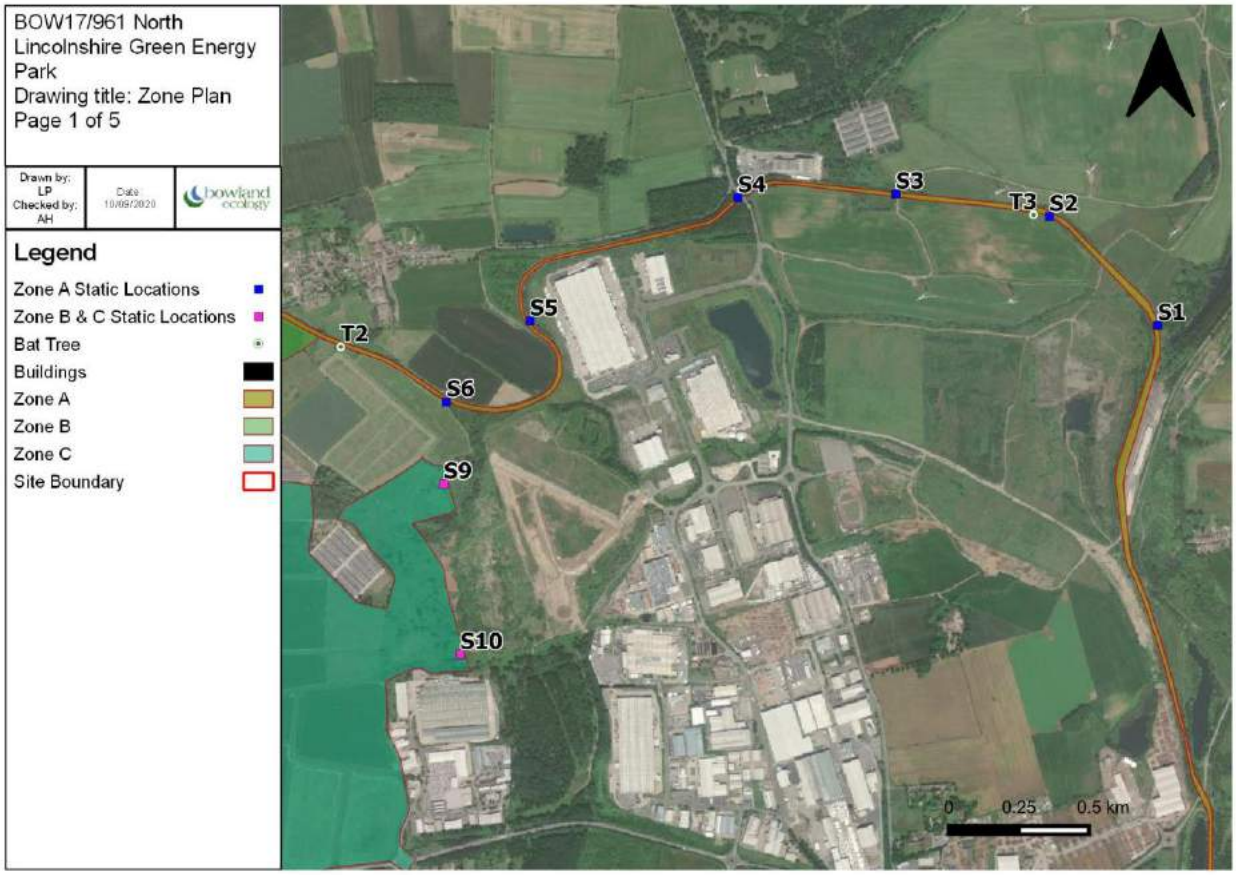
Collins, J. (ed.) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd Edition). The Bat Conservation Trust, London.

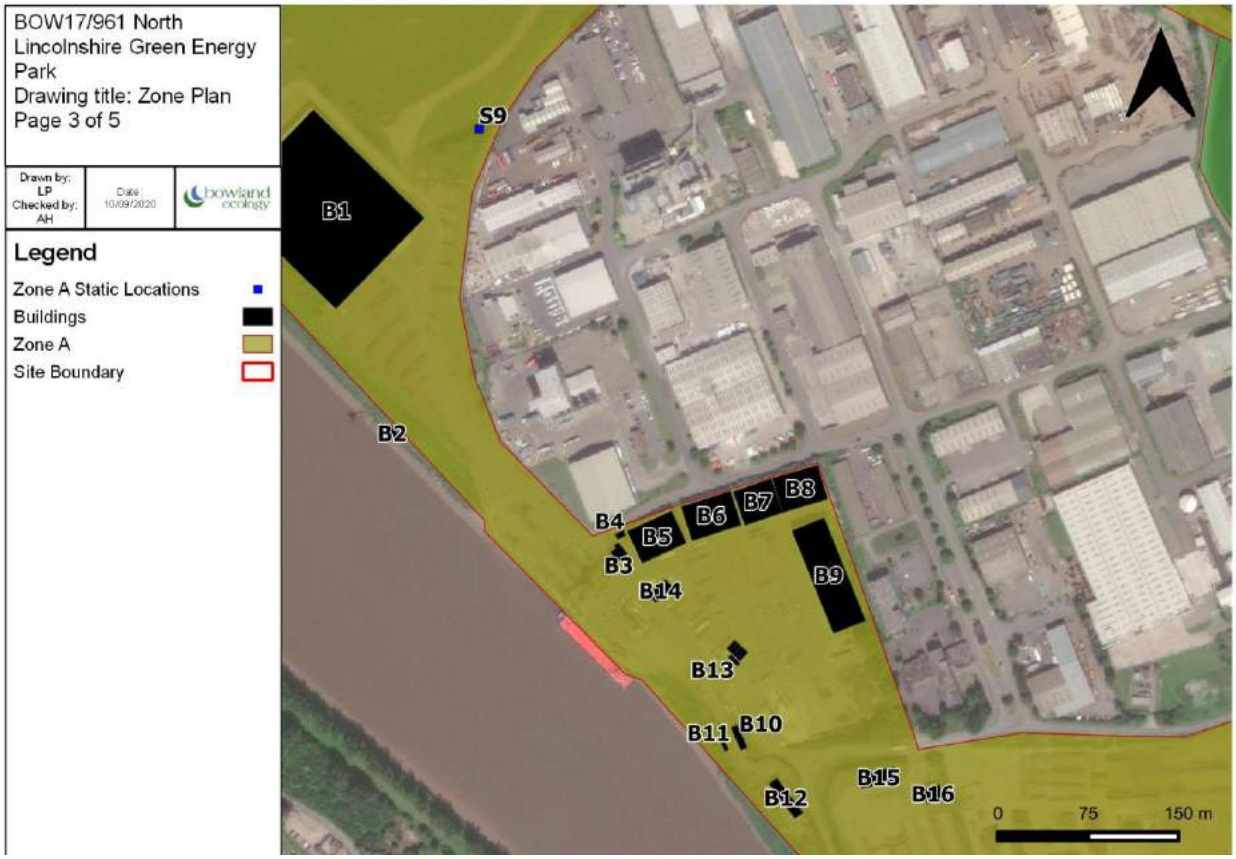
Bowland Ecology (2018). Flixborough, Lincolnshire, Desk Study and Extended Phase 1 Habitat Survey.

Ewald, J. A., Wheatley, C. J., Aebischer, N. J., Moreby, S. J., Duffield, S. J., Crick, H. Q., & Morecroft, M. B. (2015). Influences of extreme weather, climate and pesticide use on invertebrates in cereal fields over 42 years. *Global Change Biology*, *21*(11), 3931-3950.

Appendix A: Zone Map

Appendix B: Bat Static Detector, Buildings and Tree Locations

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Page 3 of 5
Drawn by: LP
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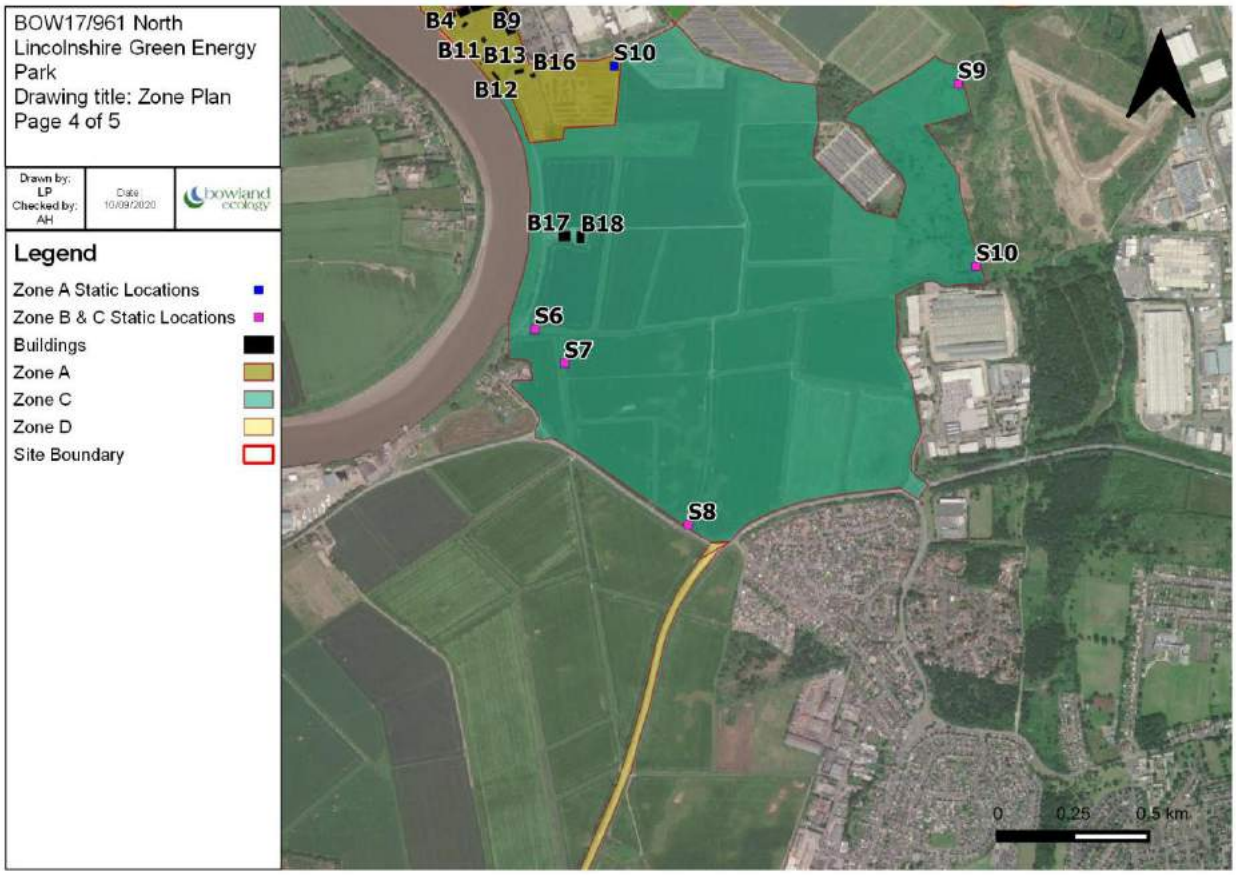
Date 10/09/2020
bowland ecology
Legend
Zone A Static Locations
Buildings
Zone A
Site Boundary
S9
B1
B2
B4
B5
B6
B7
B8
B3
B14
B9
B13
B11
B10
B15
B12
B16
0
75
150 m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Page 4 of 5
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Date 10/09/2020
bowland ecology
Legend
Zone A Static Locations
Zone B & C Static Locations
Buildings
Zone A
Zone C
Zone D
Site Boundary
B4
B9
B11
B13
B16
S10
B12
S9
B17
B18
S10
S6
S7
S8
0
0.25
0.5 km


BOW17/961 North Lincolnshire Green Energy Park
Drawing title: Zone Plan
Page 5 of 5
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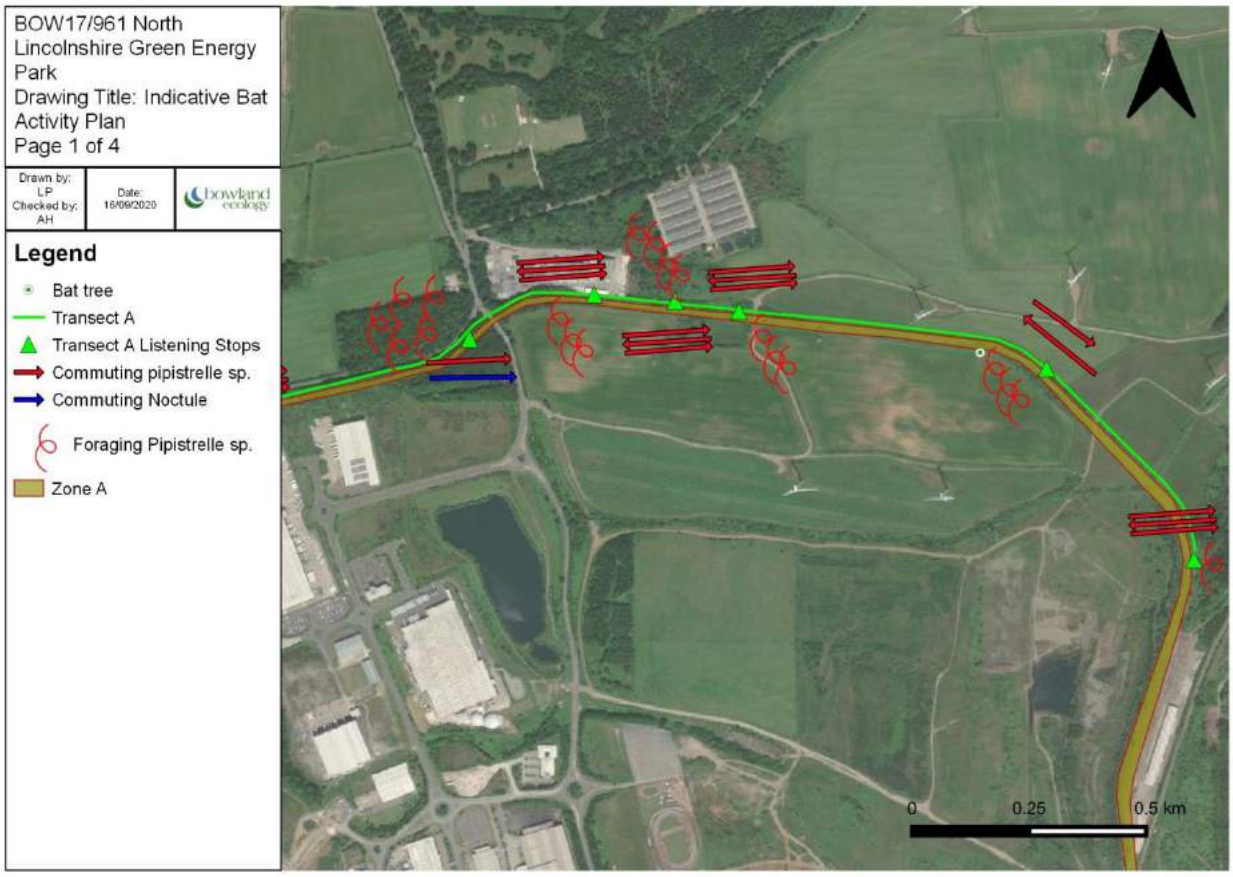
Date 10/09/2020
bowland ecology
Legend
Bat tree
Zone B & C Static Locations
Buildings
Zone C
Zone D
Site Boundary
S8
B19
T13
B20
0
0.25
0.5 km

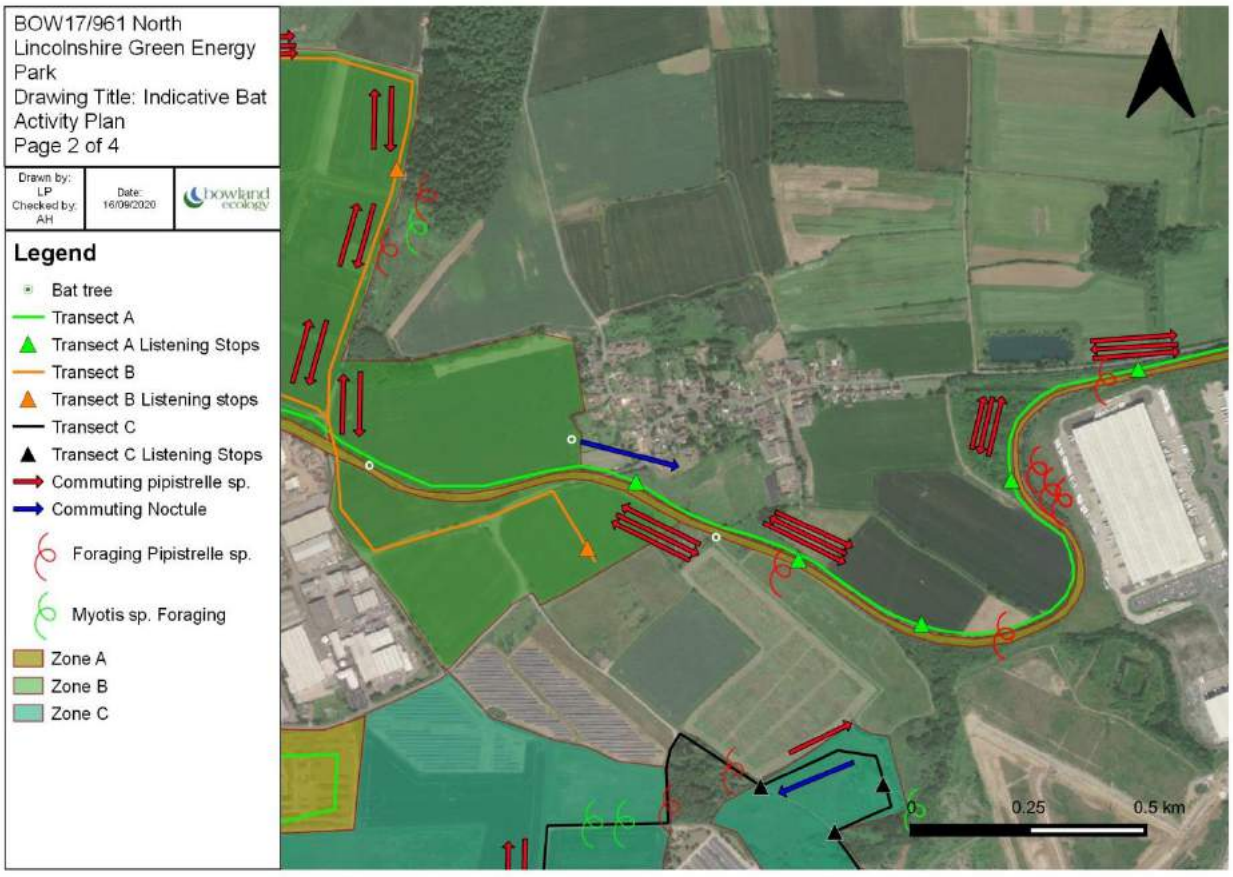
Appendix C: Bat Roost Potential and Habitat Suitability Categories

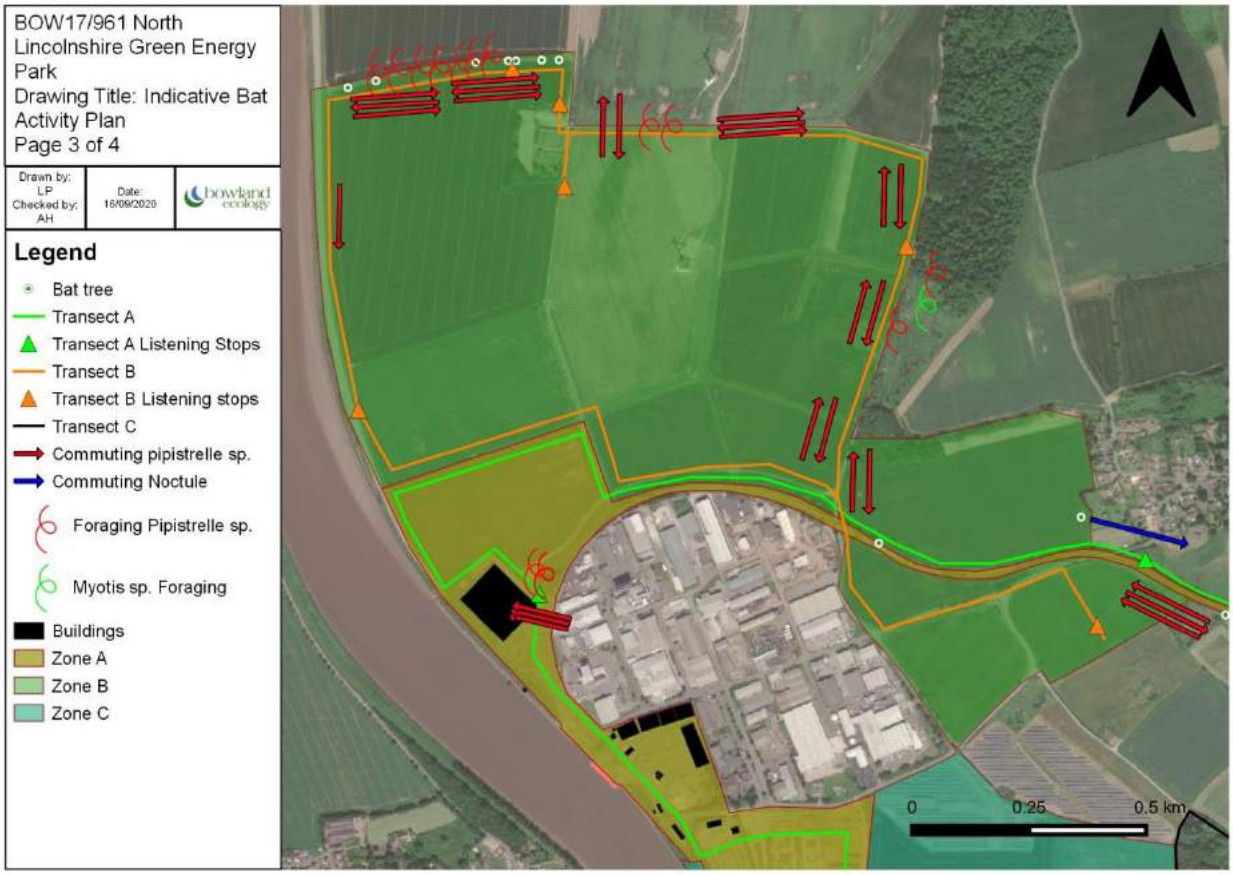
Guidelines for assessing the potential suitability of proposed development sites for bats, based on the presence of habitat features within the landscape (Collins, 2016).

Suitability	Description of Roosting Habitat	Commuting & Foraging Habitats
Negligible	Negligible habitat features on site likely to be used by roosting bats	Negligible habitat features on site likely to be used by commuting or foraging bats.
Low	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 habitats to be used on a regular basis or by a larger number of bats (i.e., unlikely to be suitable maternity or hibernation). A tree of sufficient size and age to contain potential roosting features but with none seen from the ground, or feature seen with only very limited roosting potential.	Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or unvegetated stream, but isolated i.e., not very well connected to the surrounding landscape by other habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
Moderate	A structure or 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 of high conservation status.	Continuous habitat connected to the wider landscape that could be used by bats for commuting, such as lines of trees and scrub or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging, such as trees, scrub, grassland, or water.
High	A structure or 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.	Continuous high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines of trees and woodland edge. High quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats, such as broadleaved woodland, tree-lined watercourses, and grazed parkland. Site is close and connected to known roosts.

Appendix D: Bat Activity Survey Plans



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Page 3 of 4
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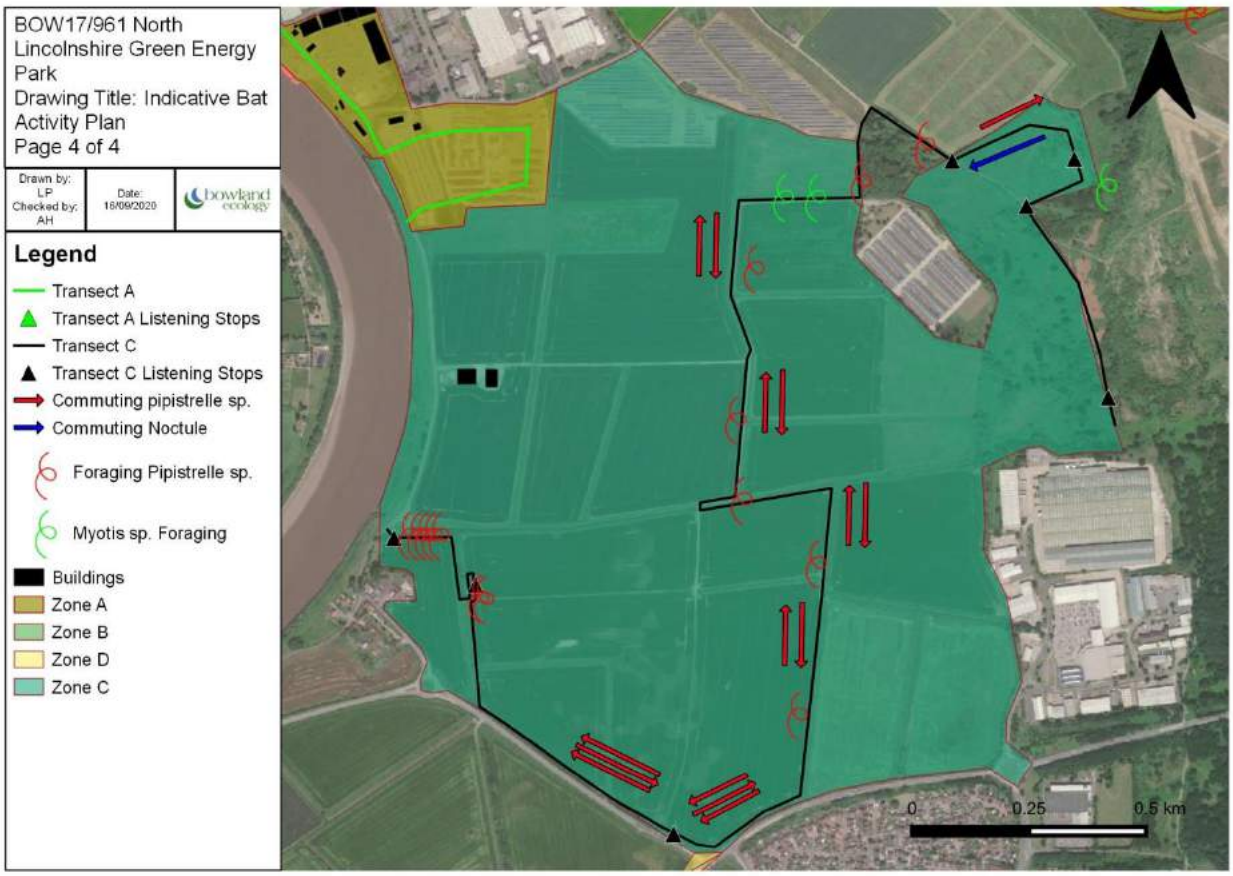
Checked by: AH
Date: 18/09/2020
bowland ecology
Legend
Bat tree
Transect A
Transect A Listening Stops
Transect B
Transect B Listening stops
Transect C
Commuting pipistrelle sp.
Commuting Noctule
Foraging Pipistrelle sp.
Myotis sp. Foraging
Buildings
Zone A
Zone B
Zone C
0
0.25
0.5 km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Drawing Title: Indicative Bat Activity Plan
Page 4 of 4
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Legend
Transect A
Transect A Listening Stops
Transect C
Transect C Listening Stops
Commuting pipistrelle sp.
Commuting Noctule
Foraging Pipistrelle sp.
Myotis sp. Foraging
Buildings
Zone A
Zone B
Zone D
Zone C
0
0.25
0.5 km

Appendix E: Building and Tree Assessment

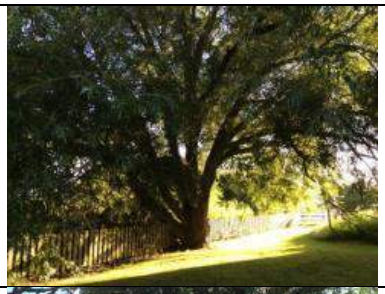
Zone	Number	Description	Bat Roost Potential	Photograph
A	B1	A large corrugated, metal storage building located at northern edge of the Order Limits. The roof is pitched with skylights along all sections making the internal space very light. The building is used for the storage of materials and internally is well lit and relatively noisy due to vehicle movements. No PRFs were noted during the survey.	**Negligible**	
A	B2	A single storey red brick building with a pitched corrugated roof located on the banks of the River Trent outside of the Order Limits. Structural cracks are located on the north-eastern facing elevation provide small PRFs.	**Low**	
A	B3	Single storey red brick building with a pitched roof covered with timber and bitumastic felt both of which are in very poor condition with sections of felt and timber missing. Appears to have previously been a tiled roof. Windows and doors are open and broken. The exposed, damp nature of the building limits the value of available PRFs.	**Negligible**	
A	B4	Single storey red brick building with a mono pitch corrugated roof. The building is used to house electrical generators and lacks PRFs.	**Negligible**	No Photograph
A	B5-B9	Series of five large metal corrugated storage sheds with pitched, metal corrugated roofs. All the buildings have large doors which are open throughout the day, along with large skylights across the roof. The surrounding area is noisy and well lit. The buildings exposure and material limited PRFs.	**Negligible**	

Zone	Number	Description	Bat Roost Potential	Photograph
A	B10	Single storey red brick building with a flat concrete roof. The building overall is in poor condition with missing bricks on the lower courses close to the ground but has well-sealed metal framed windows and doors. No surrounding or connecting habitat suitable for roosting bats was noted, limiting PRFs.	**Negligible**	
A	B11	Single storey, red brick building with a flat roof. Some areas have missing bricks and mortar and there are some gaps in the brickwork, however, these are all on lower courses close to the ground and considered to be of limited value as a PRFs.	**Negligible**	
A	B12	Red brick building with a flat roof used as a mechanics garage. Large doors are open all day, creating a draughty environment which limits PRFs.	**Negligible**	
A	B13	A series of portacabins with metal frames and flat metal roofs, the building is used as office facilities. The building structure, along with as lack of suitable surrounding and/or connecting habitat, limits PRFs.	**Negligible**	
A	B14	Single storey red brick building with PVC framed windows and a flat bitumen felted roof with concrete slabs on the edges. Well-sealed timber barge boards are present on the northern elevation. Internally the ceiling comprises suspended plaster board. Paired with a lack of suitable surrounding and/or connecting habitat, PRFs are limited.	**Negligible**	
C	B15	Large porta cabin building used as an office facility. The building is well sealed and provides negligible bat roost potential with no PRFs and a	**Negligible**	

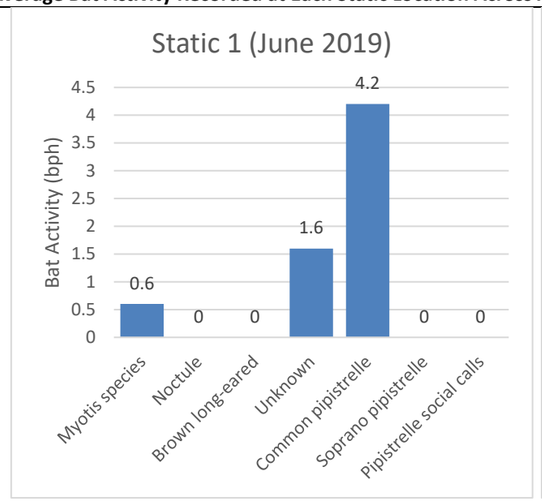
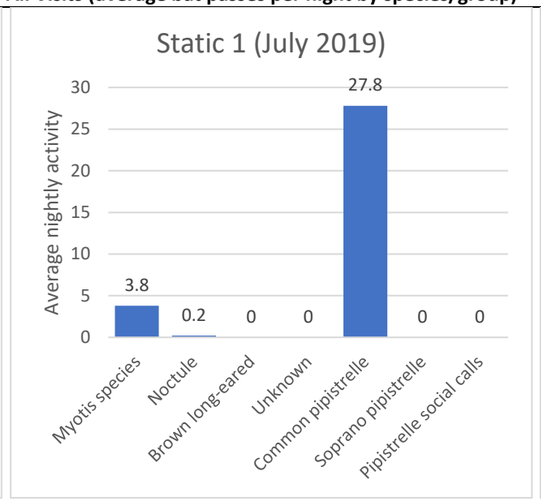
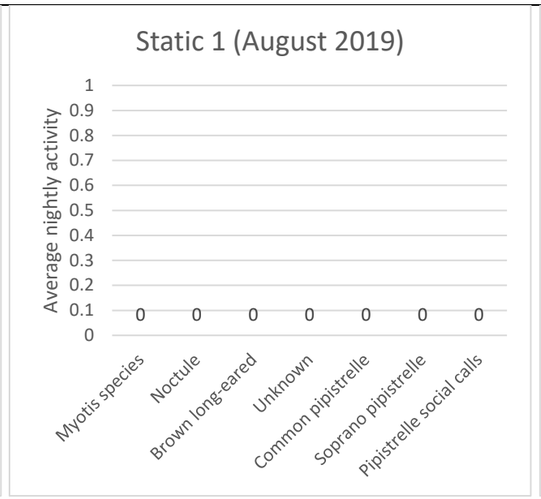
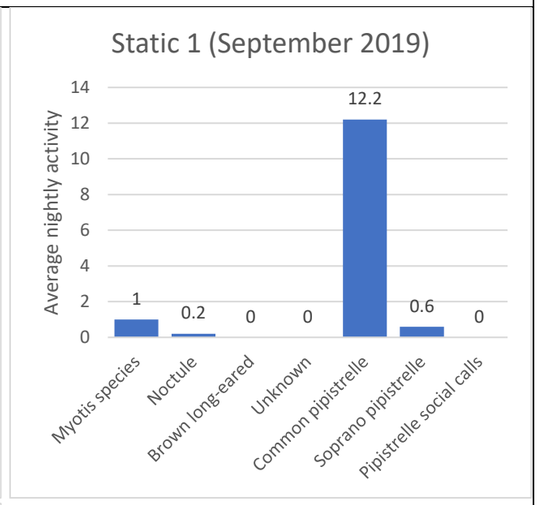
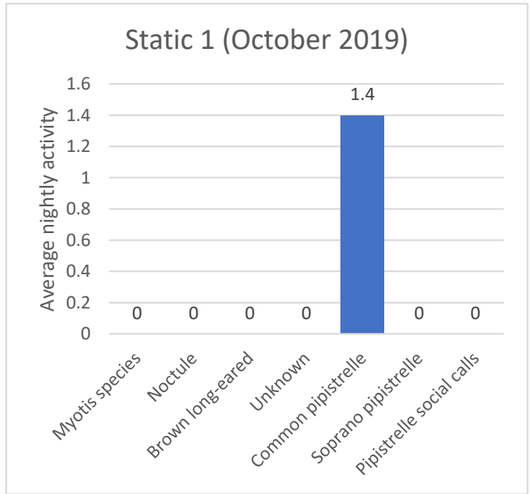
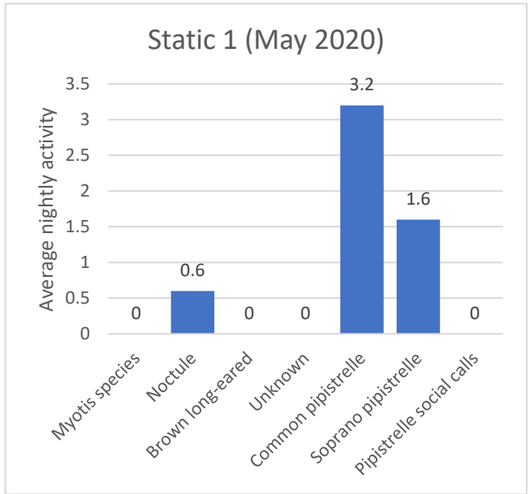
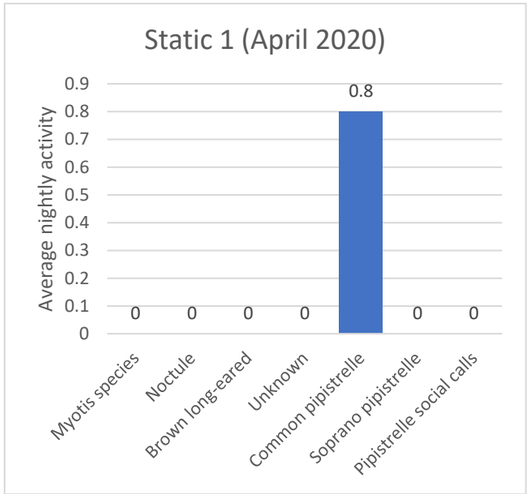
Zone	Number	Description	Bat Roost Potential	Photograph
		lack of suitable surrounding and/or connecting habitat.		
C	B16	Large storage building with breeze block walls from the ground to the mid-point on the building. The remainder is clad with timber to the wall tops. The roof comprises single skinned corrugated metal sheeting. Paired with a lack of suitable surrounding and/or connecting habitat, PRFs are limited.	**Negligible**	
C	B17	Large farm building, comprising red brick walls with and timber slats, with a pitched roof constructed of corrugated sheeting. The building presented limited PRFs.	**Negligible**	
C	B18	Large farm building constructed of timber slats and metal sheeting. The roof is pitched, comprising corrugated roofing material. The building presented limited PRFs.	**Negligible**	
D	B19	Located to the east of the A1077, within the Gallagher Retail Park. The building is in use as a Tesco Extra and is of modern construction. The roof is flat and constructed of metal sheeting. The building is well lit and well-sealed, presenting limited PRFs.	**Negligible**	
D	B20	Situated to the east of the A1077 road, in the Gallagher Retail Park and is in use as a hotel and restaurant. The building is of modern, brick construction. The roof has multiple pitches and is constructed of tiles. No missing mortar, missing or slipped tiles were recorded. A small section of roof is flat, with roof liner present. Small gaps beneath the roof lining may be suitable for small numbers of roosting bats. Timber cladding is present around some of the windows; however, it is well	**Low**	

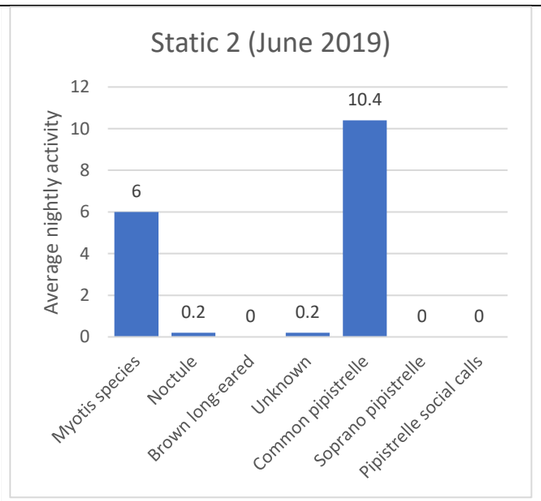
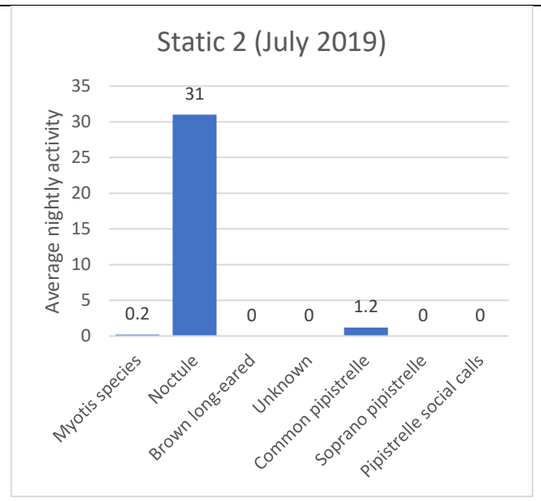
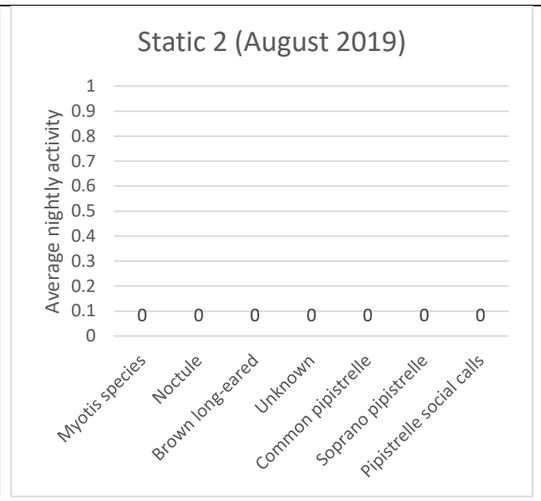
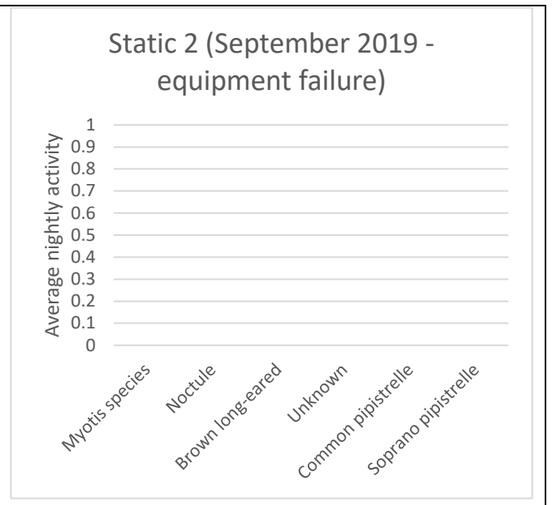
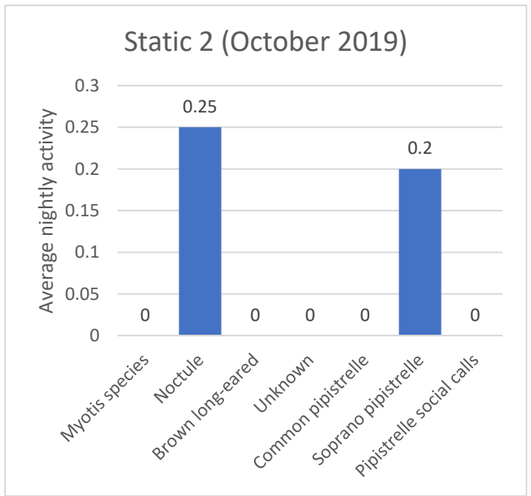
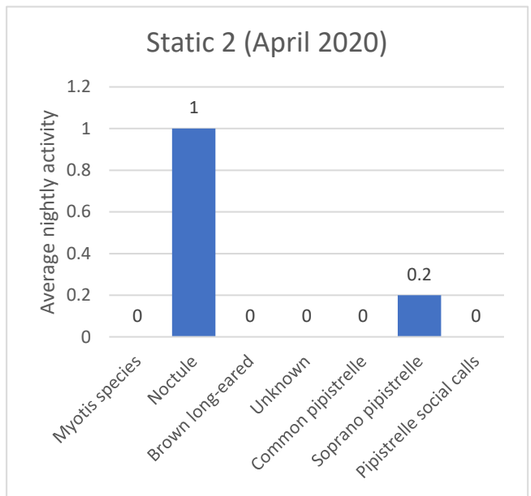
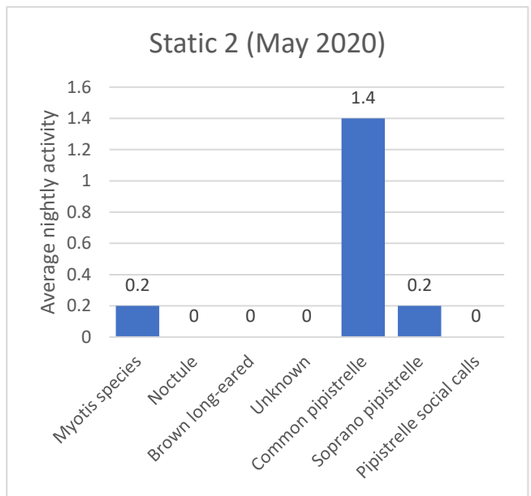
Zone	Number	Description	Bat Roost Potential	Photograph
		sealed, with no gaps suitable for roosting bats were noted.		
A	T1	Semi-mature ash tree located within scrub on the railway boundary. The tree presents light ivy cladding.	**Low**	No Photograph
A	T2	Semi-mature ash with moderate ivy cladding. Dense foliage in the canopy limited a full view of the tree.	**Low/moderate**	No Photograph
A	T3	Semi-mature trees with bat boxes attached.	**High**	No Photograph
B	T4	Semi – mature ash tree, situated in an arable field, within a line of trees including mature trees and saplings with tree guards still present. Approximately 20 m high with a diameter of 0.75 m. The tree is located to the north of the Order Limits. PRF's comprise – several knot holes, branch tear-outs and rotting bark in the canopy.	**Moderate**	
B	T5	Mature ash tree, situated in an arable field, within a line of trees including mature trees and saplings with tree guards still present. Over 20 m high with a diameter of 0.8 m. The tree is located to the north of the Order Limits. PRF's comprise – knot hole present on the south east elevation, a wound fall in the main trunk and a compression fork.	**Moderate-high**	
B	T6	Semi – mature ash tree, situated in an arable field, within a line of trees including mature trees and saplings with tree guards still present. Under 20 m high with a diameter of 0.6 m. The tree is located to the north of the Order Limits. PRF's comprise a broken limb on the north elevation of the main trunk which could lead to a cavity and a knot hole on the south elevation.	**Low-moderate**	

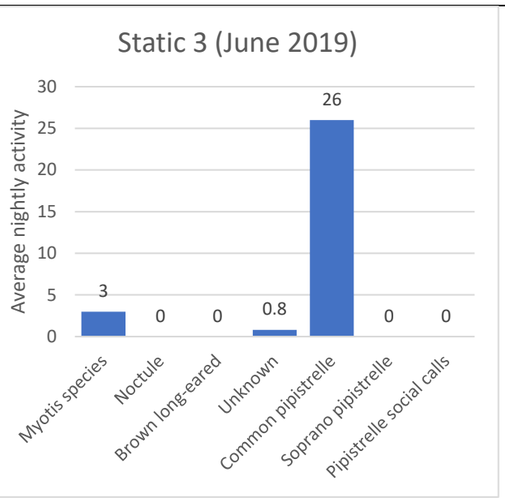
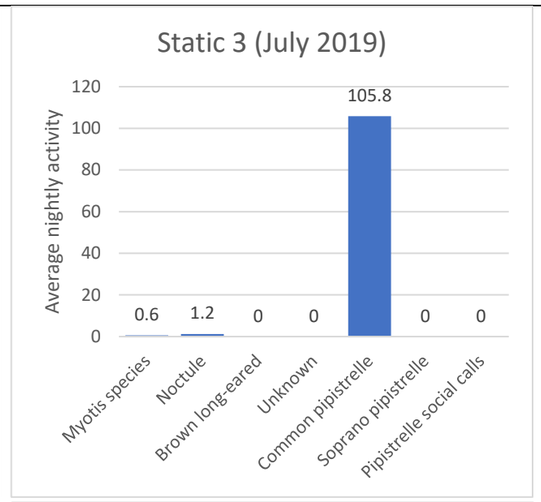
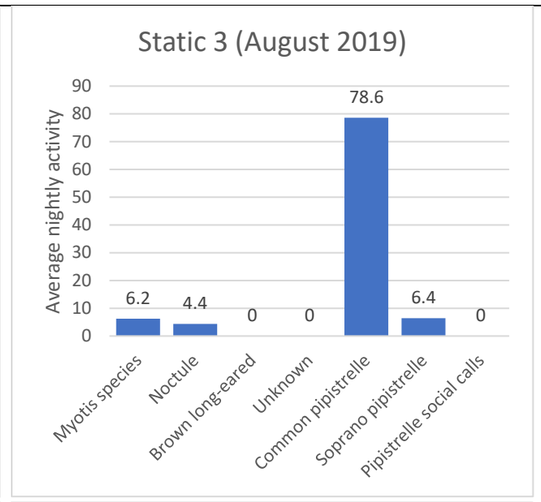
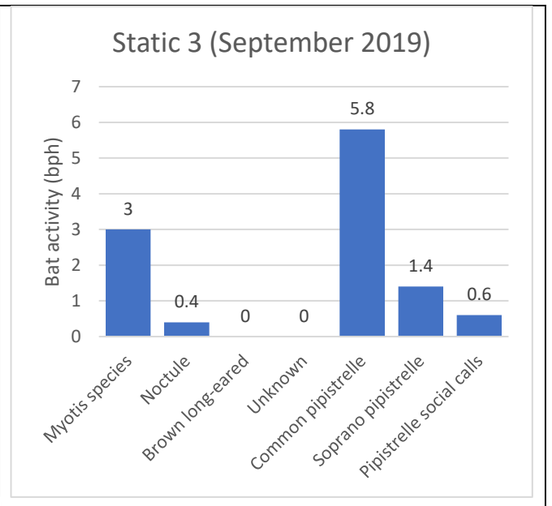
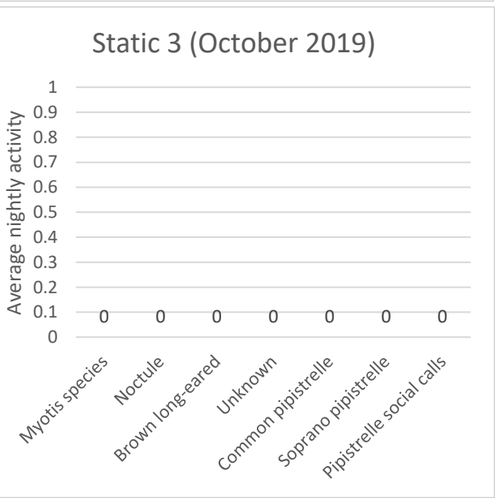
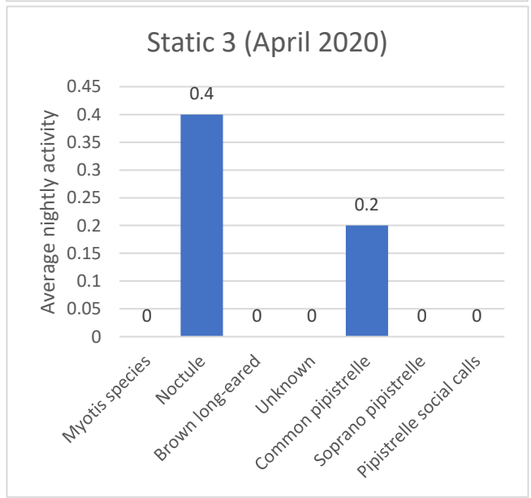
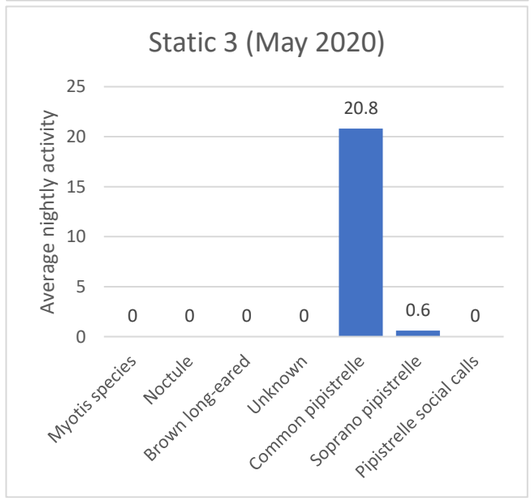
Zone	Number	Description	Bat Roost Potential	Photograph
B	T7	Semi – mature ash tree, situated in an arable field, within a line of trees including mature trees and saplings with tree guards still present. Under 20 m high with a diameter of 0.5 m. The tree is located to the north of the Order Limits. PRF's comprise – cavities on all elevations, suggests that this would be draughty but could potentially lead to a large cavity further up the trunk, a torn limb was also noted on the south elevation.	**Low-moderate**	
B	T8	Semi – mature ash tree, situated in an arable field, in a line of trees including mature trees and saplings with tree guards still present. Under 20 m high with a diameter of 0.5 m. The tree is located to the north of the Order Limits. PRF's comprise – a split trunk running from ground level to 3 m in height on the north east elevation and a large tear out on the southern elevation. Both features are very exposed and do not appear to lead to cavities.	**Low**	
B	T9	Very mature ash tree situated in an arable field, in a line of trees including mature trees and saplings with tree guards still present. Over 20 m high, with a diameter of 0.8 m and a large canopy. The tree is located to the north of the Order Limits. PRF's comprise – multiple knot holes, torn limbs which feature dead wood and cavities, snapped limbs in the canopy and multiple wounds.	**Moderate-high**	
B	T10	Semi – mature ash tree, situated in an arable field, in a line of trees including mature trees and saplings with tree guards still present. Under 20 m high with a diameter of 0.6 m. The tree is located adjacent to the north of the Order Limits. PRF's comprise – occasional knot holes and rotting bark in the canopy	**Low**	

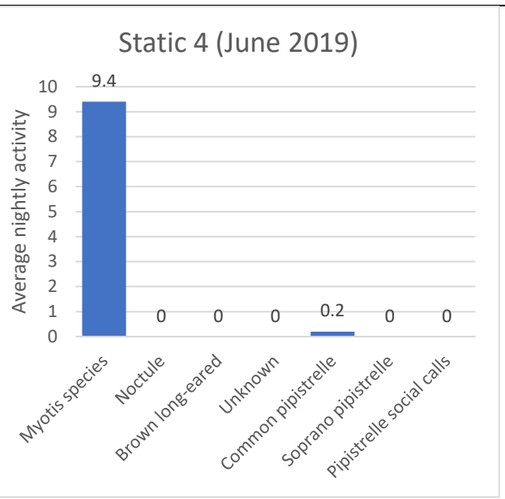
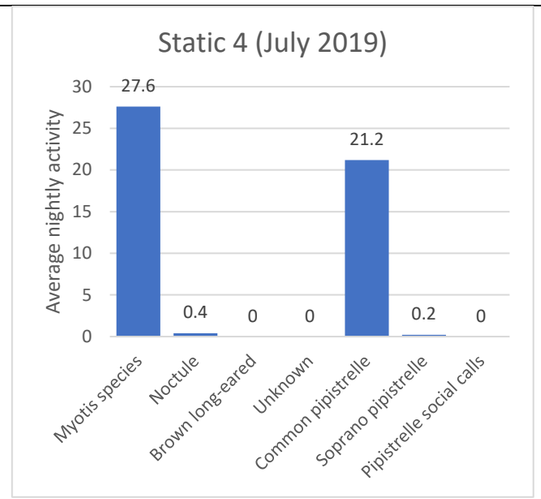
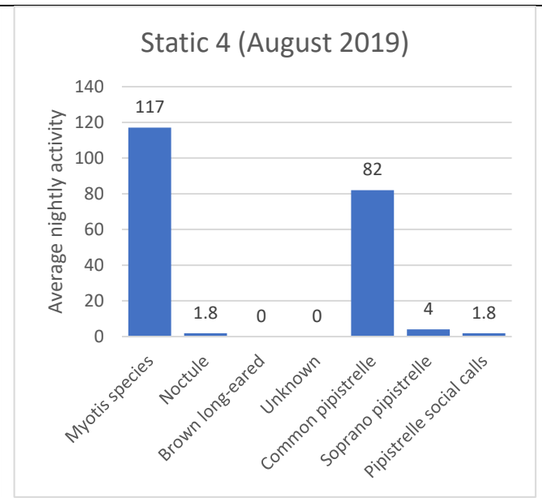
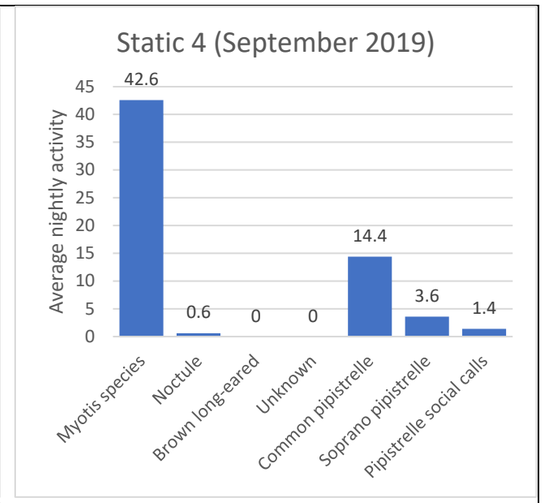
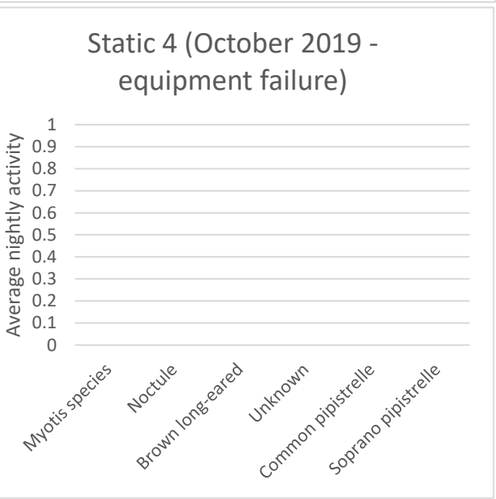
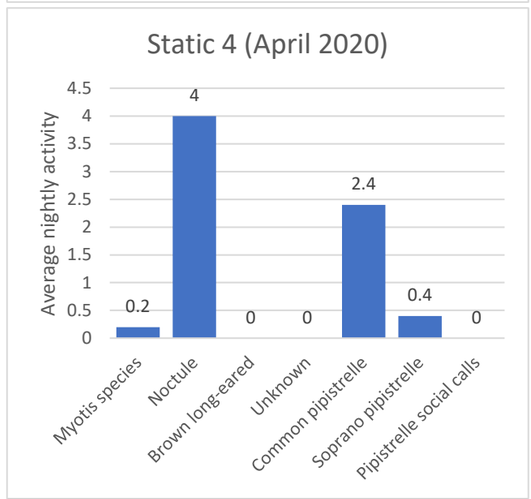
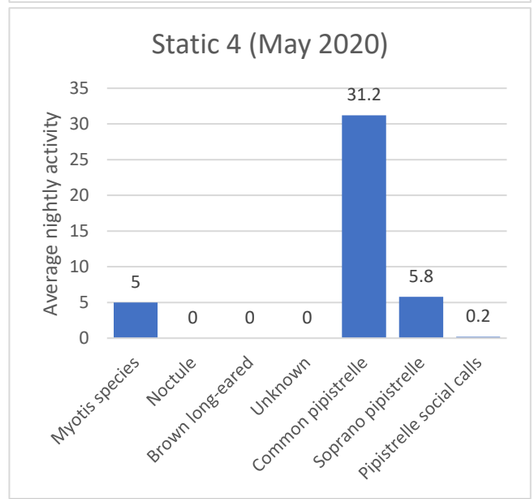
Zone	Number	Description	Bat Roost Potential	Photograph
B	T11	Semi-mature oak tree situated in area of dense bracken, near to multiple semi-mature trees, hedgerows, dense willow scrub, dense bramble scrub and areas of open water. Under 20 m high with a diameter of 0.6 m. PRF's comprise – compression fork located on the south facing aspect of the trunk.	**Low**	
C	T12	Dead oak tree located in an arable field, close to areas of dense scrub. The tree appears to have been struck by lightning. PRFs comprise a large split in the trunk which may lead to a large internal cavity	**Moderate**	No Photograph
D	T13	Mature willow tree situated in the grounds of B20, to the east of the Southern DHPWN Land. The tree is under 20 m in height, with a diameter of 0.7 m. PRFs comprise several torn limbs and lifted bark.	**Low**	
D	T14	Mature willow tree which is located adjacent to an area of dense scrub, within 0.1 km of the Southern DHPWN Land. The tree is approximately 11 m in height, with a diameter of 1.4 m. PRF's comprise – a large crack in the trunk approximately 2.5 m from ground level. Lifted bark and split branches are present higher in the canopy.	**Low**	
D	T15	Mature willow tree which is located close to an area of dense scrub, within 0.1 km of the Southern DHPWN Land. The tree is approximately 9 m in height, with a diameter of 1 m. PRF's comprise a split in the trunk approximately 1.5 m from ground level. Lifted bark is present higher in the canopy.	**Low**	

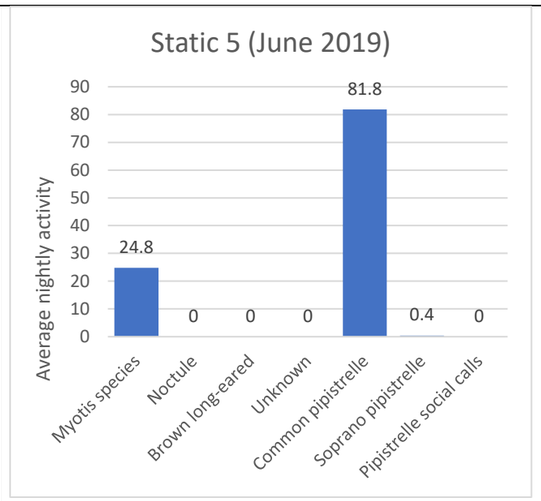
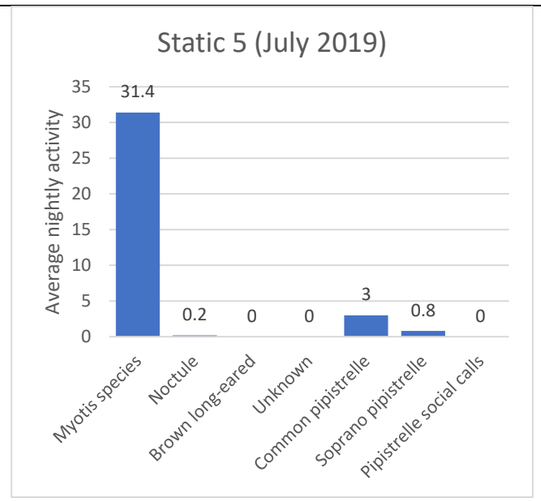
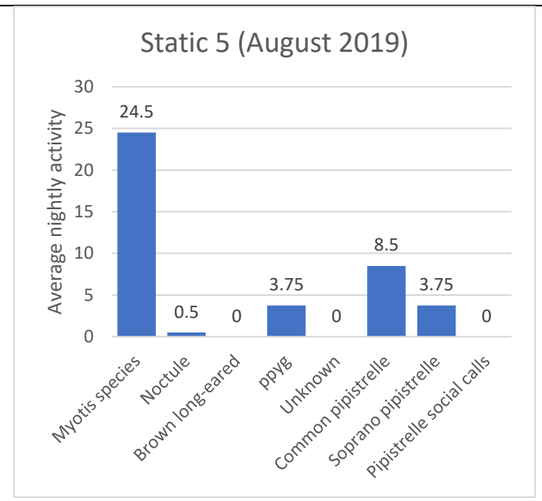
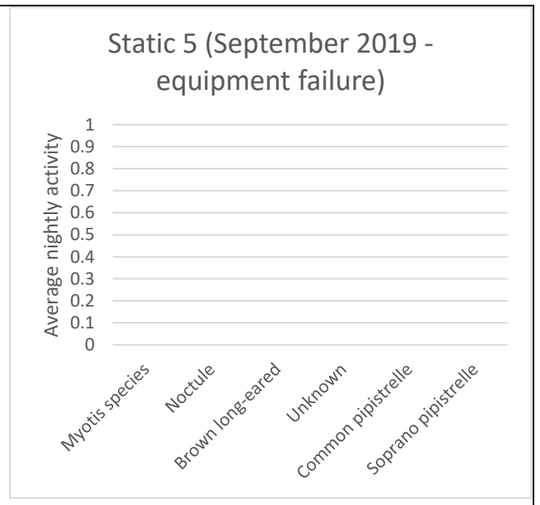
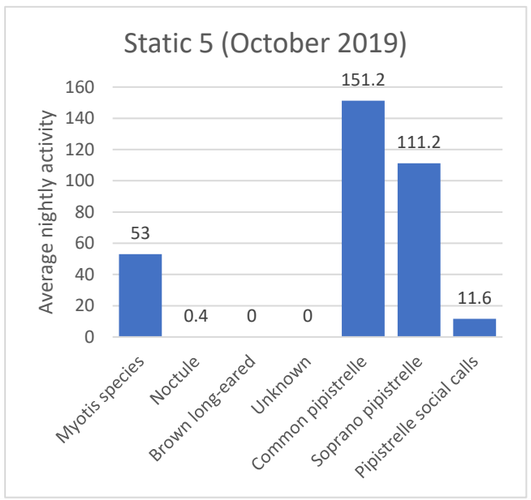
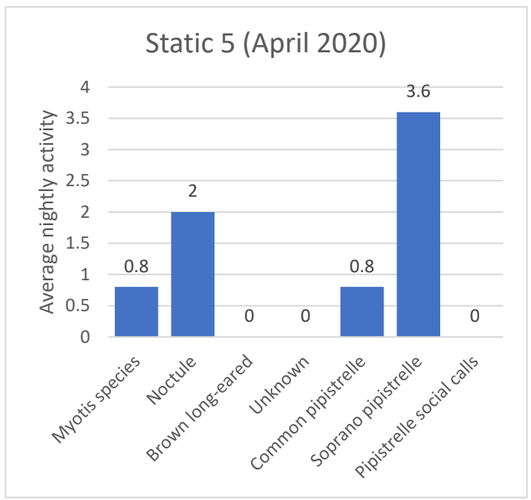
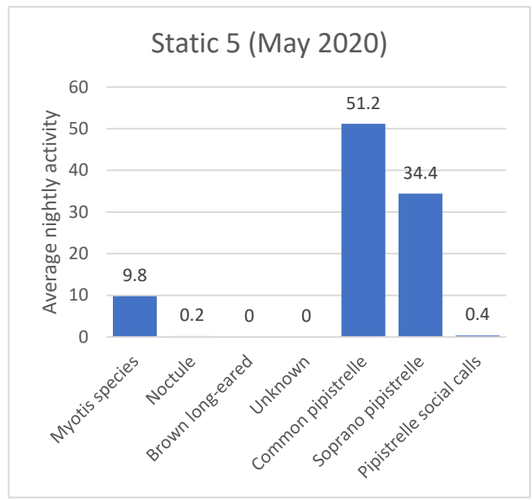
Appendix F: Static Bat Detector Results

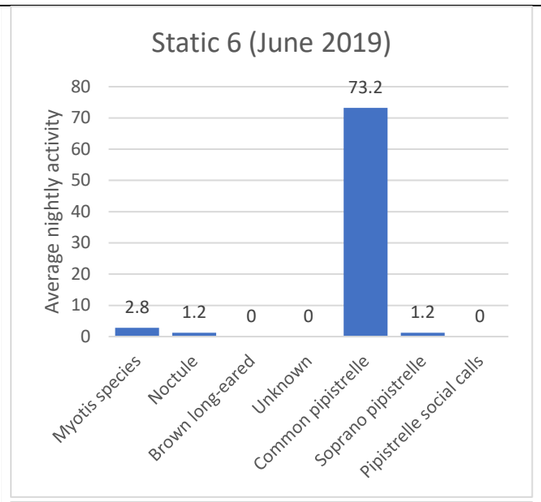
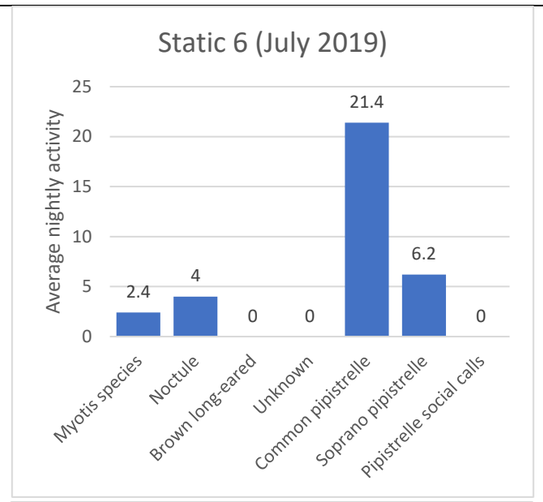
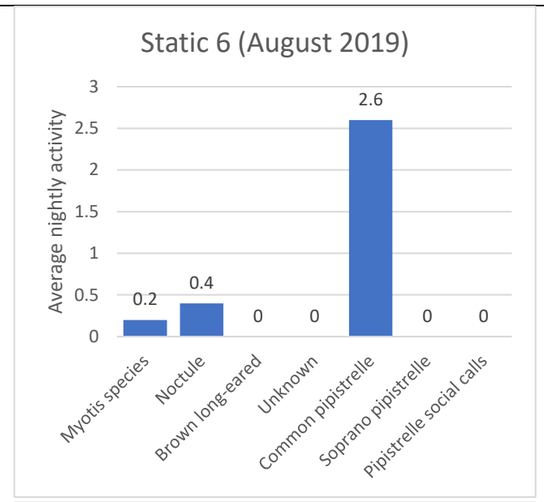
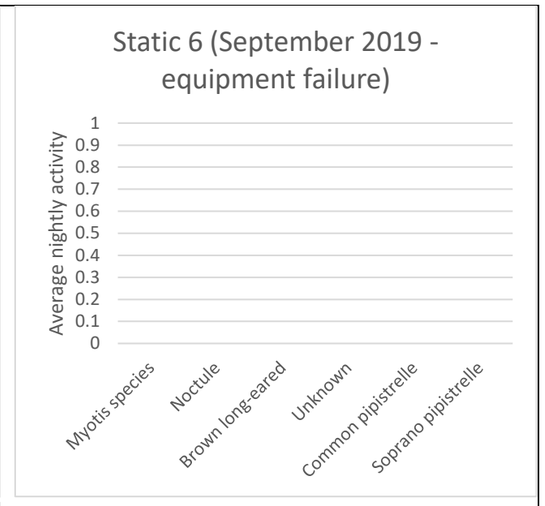
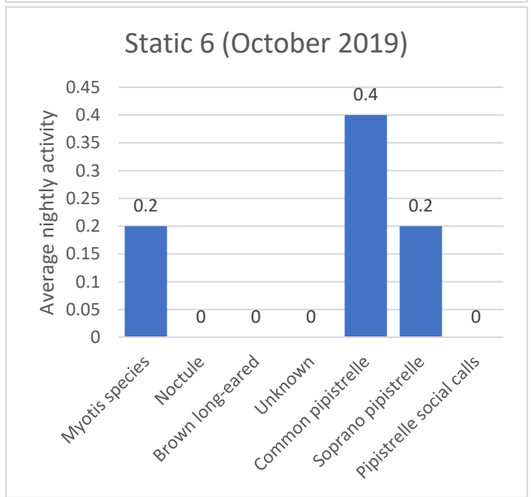
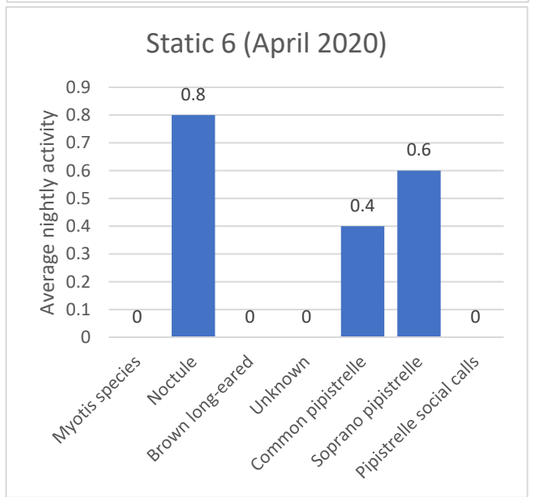
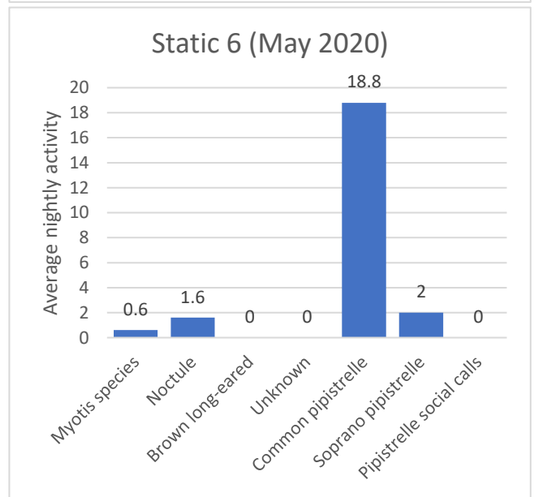
Zone	Static	Average Bat Activity Recorded at Each Static Location Across All Visits (average bat passes per night by species/group)
A	1	      

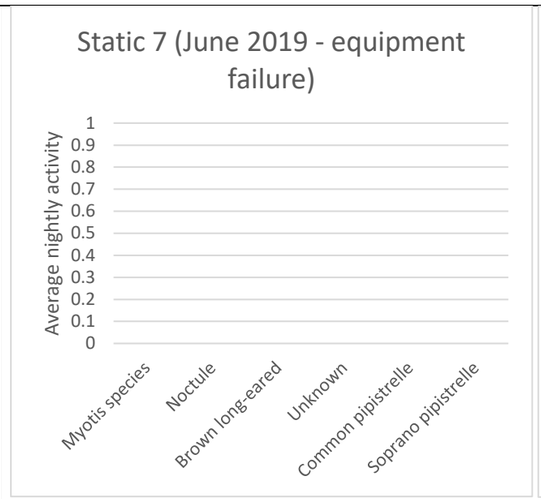
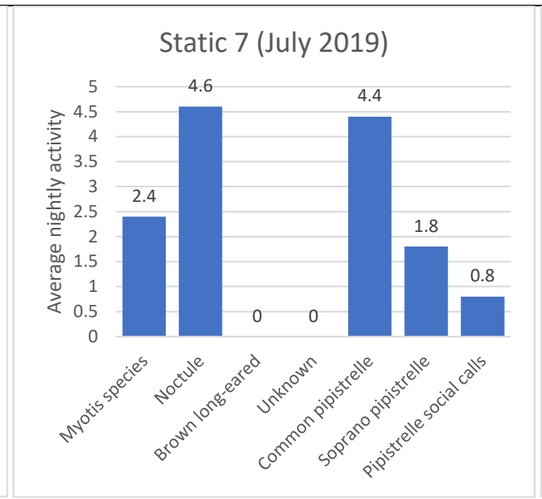
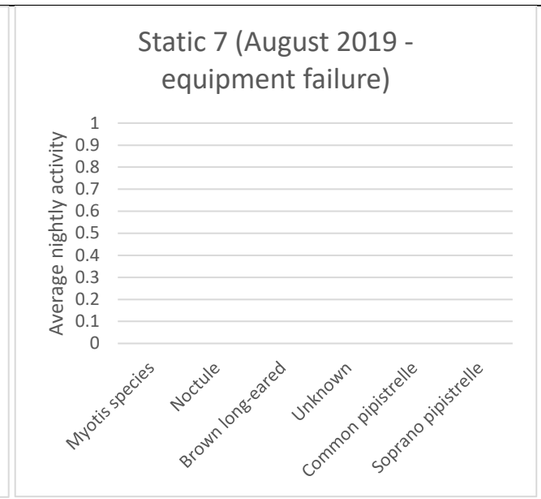
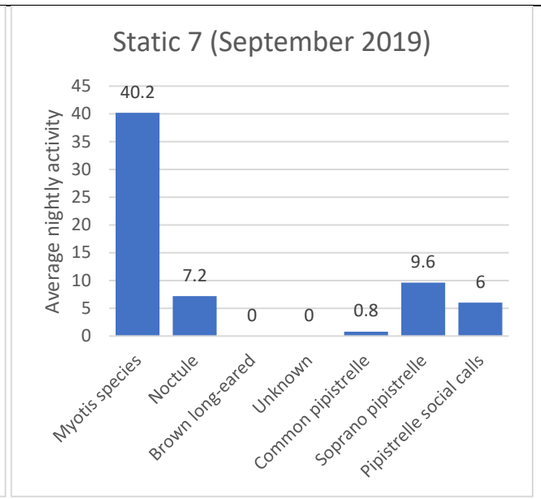
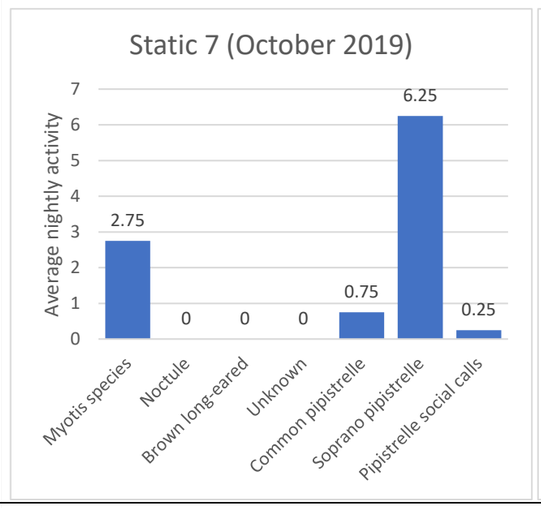
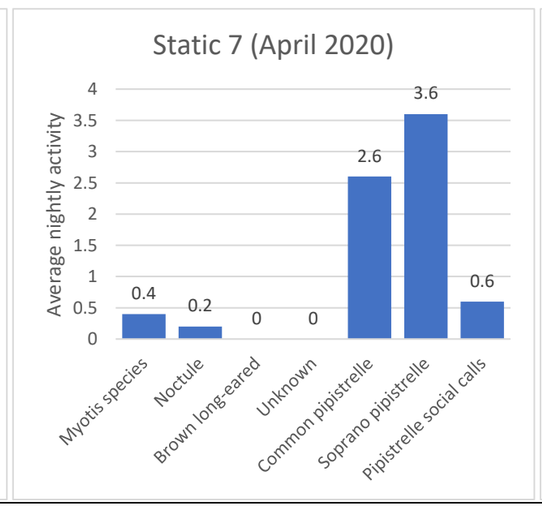
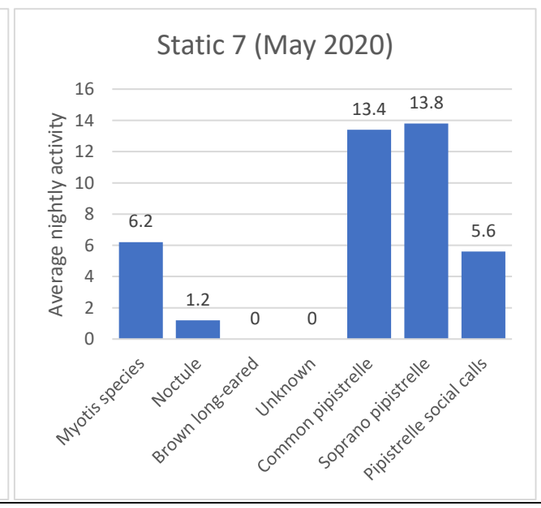
A	2	 Static 2 (June 2019) Average nightly activity 12 10 8 6 4 2 0 6 0.2 0 0.2 10.4 0 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls  Static 2 (July 2019) Average nightly activity 35 30 25 20 15 10 5 0 0.2 31 0 0 1.2 0 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls  Static 2 (August 2019) Average nightly activity 1 0.9 0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.1 0 0 0 0 0 0 0 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls  Static 2 (September 2019 - equipment failure) Average nightly activity 1 0.9 0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.1 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle  Static 2 (October 2019) Average nightly activity 0.3 0.25 0.2 0.15 0.1 0.05 0 0 0.25 0 0 0 0.2 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls  Static 2 (April 2020) Average nightly activity 1.2 1 0.8 0.6 0.4 0.2 0 0 1 0 0 0 0.2 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls  Static 2 (May 2020) Average nightly activity 1.6 1.4 1.2 1 0.8 0.6 0.4 0.2 0 0.2 0 0 0 1.4 0.2 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls

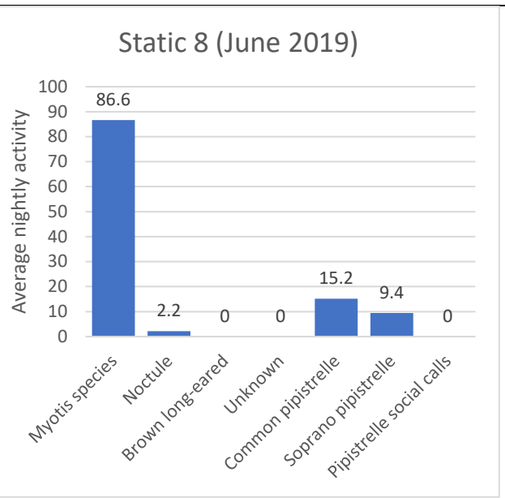
A	3	 Static 3 (June 2019) Average nightly activity 30 25 20 15 10 5 0 3 0 0 0.8 26 0 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls  Static 3 (July 2019) Average nightly activity 120 100 80 60 40 20 0 0.6 1.2 0 0 105.8 0 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls  Static 3 (August 2019) Average nightly activity 90 80 70 60 50 40 30 20 10 0 6.2 4.4 0 0 78.6 6.4 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls  Static 3 (September 2019) Bat activity (bph) 7 6 5 4 3 2 1 0 3 0.4 0 0 5.8 1.4 0.6 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls  Static 3 (October 2019) Average nightly activity 1 0.9 0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.1 0 0 0 0 0 0 0 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls  Static 3 (April 2020) Average nightly activity 0.45 0.4 0.35 0.3 0.25 0.2 0.15 0.1 0.05 0 0 0.4 0 0 0.2 0 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls  Static 3 (May 2020) Average nightly activity 25 20 15 10 5 0 0 0 0 0 20.8 0.6 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls

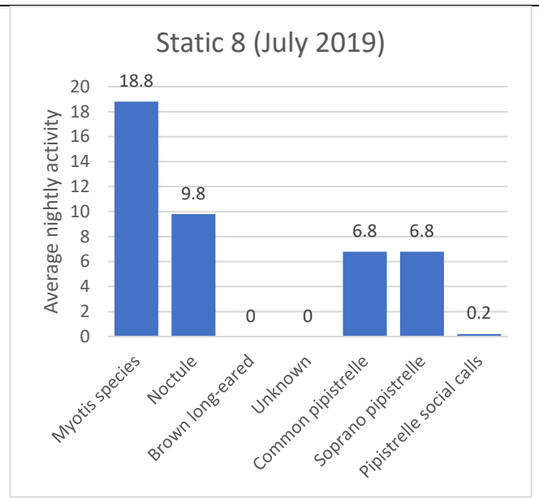
A	4	 Static 4 (June 2019) Average nightly activity 9.4 0 0 0 0.2 0 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls  Static 4 (July 2019) Average nightly activity 27.6 0.4 0 0 21.2 0.2 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls  Static 4 (August 2019) Average nightly activity 117 1.8 0 0 82 4 1.8 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls  Static 4 (September 2019) Average nightly activity 42.6 0.6 0 0 14.4 3.6 1.4 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls  Static 4 (October 2019 - equipment failure) Average nightly activity Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle  Static 4 (April 2020) Average nightly activity 0.2 4 0 0 2.4 0.4 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls  Static 4 (May 2020) Average nightly activity 5 0 0 0 31.2 5.8 0.2 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls

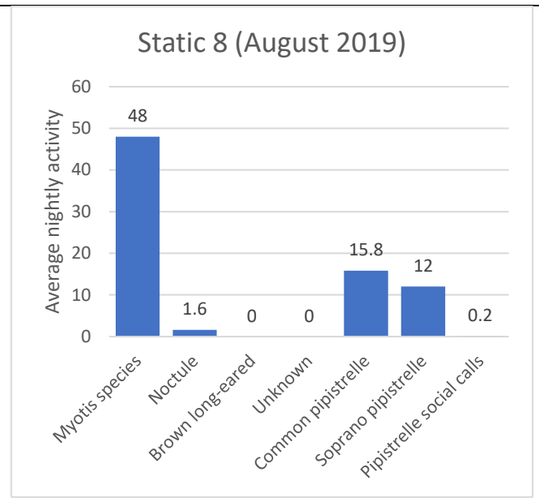
A	5	 Static 5 (June 2019) Average nightly activity 90 80 70 60 50 40 30 20 10 0 24.8 0 0 0 81.8 0.4 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls  Static 5 (July 2019) Average nightly activity 35 30 25 20 15 10 5 0 31.4 0.2 0 0 3 0.8 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls  Static 5 (August 2019) Average nightly activity 30 25 20 15 10 5 0 24.5 0.5 0 3.75 0 8.5 3.75 0 Myotis species Noctule Brown long-eared ppyg Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls  Static 5 (September 2019 - equipment failure) Average nightly activity 1 0.9 0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.1 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle  Static 5 (October 2019) Average nightly activity 160 140 120 100 80 60 40 20 0 53 0.4 0 0 151.2 111.2 11.6 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls  Static 5 (April 2020) Average nightly activity 4 3.5 3 2.5 2 1.5 1 0.5 0 0.8 2 0 0 0.8 3.6 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls  Static 5 (May 2020) Average nightly activity 60 50 40 30 20 10 0 9.8 0.2 0 0 51.2 34.4 0.4 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls

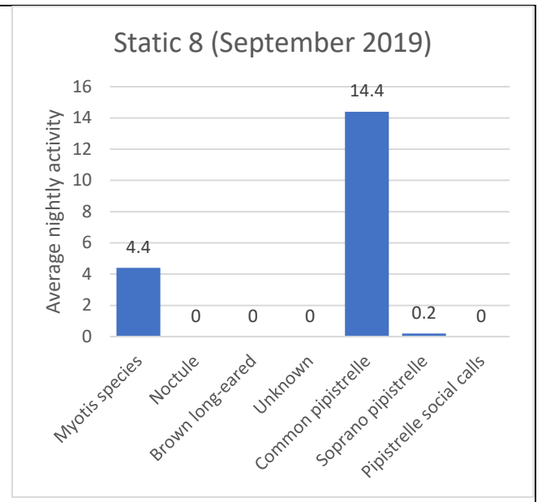
A	6	 Static 6 (June 2019) Average nightly activity 80 70 60 50 40 30 20 10 0 2.8 1.2 0 0 73.2 1.2 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls  Static 6 (July 2019) Average nightly activity 25 20 15 10 5 0 2.4 4 0 0 21.4 6.2 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls  Static 6 (August 2019) Average nightly activity 3 2.5 2 1.5 1 0.5 0 0.2 0.4 0 0 2.6 0 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls  Static 6 (September 2019 - equipment failure) Average nightly activity 1 0.9 0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.1 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle  Static 6 (October 2019) Average nightly activity 0.45 0.4 0.35 0.3 0.25 0.2 0.15 0.1 0.05 0 0.2 0 0 0 0.4 0.2 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls  Static 6 (April 2020) Average nightly activity 0.9 0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.1 0 0 0.8 0 0 0.4 0.6 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls  Static 6 (May 2020) Average nightly activity 20 18 16 14 12 10 8 6 4 2 0 0.6 1.6 0 0 18.8 2 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls

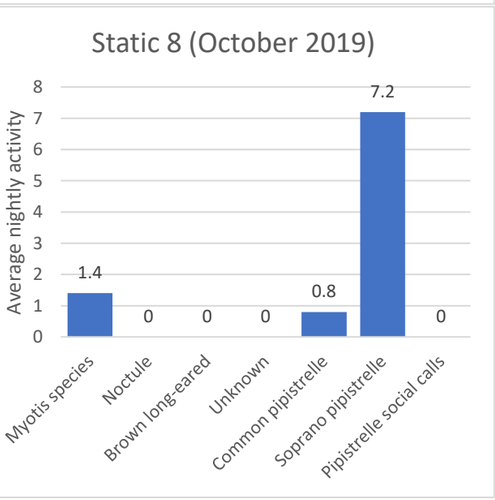
A	7	 Static 7 (June 2019 - equipment failure) Average nightly activity 0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle  Static 7 (July 2019) Average nightly activity 0 0.5 1 1.5 2 2.5 3 3.5 4 4.5 5 2.4 4.6 0 0 4.4 1.8 0.8 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls  Static 7 (August 2019 - equipment failure) Average nightly activity 0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle  Static 7 (September 2019) Average nightly activity 0 5 10 15 20 25 30 35 40 45 40.2 7.2 0 0 0.8 9.6 6 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls  Static 7 (October 2019) Average nightly activity 0 1 2 3 4 5 6 7 2.75 0 0 0 0.75 6.25 0.25 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls  Static 7 (April 2020) Average nightly activity 0 0.5 1 1.5 2 2.5 3 3.5 4 0.4 0.2 0 0 2.6 3.6 0.6 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls  Static 7 (May 2020) Average nightly activity 0 2 4 6 8 10 12 14 16 6.2 1.2 0 0 13.4 13.8 5.6 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls
A	8	

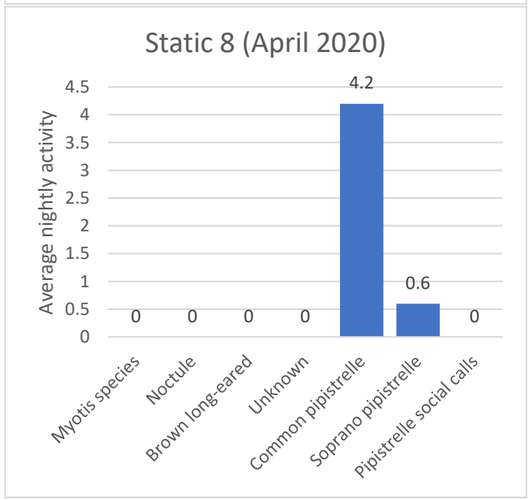

Static 8 (June 2019)
Average nightly activity
100
90
80
70
60
50
40
30
20
10
0
86.6
2.2
0
0
15.2
9.4
0
Myotis species
Noctule
Brown long-eared
Unknown
Common pipistrelle
Soprano pipistrelle
Pipistrelle social calls


Static 8 (July 2019)
Average nightly activity
20
18
16
14
12
10
8
6
4
2
0
18.8
9.8
0
0
6.8
6.8
0.2
Myotis species
Noctule
Brown long-eared
Unknown
Common pipistrelle
Soprano pipistrelle
Pipistrelle social calls


Static 8 (August 2019)
Average nightly activity
60
50
40
30
20
10
0
48
1.6
0
0
15.8
12
0.2
Myotis species
Noctule
Brown long-eared
Unknown
Common pipistrelle
Soprano pipistrelle
Pipistrelle social calls

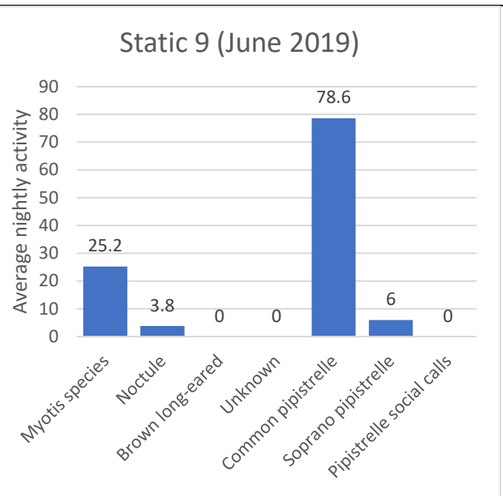

Static 8 (September 2019)
Average nightly activity
16
14
12
10
8
6
4
2
0
4.4
0
0
0
14.4
0.2
0
Myotis species
Noctule
Brown long-eared
Unknown
Common pipistrelle
Soprano pipistrelle
Pipistrelle social calls

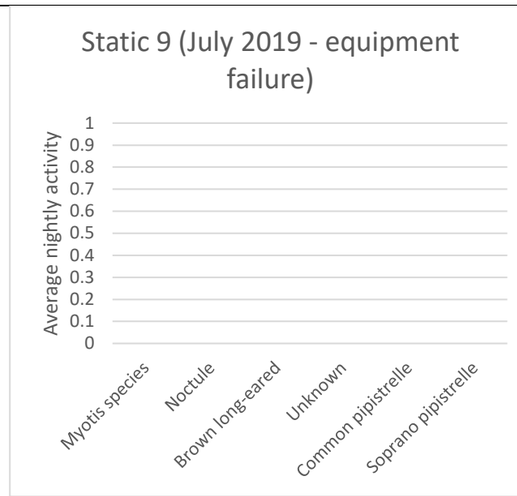

Static 8 (October 2019)
Average nightly activity
8
7
6
5
4
3
2
1
0
1.4
0
0
0
0.8
7.2
0
Myotis species
Noctule
Brown long-eared
Unknown
Common pipistrelle
Soprano pipistrelle
Pipistrelle social calls

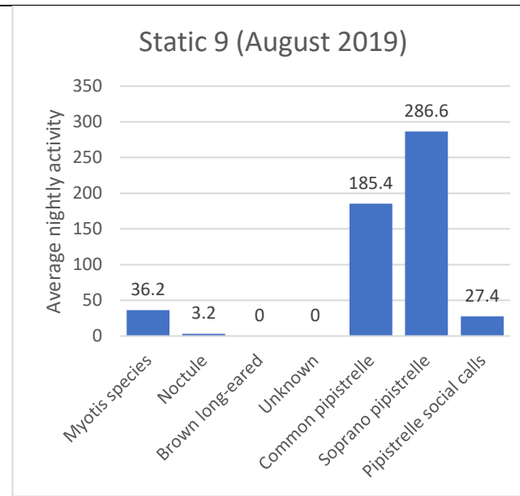

Static 8 (April 2020)
Average nightly activity
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
0
0
0
0
4.2
0.6
0
Myotis species
Noctule
Brown long-eared
Unknown
Common pipistrelle
Soprano pipistrelle
Pipistrelle social calls

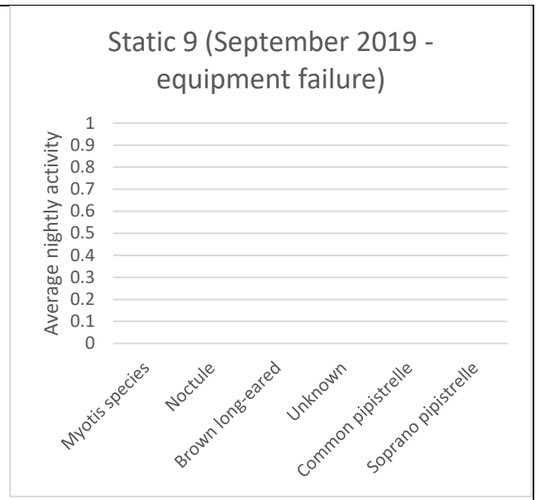

Static 8 (May 2020 - equipment failure)
Average nightly activity
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Myotis species
Noctule
Brown long-eared
Unknown
Common pipistrelle
Soprano pipistrelle

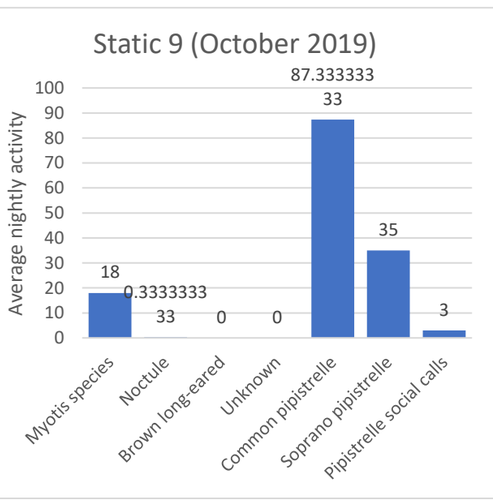
A	9	

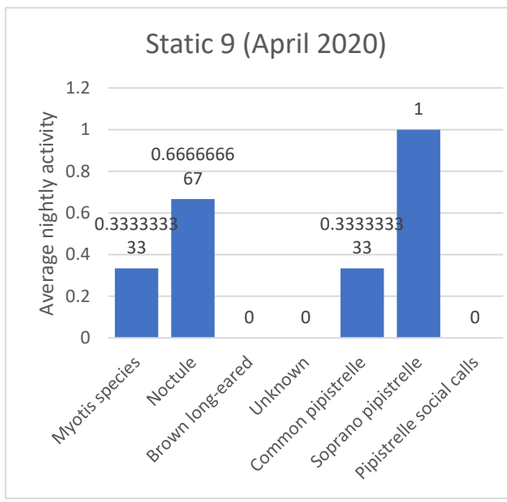

Static 9 (June 2019)
Average nightly activity
90
80
70
60
50
40
30
20
10
0
25.2
3.8
0
0
78.6
6
0
Myotis species
Noctule
Brown long-eared
Unknown
Common pipistrelle
Soprano pipistrelle
Pipistrelle social calls

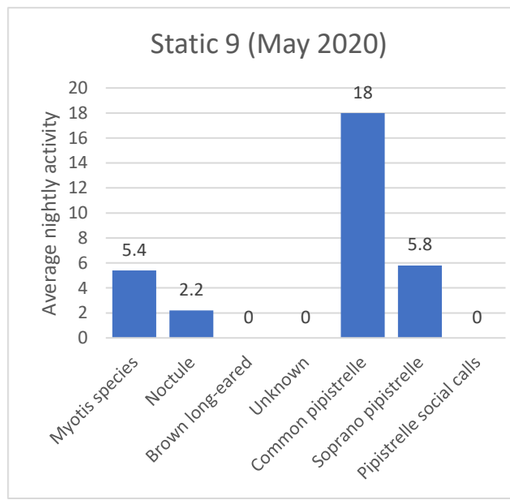

Static 9 (July 2019 - equipment failure)
Average nightly activity
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Myotis species
Noctule
Brown long-eared
Unknown
Common pipistrelle
Soprano pipistrelle

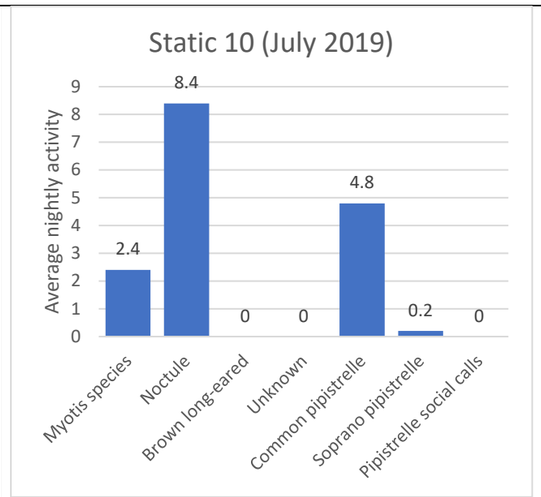
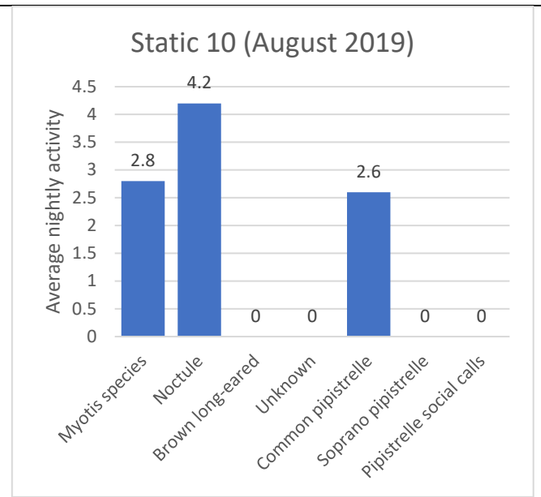
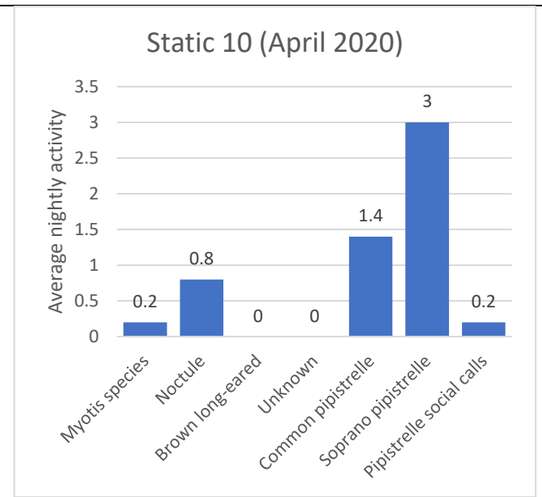
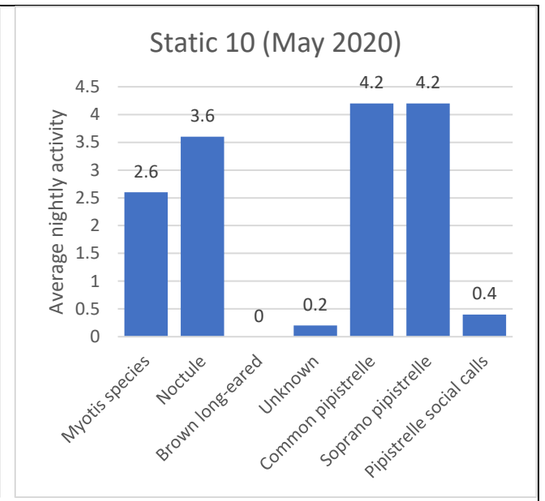
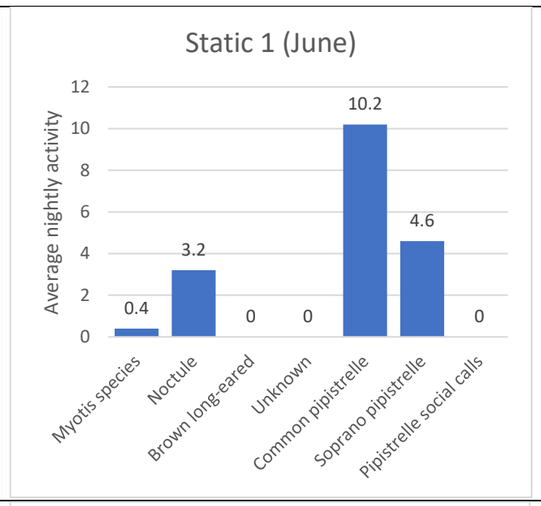
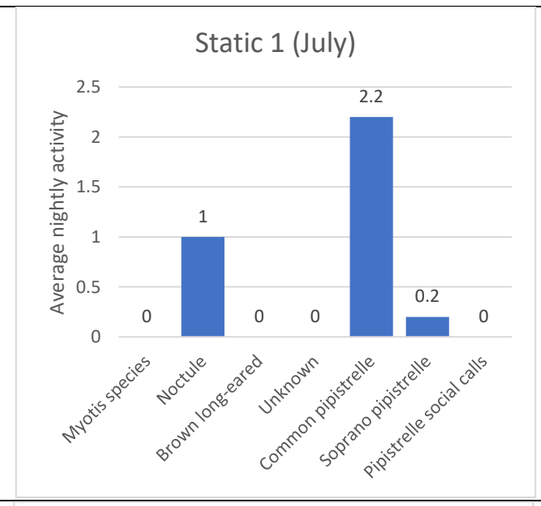
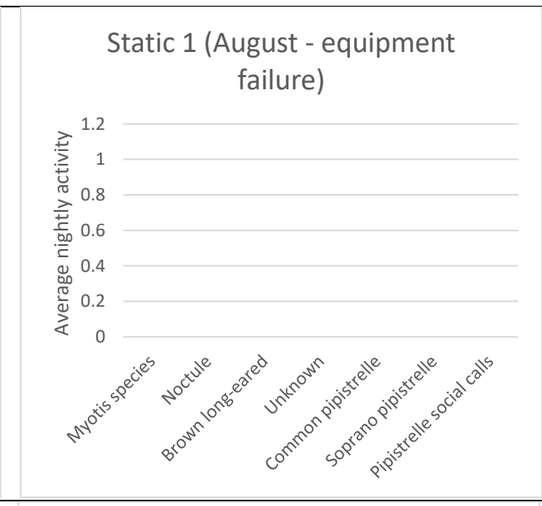
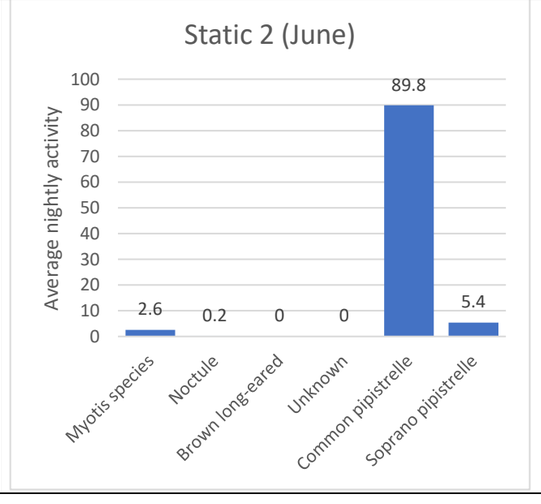
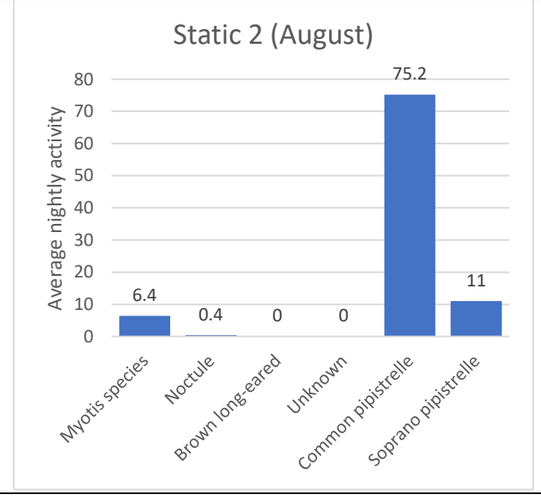
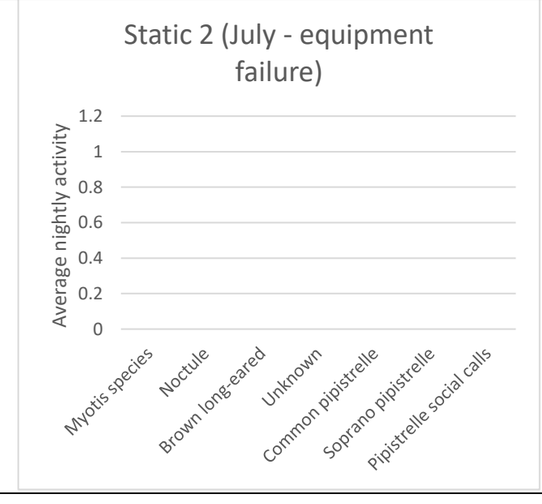

Static 9 (August 2019)
Average nightly activity
350
300
250
200
150
100
50
0
36.2
3.2
0
0
185.4
286.6
27.4
Myotis species
Noctule
Brown long-eared
Unknown
Common pipistrelle
Soprano pipistrelle
Pipistrelle social calls

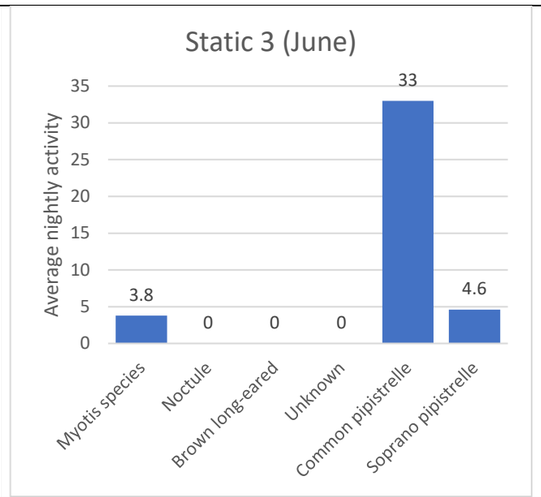
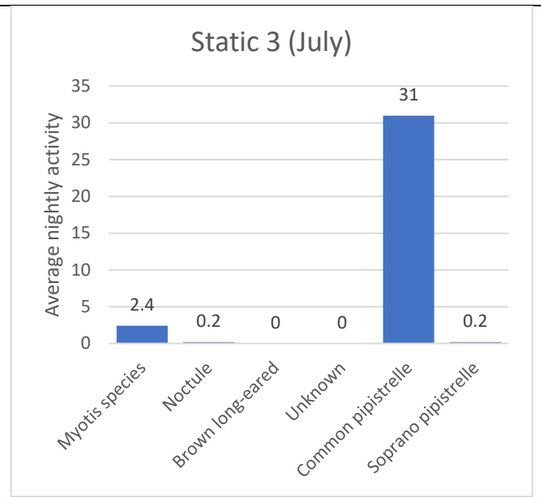
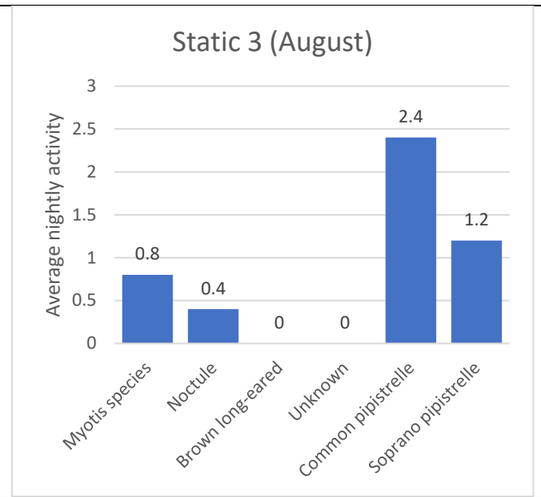
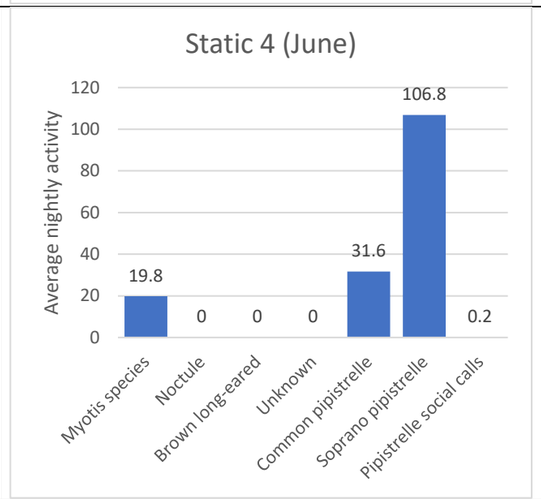
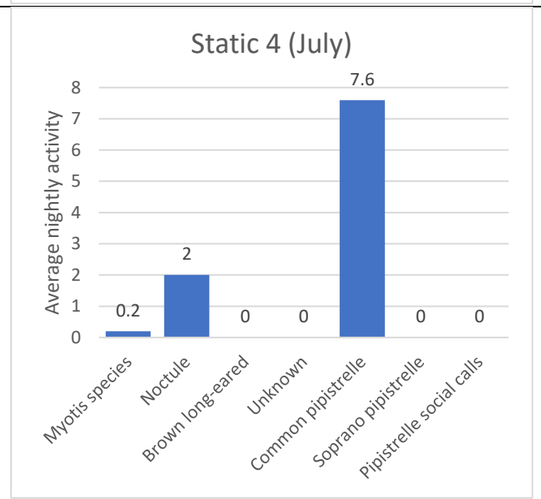
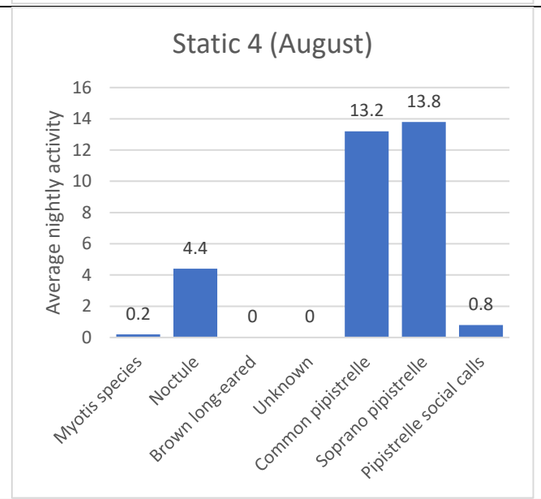
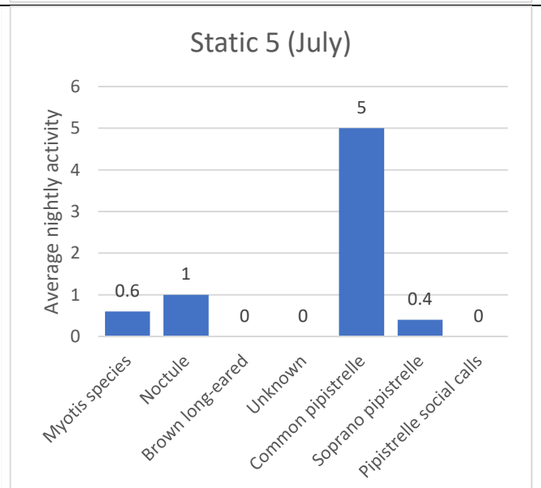
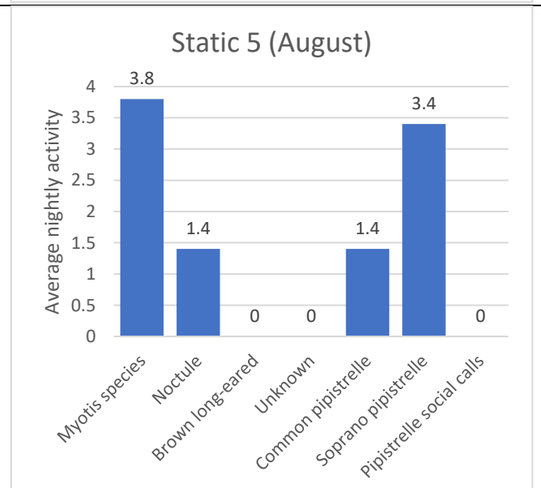
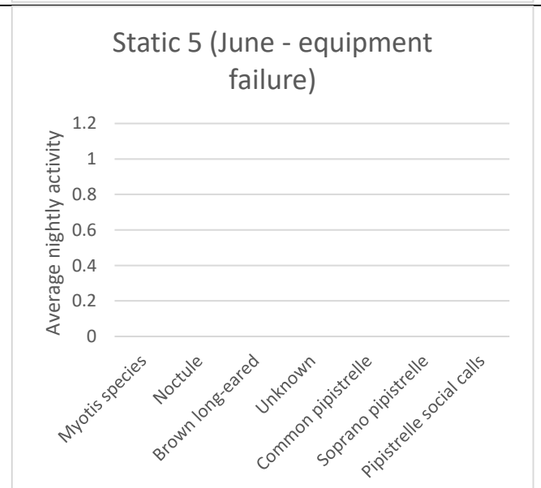

Static 9 (September 2019 - equipment failure)
Average nightly activity
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Myotis species
Noctule
Brown long-eared
Unknown
Common pipistrelle
Soprano pipistrelle

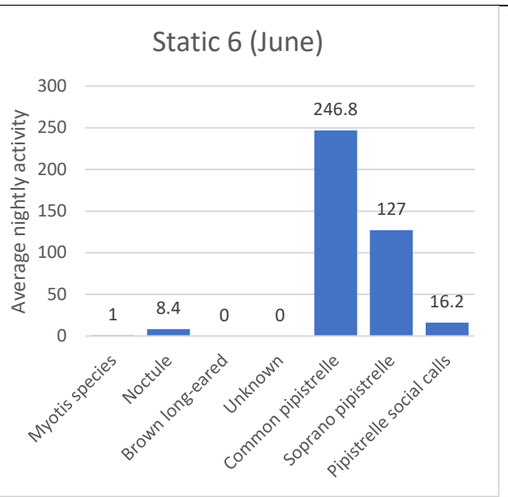
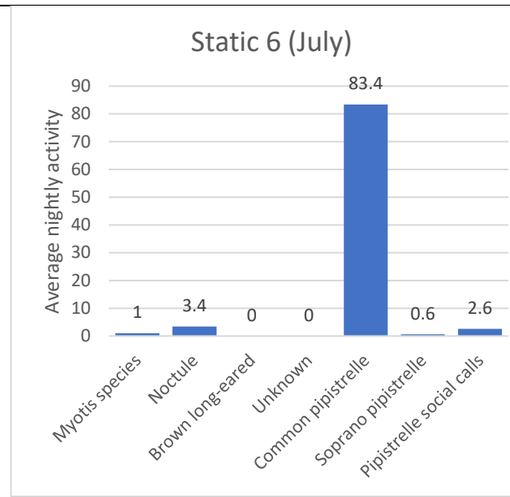
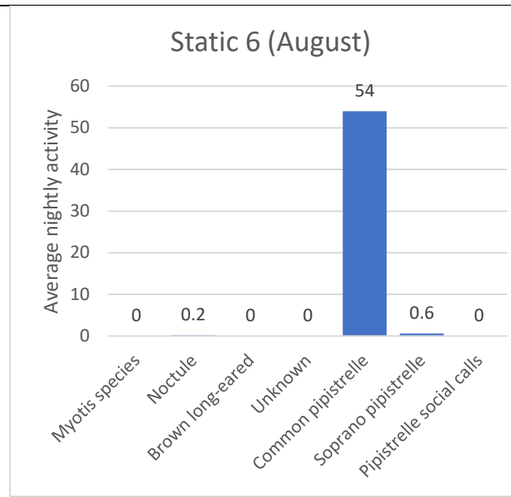
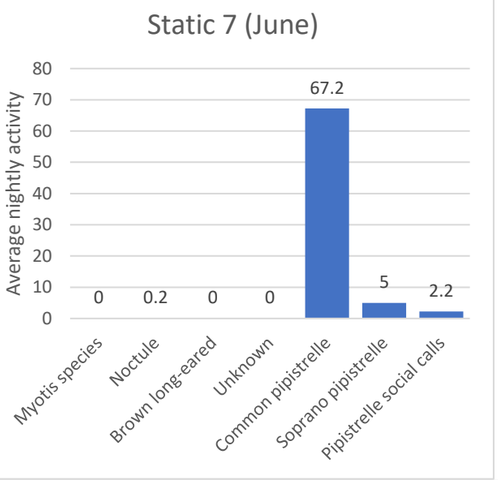
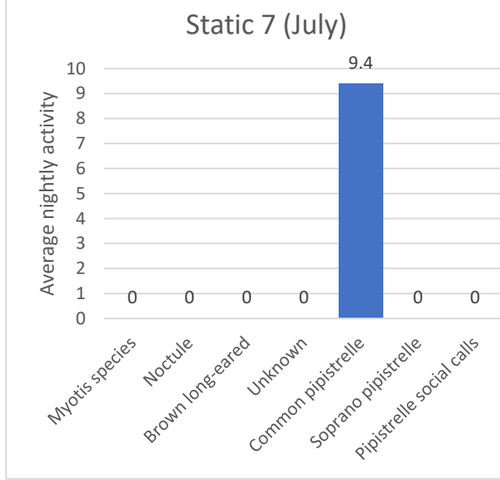
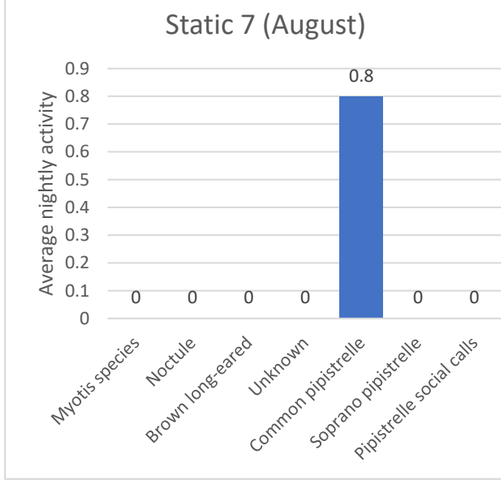
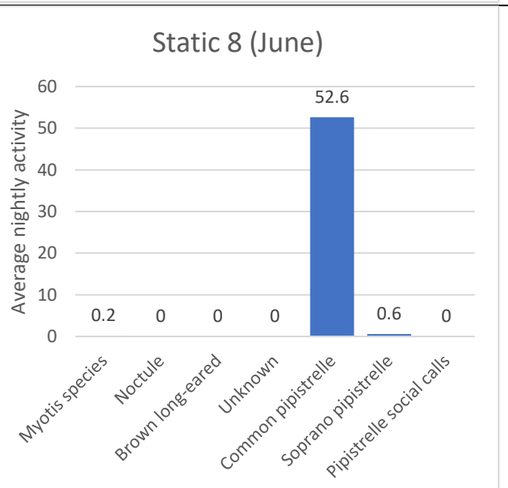
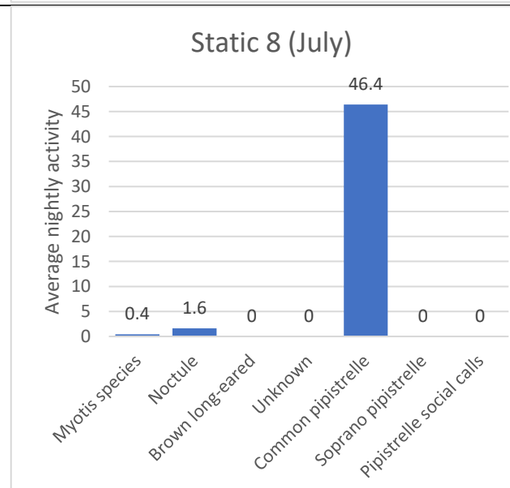
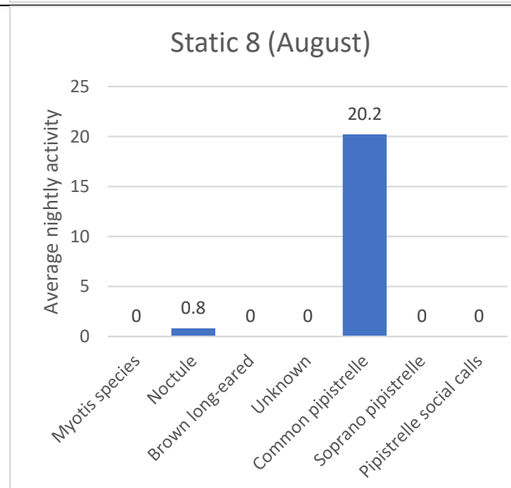

Static 9 (October 2019)
Average nightly activity
100
90
80
70
60
50
40
30
20
10
0
18
0.3333333
33
0
0
87.333333
33
35
3
Myotis species
Noctule
Brown long-eared
Unknown
Common pipistrelle
Soprano pipistrelle
Pipistrelle social calls

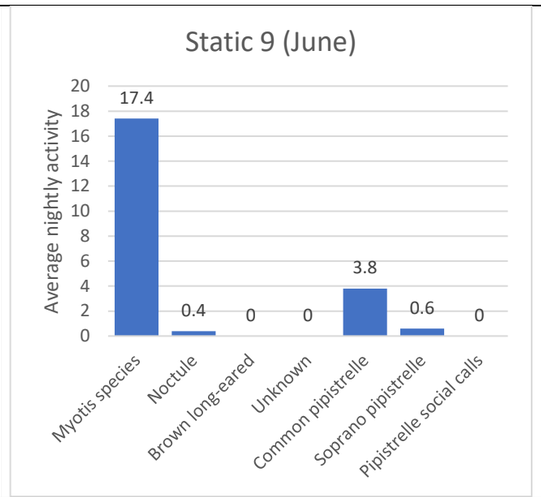
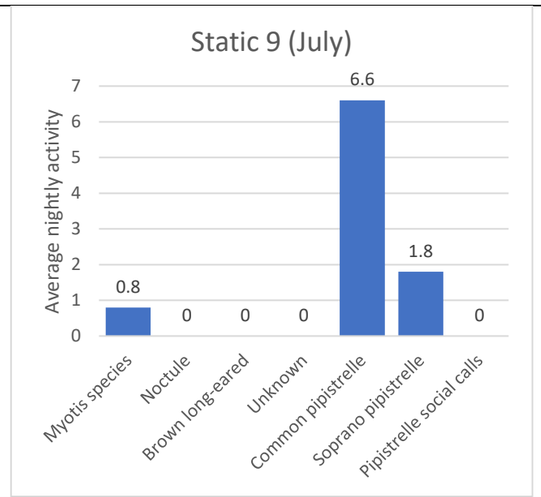
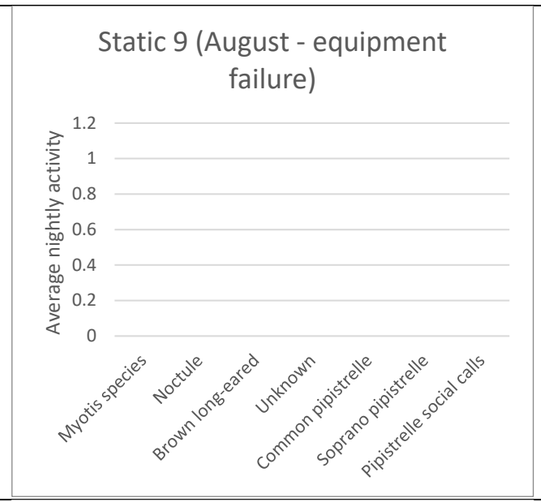
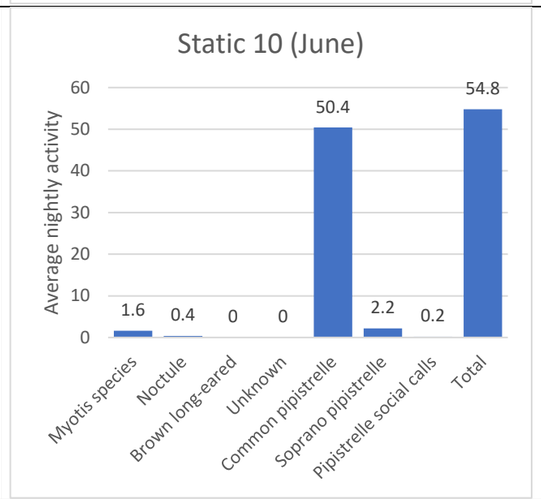
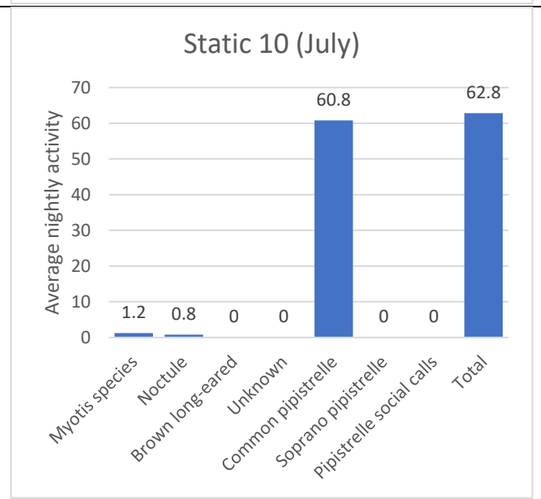
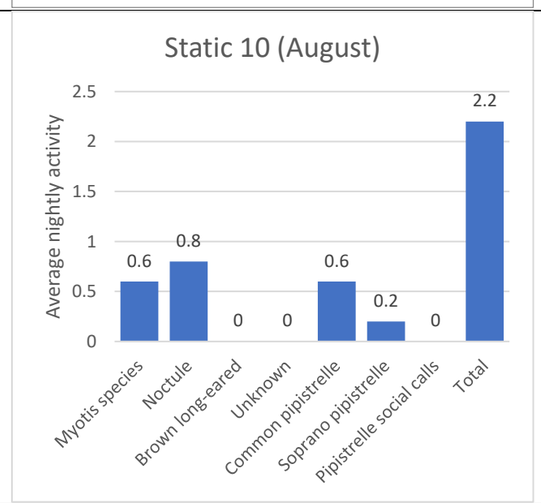

Static 9 (April 2020)
Average nightly activity
1.2
1
0.8
0.6
0.4
0.2
0
0.3333333
33
0.6666666
67
0
0
0.3333333
33
1
0
Myotis species
Noctule
Brown long-eared
Unknown
Common pipistrelle
Soprano pipistrelle
Pipistrelle social calls


Static 9 (May 2020)
Average nightly activity
20
18
16
14
12
10
8
6
4
2
0
5.4
2.2
0
0
18
5.8
0
Myotis species
Noctule
Brown long-eared
Unknown
Common pipistrelle
Soprano pipistrelle
Pipistrelle social calls

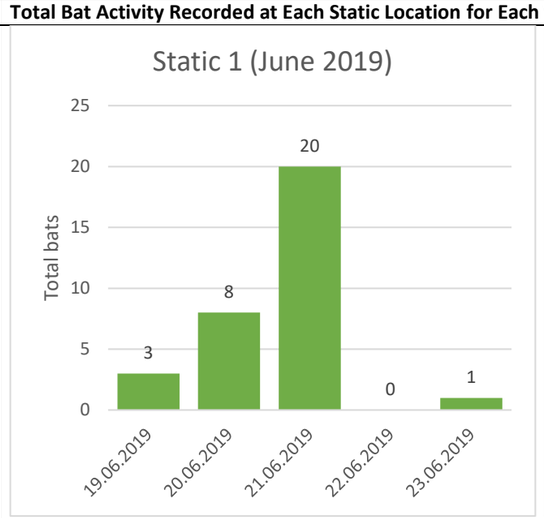
A	10	 Static 10 (July 2019) Average nightly activity 0 1 2 3 4 5 6 7 8 9 2.4 8.4 0 0 4.8 0.2 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls  Static 10 (August 2019) Average nightly activity 0 0.5 1 1.5 2 2.5 3 3.5 4 4.5 2.8 4.2 0 0 2.6 0 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls  Static 10 (April 2020) Average nightly activity 0 0.5 1 1.5 2 2.5 3 3.5 0.2 0.8 0 0 1.4 3 0.2 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls  Static 10 (May 2020) Average nightly activity 0 0.5 1 1.5 2 2.5 3 3.5 4 4.5 2.6 3.6 0 0.2 4.2 4.2 0.4 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls
B	1	 Static 1 (June) Average nightly activity 0 2 4 6 8 10 12 0.4 3.2 0 0 10.2 4.6 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls  Static 1 (July) Average nightly activity 0 0.5 1 1.5 2 2.5 0 1 0 0 2.2 0.2 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls  Static 1 (August - equipment failure) Average nightly activity 0 0.2 0.4 0.6 0.8 1 1.2 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls
B	2	 Static 2 (June) Average nightly activity 0 10 20 30 40 50 60 70 80 90 100 2.6 0.2 0 0 89.8 5.4 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle  Static 2 (August) Average nightly activity 0 10 20 30 40 50 60 70 80 6.4 0.4 0 0 75.2 11 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle  Static 2 (July - equipment failure) Average nightly activity 0 0.2 0.4 0.6 0.8 1 1.2 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls

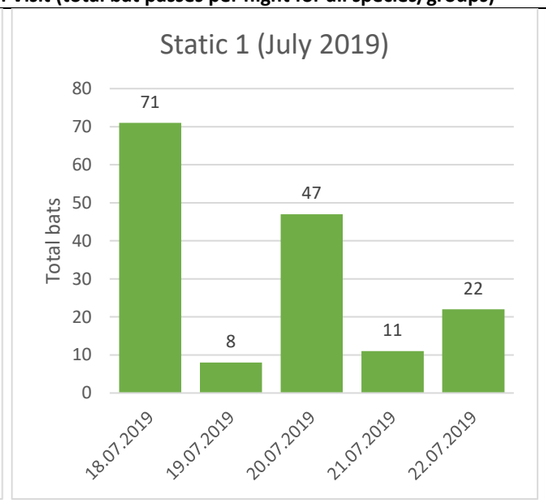
B	3	 Static 3 (June) Average nightly activity 35 30 25 20 15 10 5 0 3.8 0 0 0 33 4.6 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle	 Static 3 (July) Average nightly activity 35 30 25 20 15 10 5 0 2.4 0.2 0 0 31 0.2 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle	 Static 3 (August) Average nightly activity 3 2.5 2 1.5 1 0.5 0 0.8 0.4 0 0 2.4 1.2 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle	
B	4	 Static 4 (June) Average nightly activity 120 100 80 60 40 20 0 19.8 0 0 0 31.6 106.8 0.2 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls	 Static 4 (July) Average nightly activity 8 7 6 5 4 3 2 1 0 0.2 2 0 0 7.6 0 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls	 Static 4 (August) Average nightly activity 16 14 12 10 8 6 4 2 0 0.2 4.4 0 0 13.2 13.8 0.8 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls	
B	5	 Static 5 (July) Average nightly activity 6 5 4 3 2 1 0 0.6 1 0 0 5 0.4 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls	 Static 5 (August) Average nightly activity 4 3.5 3 2.5 2 1.5 1 0.5 0 3.8 1.4 0 0 1.4 3.4 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls	 Static 5 (June - equipment failure) Average nightly activity 1.2 1 0.8 0.6 0.4 0.2 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls	

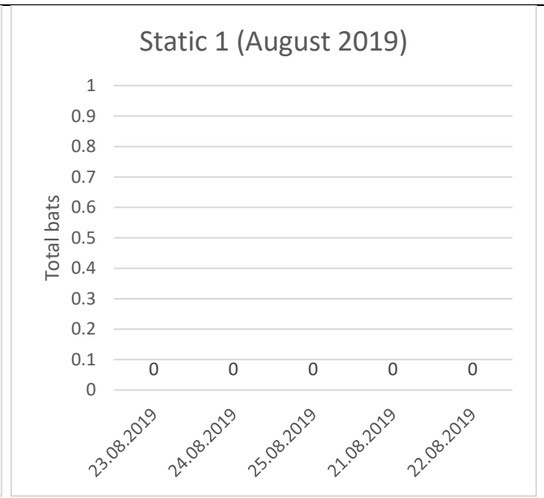
C	6	 Static 6 (June) Average nightly activity 300 250 200 150 100 50 0 1 8.4 0 0 246.8 127 16.2 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls	 Static 6 (July) Average nightly activity 90 80 70 60 50 40 30 20 10 0 1 3.4 0 0 83.4 0.6 2.6 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls	 Static 6 (August) Average nightly activity 60 50 40 30 20 10 0 0 0.2 0 0 54 0.6 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls	
C	7	 Static 7 (June) Average nightly activity 80 70 60 50 40 30 20 10 0 0 0.2 0 0 67.2 5 2.2 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls	 Static 7 (July) Average nightly activity 10 9 8 7 6 5 4 3 2 1 0 0 0 0 0 9.4 0 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls	 Static 7 (August) Average nightly activity 0.9 0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.1 0 0 0 0 0 0.8 0 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls	
C	8	 Static 8 (June) Average nightly activity 60 50 40 30 20 10 0 0.2 0 0 0 52.6 0.6 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls	 Static 8 (July) Average nightly activity 50 45 40 35 30 25 20 15 10 5 0 0.4 1.6 0 0 46.4 0 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls	 Static 8 (August) Average nightly activity 25 20 15 10 5 0 0 0.8 0 0 20.2 0 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls	

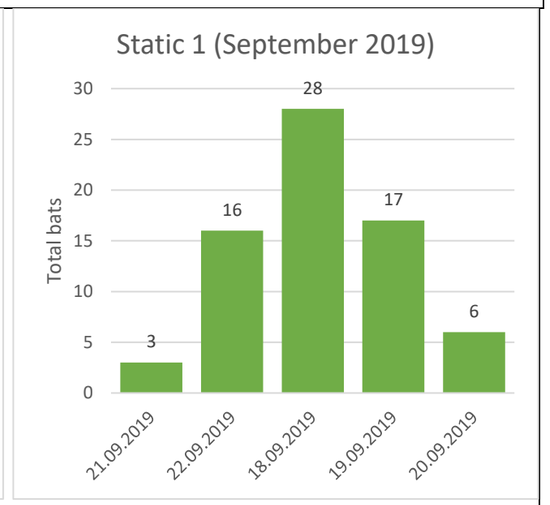
C	9	 Static 9 (June) Average nightly activity 17.4 0.4 0 0 3.8 0.6 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls	 Static 9 (July) Average nightly activity 0.8 0 0 0 6.6 1.8 0 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls	 Static 9 (August - equipment failure) Average nightly activity Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls	
C	10	 Static 10 (June) Average nightly activity 1.6 0.4 0 0 50.4 2.2 0.2 54.8 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls Total	 Static 10 (July) Average nightly activity 1.2 0.8 0 0 60.8 0 0 62.8 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls Total	 Static 10 (August) Average nightly activity 0.6 0.8 0 0 0.6 0.2 0 2.2 Myotis species Noctule Brown long-eared Unknown Common pipistrelle Soprano pipistrelle Pipistrelle social calls Total	

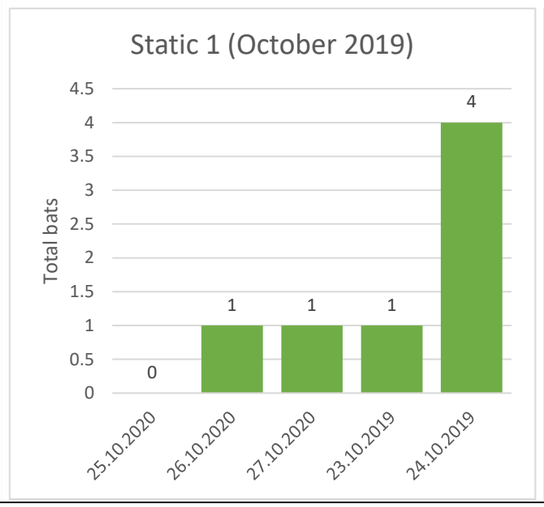
Zone	Static	Total Bat Activity Recorded at Each Static Location for Each Visit (total bat passes per night for all species/groups)
A	1	

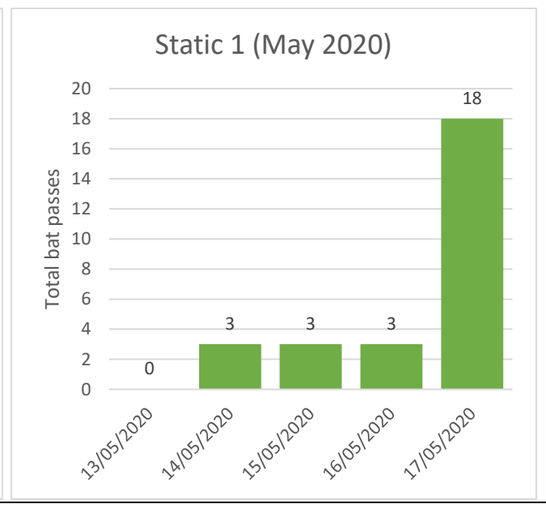


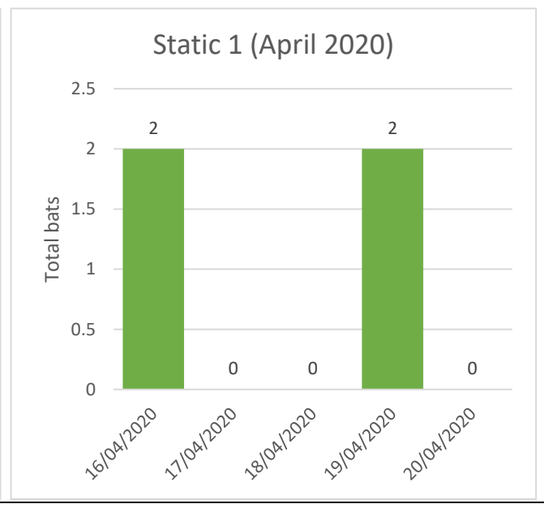


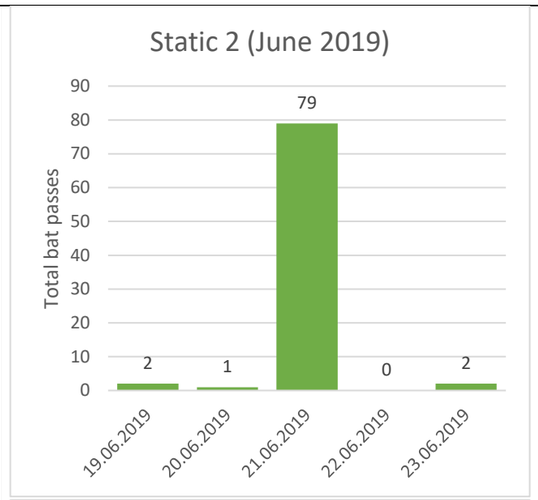
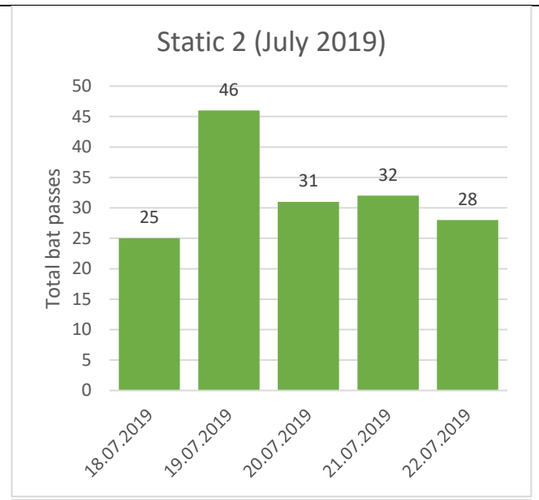
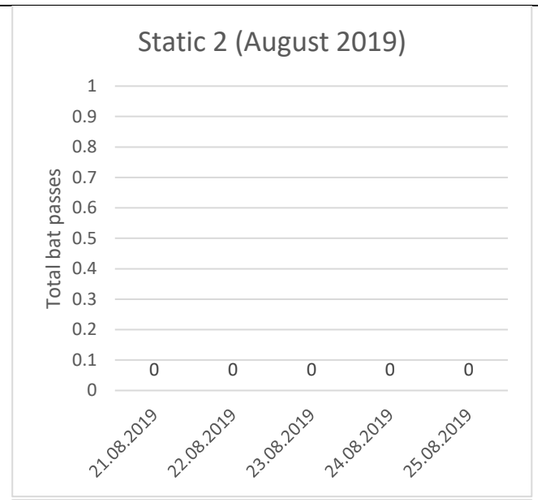
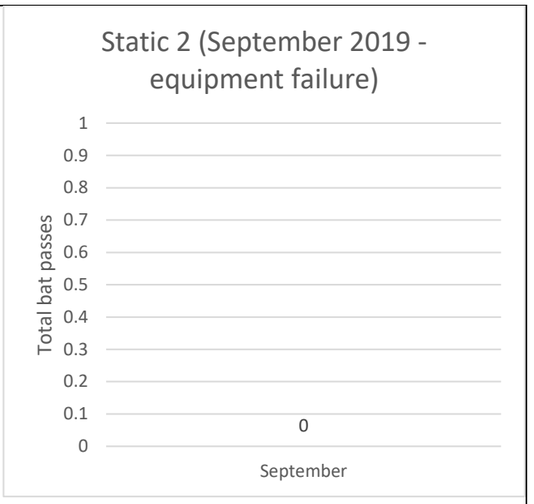
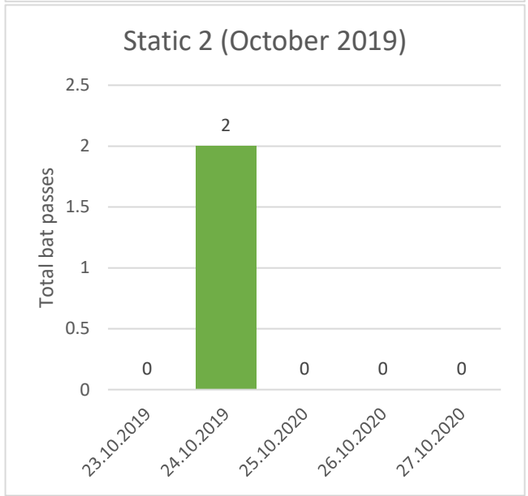
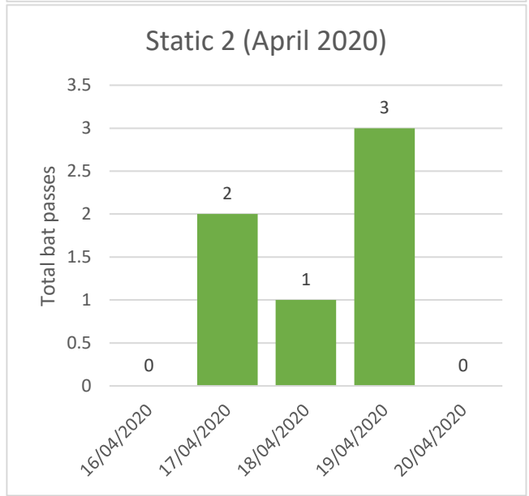
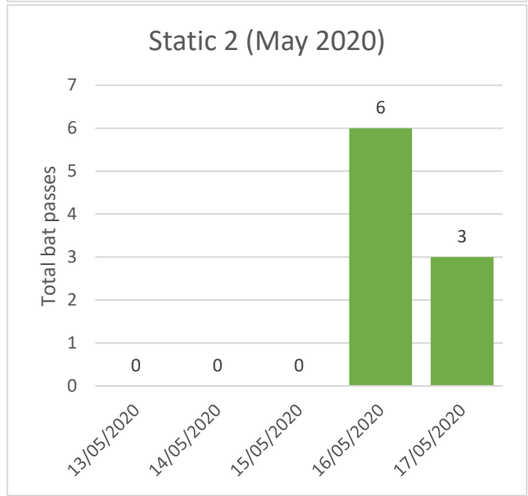


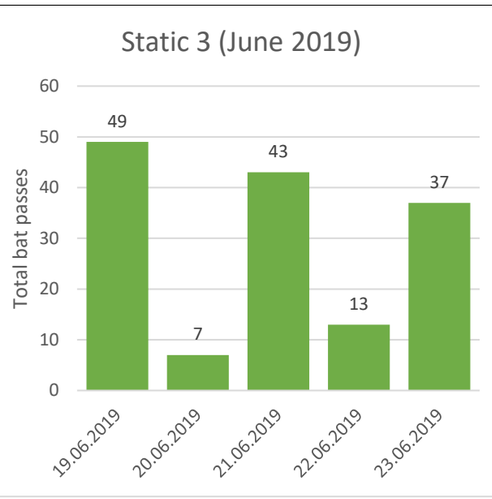
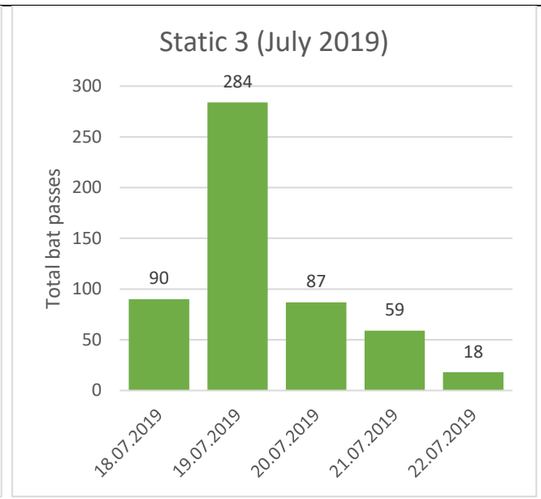
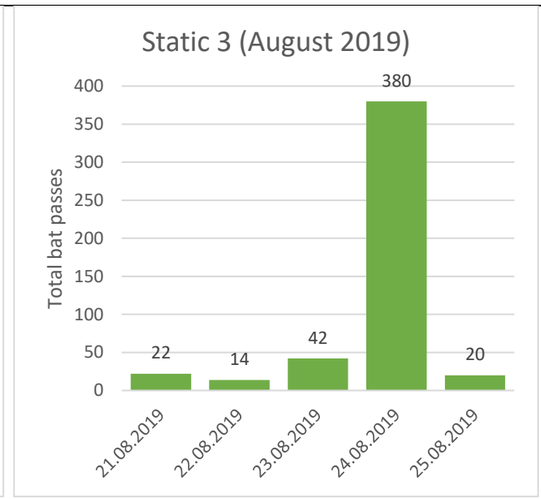
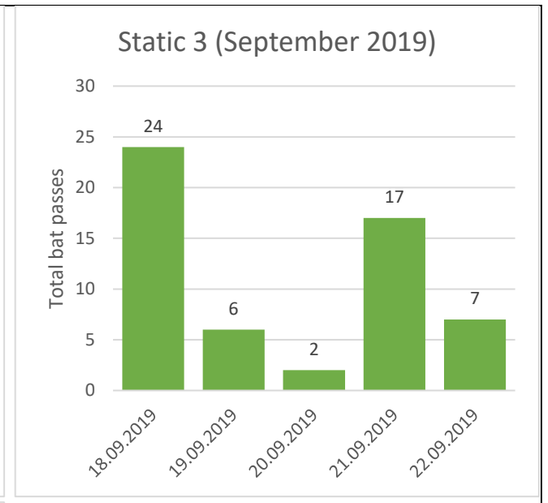
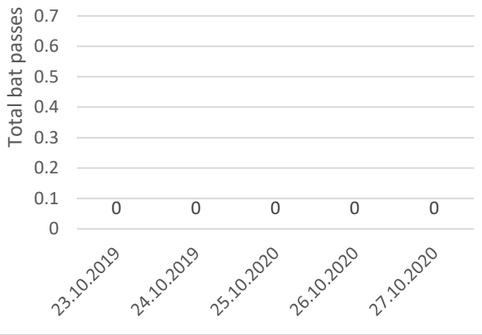
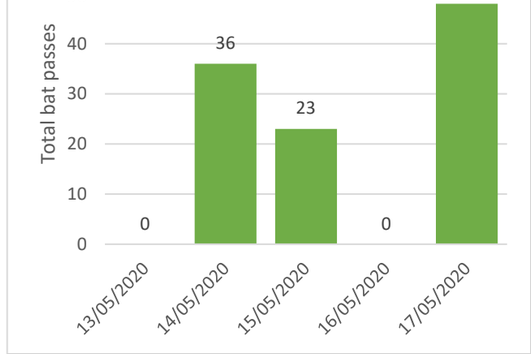
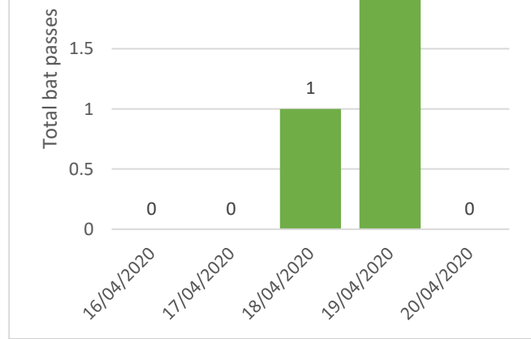


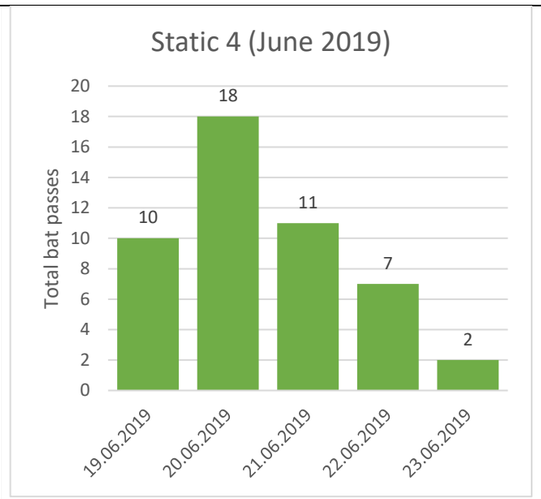
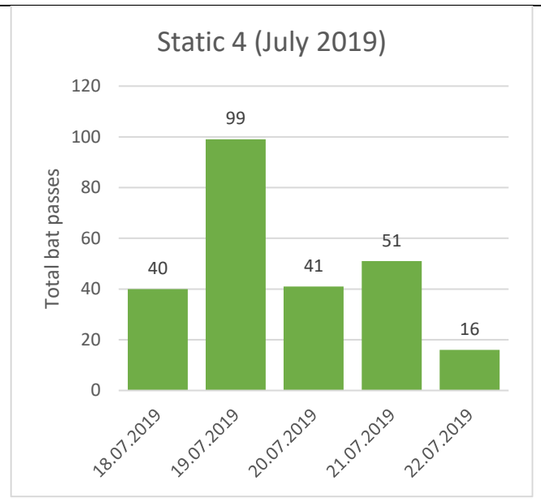
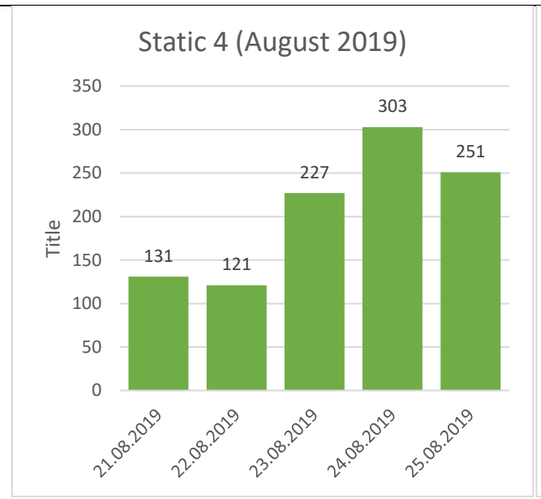
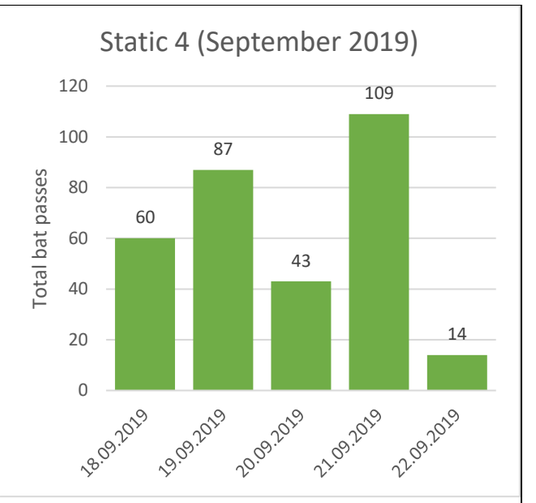
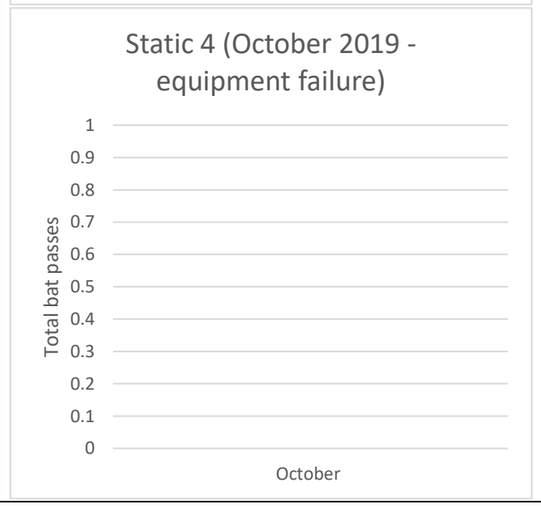
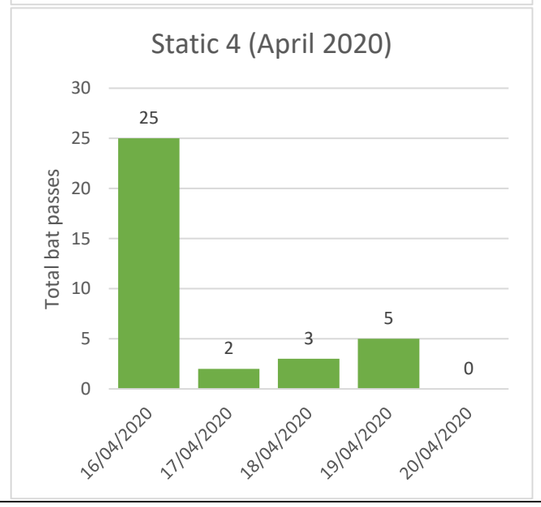
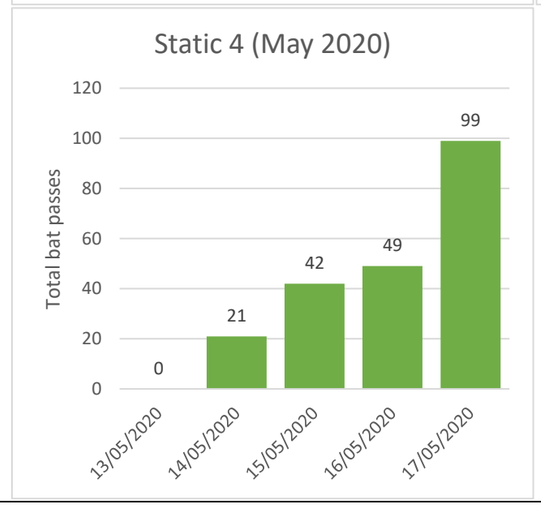


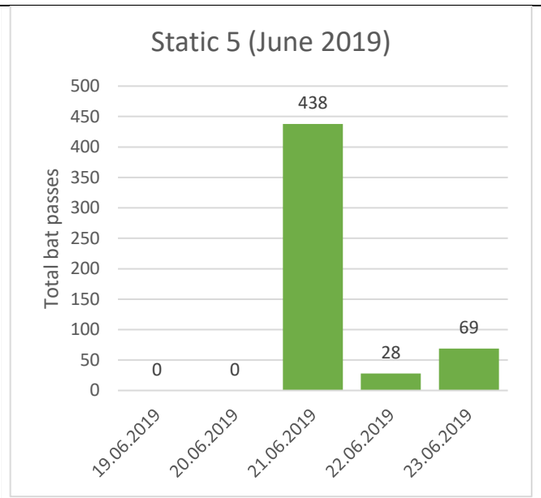
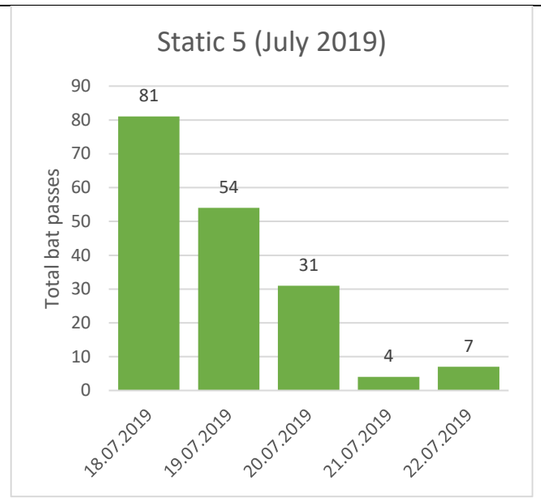
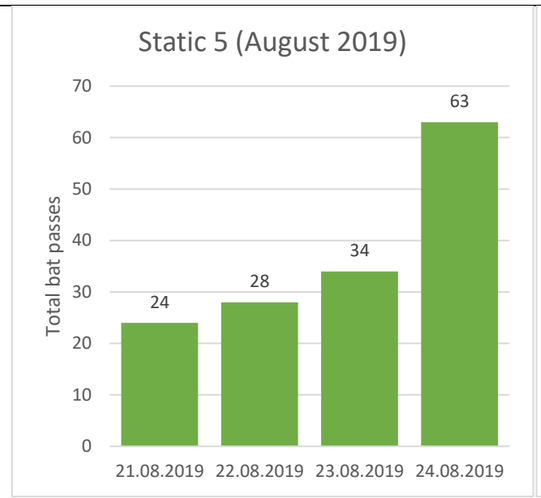
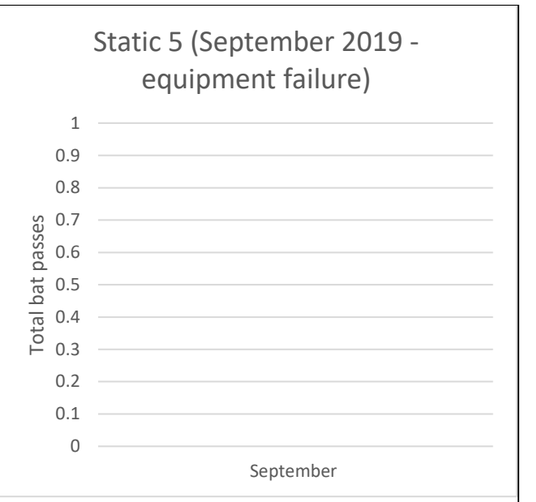
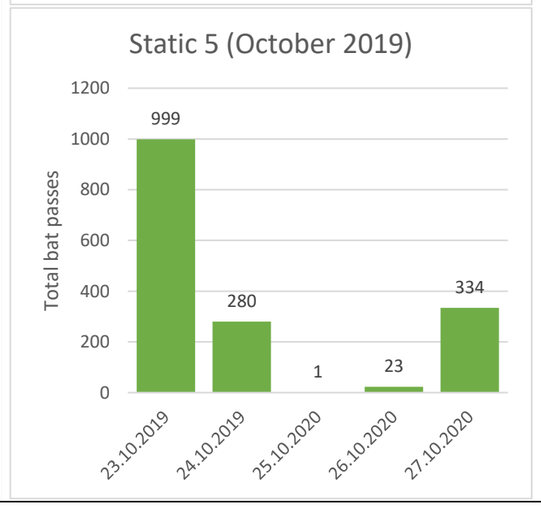
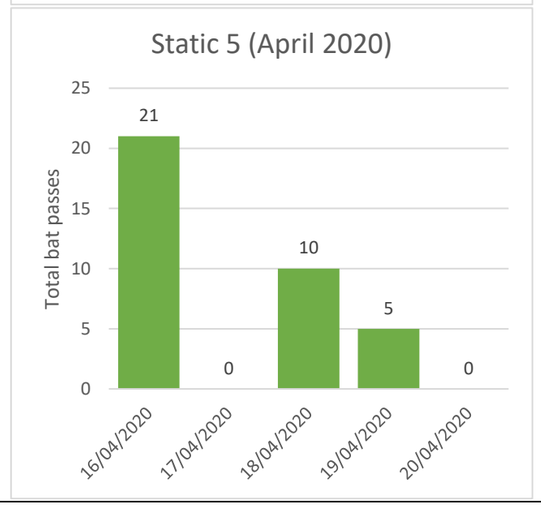
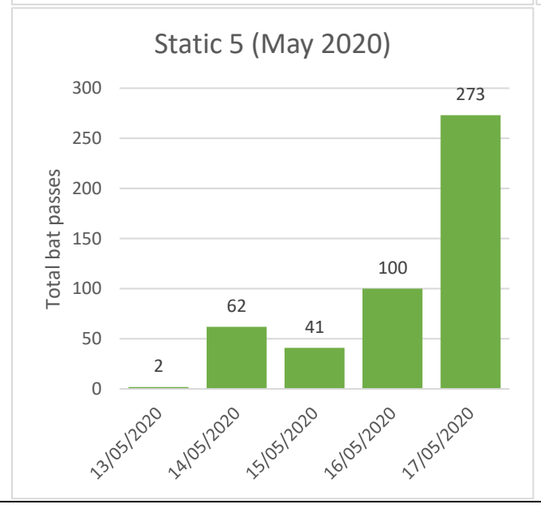


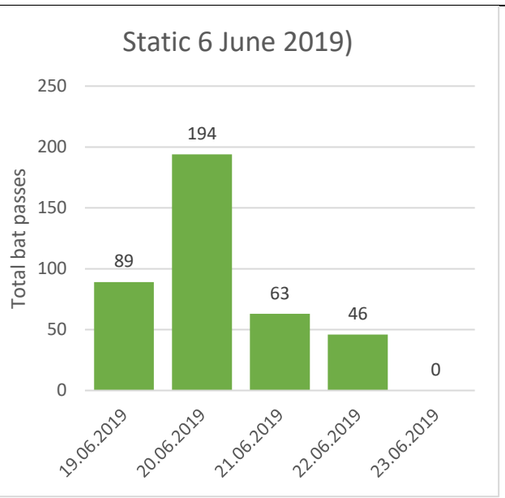
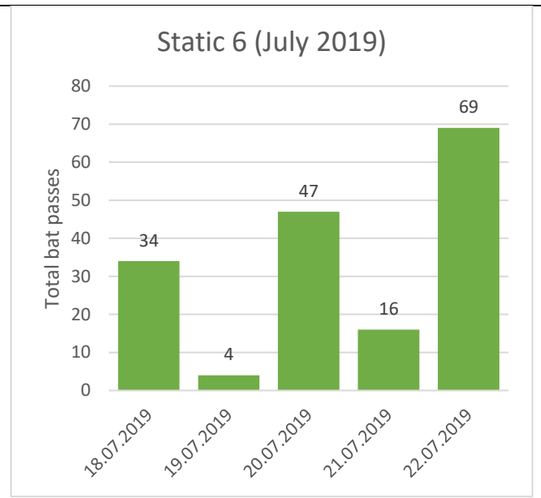
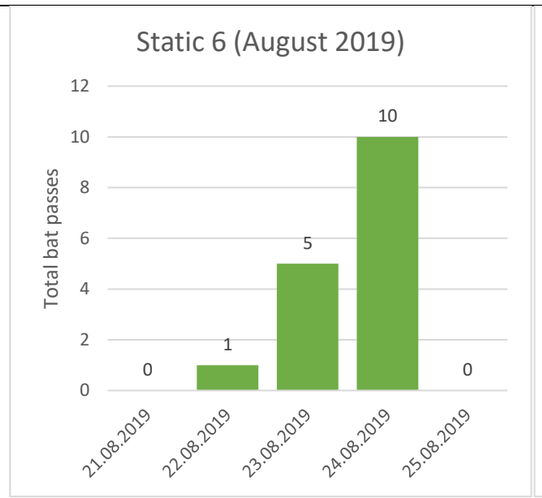
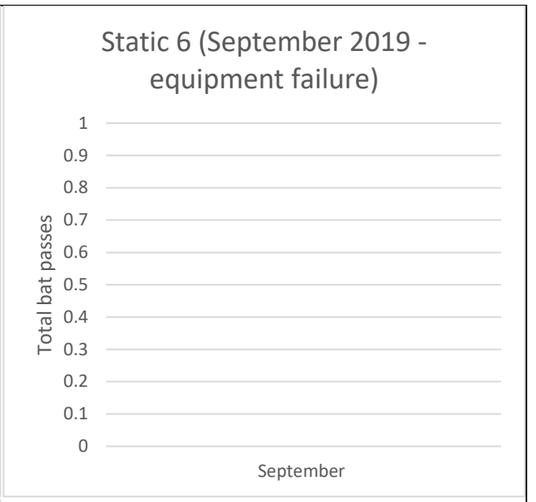
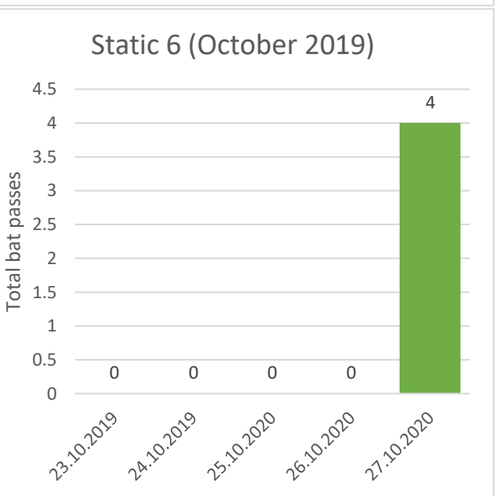
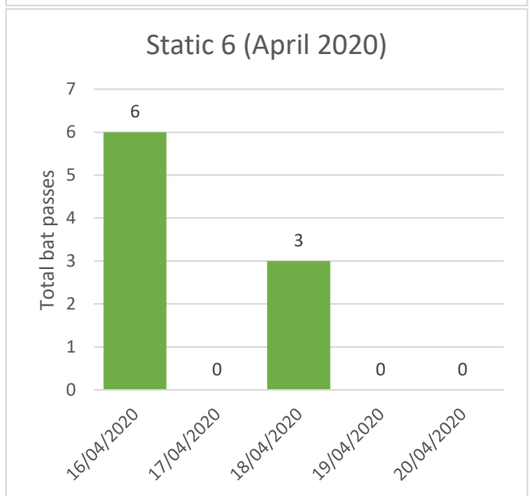
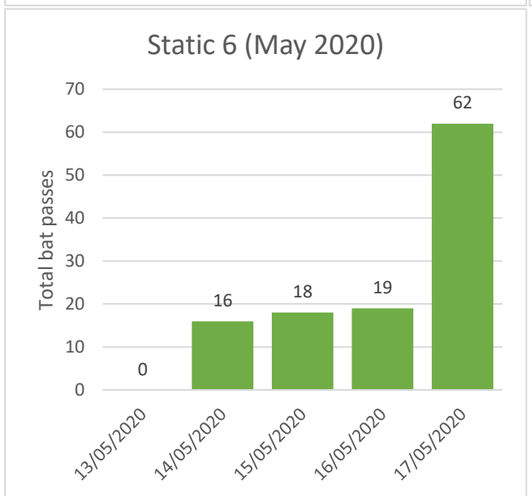


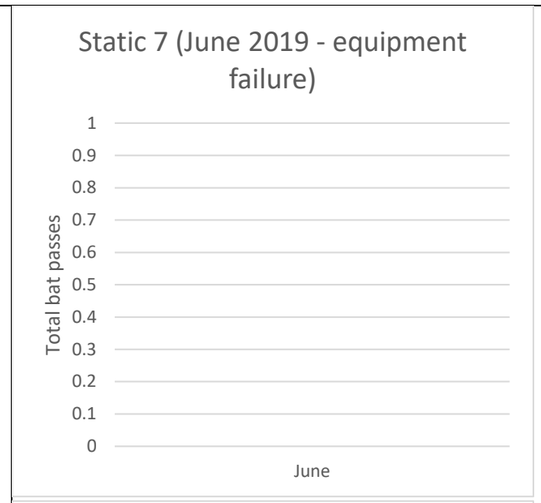
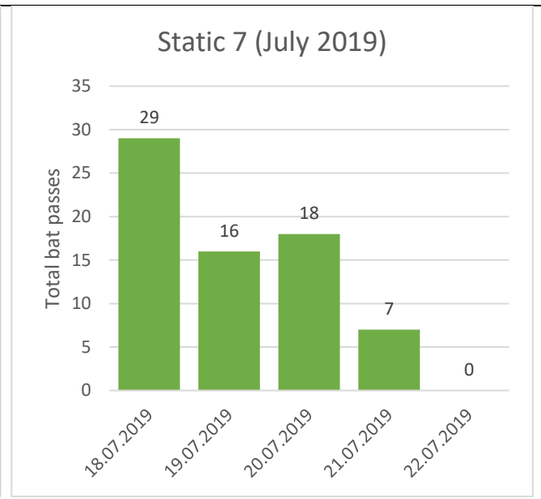
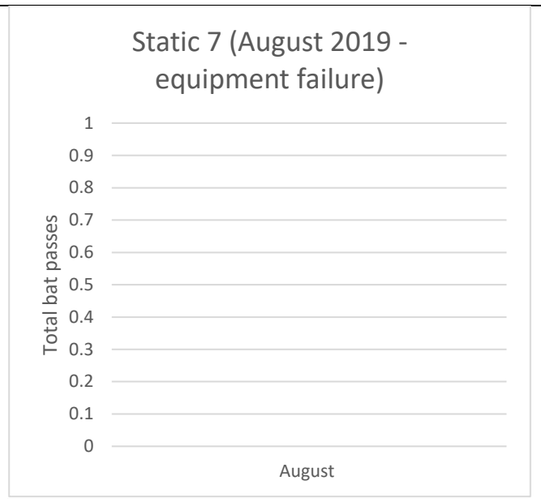
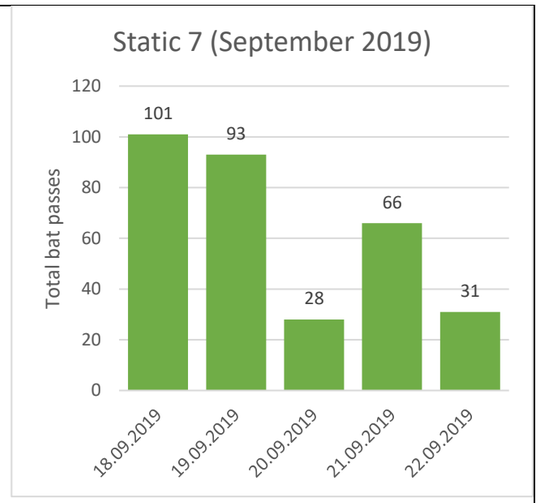
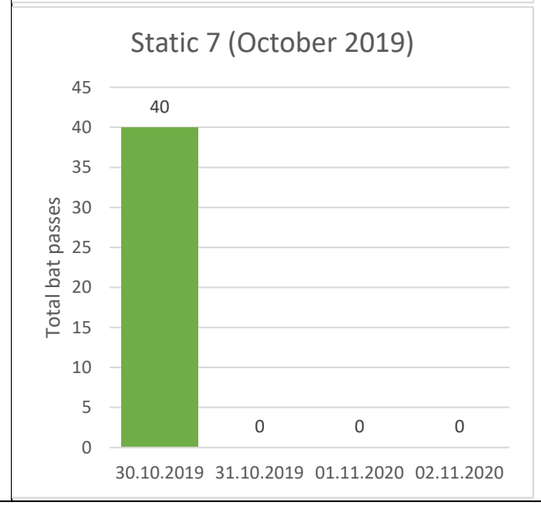
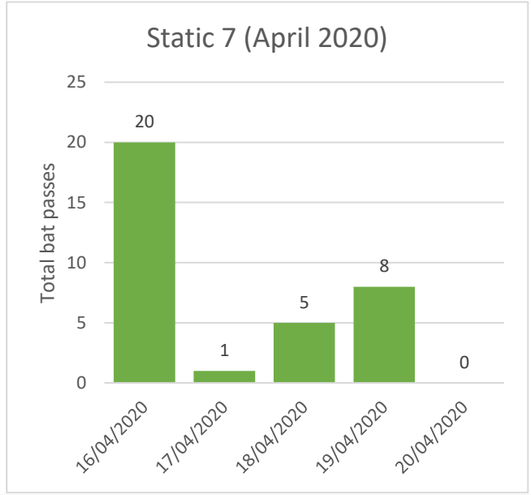
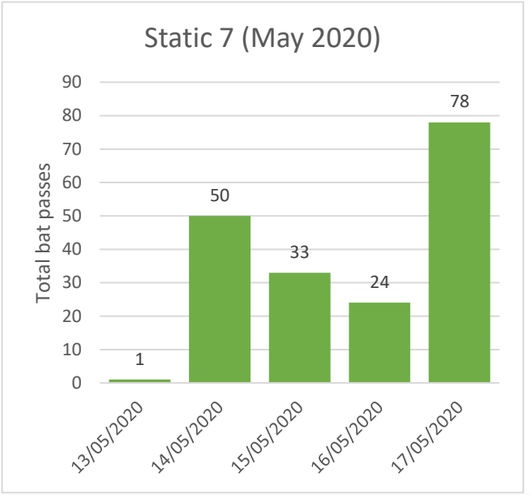
A	2	 Static 2 (June 2019) Total bat passes 90 80 70 60 50 40 30 20 10 0 2 1 79 0 2 19.06.2019 20.06.2019 21.06.2019 22.06.2019 23.06.2019  Static 2 (July 2019) Total bat passes 50 45 40 35 30 25 20 15 10 5 0 25 46 31 32 28 18.07.2019 19.07.2019 20.07.2019 21.07.2019 22.07.2019  Static 2 (August 2019) Total bat passes 1 0.9 0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.1 0 0 0 0 0 0 21.08.2019 22.08.2019 23.08.2019 24.08.2019 25.08.2019  Static 2 (September 2019 - equipment failure) Total bat passes 1 0.9 0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.1 0 0 September  Static 2 (October 2019) Total bat passes 2.5 2 1.5 1 0.5 0 0 2 0 0 0 23.10.2019 24.10.2019 25.10.2020 26.10.2020 27.10.2020  Static 2 (April 2020) Total bat passes 3.5 3 2.5 2 1.5 1 0.5 0 0 2 1 3 0 16/04/2020 17/04/2020 18/04/2020 19/04/2020 20/04/2020  Static 2 (May 2020) Total bat passes 7 6 5 4 3 2 1 0 0 0 0 6 3 13/05/2020 14/05/2020 15/05/2020 16/05/2020 17/05/2020

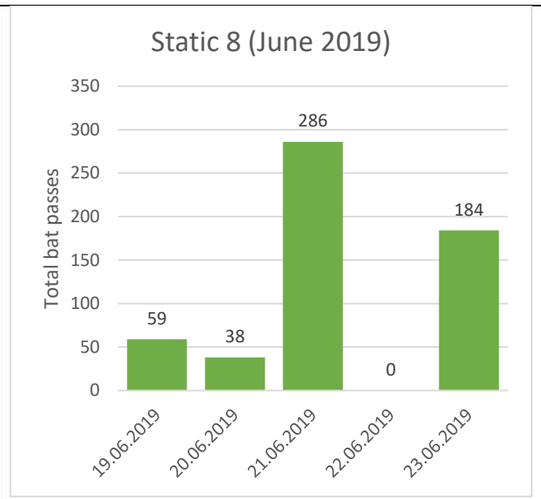
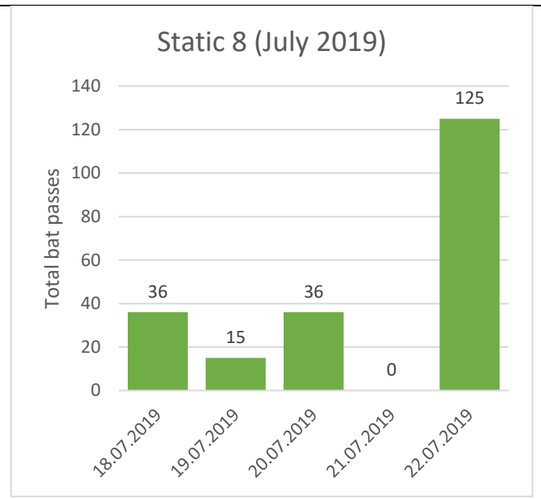
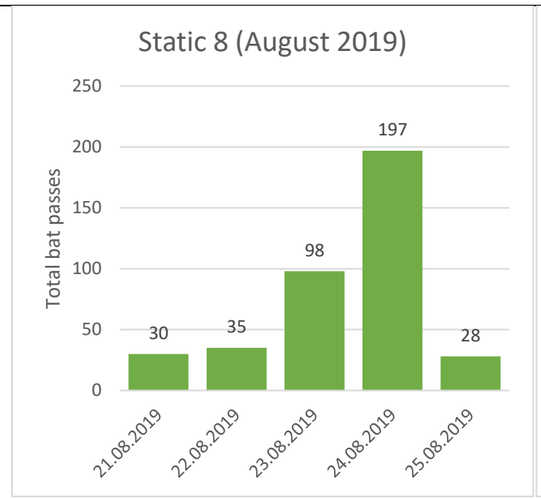
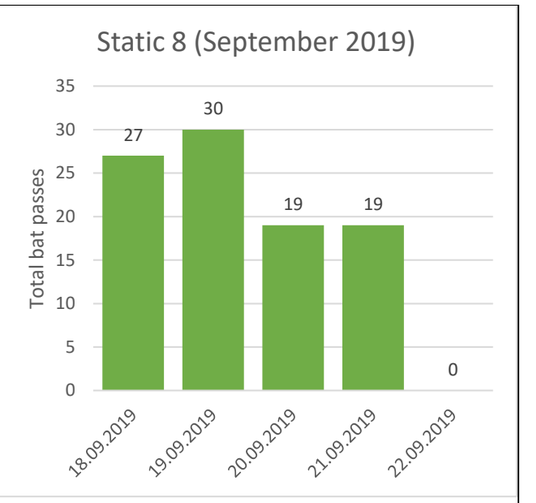
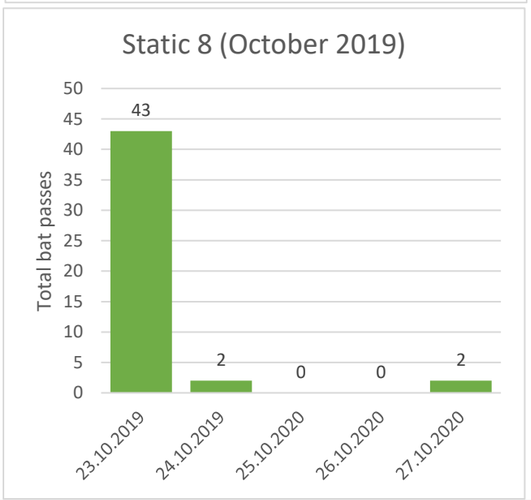
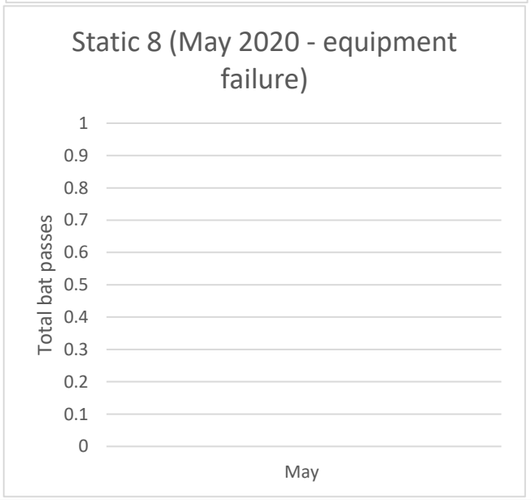
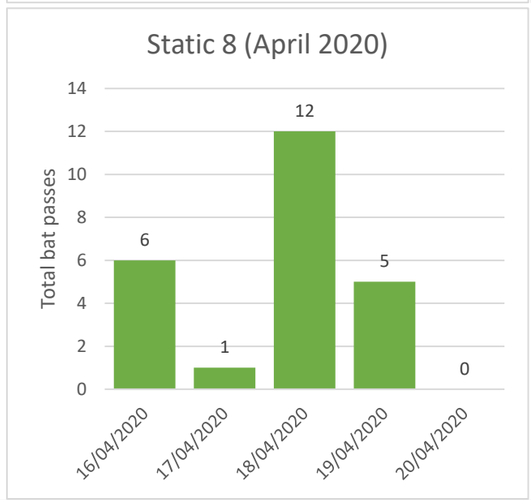
A	3	 Static 3 (June 2019) Total bat passes 0 10 20 30 40 50 60 49 7 43 13 37 19.06.2019 20.06.2019 21.06.2019 22.06.2019 23.06.2019  Static 3 (July 2019) Total bat passes 0 50 100 150 200 250 300 90 284 87 59 18 18.07.2019 19.07.2019 20.07.2019 21.07.2019 22.07.2019  Static 3 (August 2019) Total bat passes 0 50 100 150 200 250 300 350 400 22 14 42 380 20 21.08.2019 22.08.2019 23.08.2019 24.08.2019 25.08.2019  Static 3 (September 2019) Total bat passes 0 5 10 15 20 25 30 24 6 2 17 7 18.09.2019 19.09.2019 20.09.2019 21.09.2019 22.09.2019  Static 3 (October 2019) Total bat passes 0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 0 0 0 0 0 23.10.2019 24.10.2019 25.10.2020 26.10.2020 27.10.2020  Static 3 (May 2020) Total bat passes 0 10 20 30 40 50 60 0 36 23 0 48 13/05/2020 14/05/2020 15/05/2020 16/05/2020 17/05/2020  Static 6 (April 2020) Total bat passes 0 0.5 1 1.5 2 2.5 0 0 1 2 0 16/04/2020 17/04/2020 18/04/2020 19/04/2020 20/04/2020

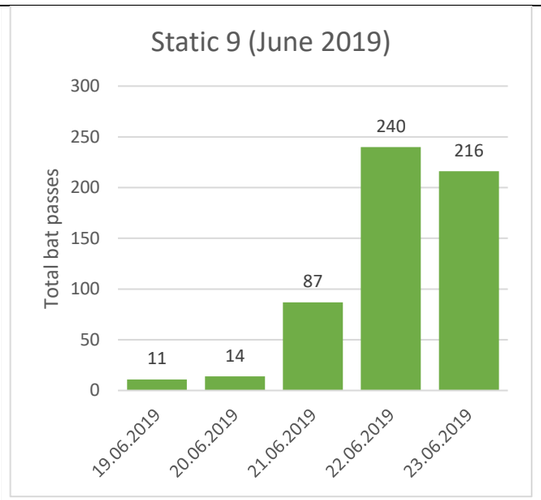
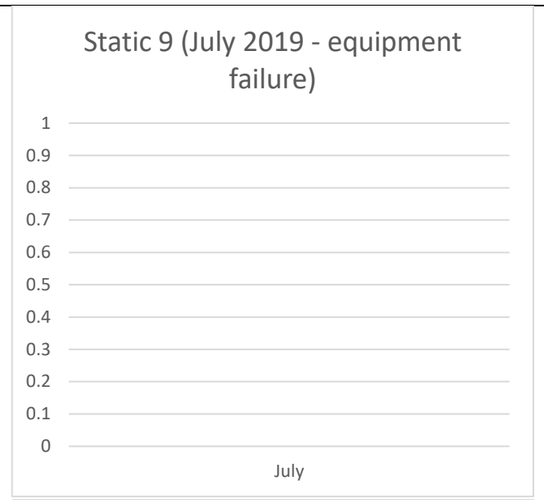
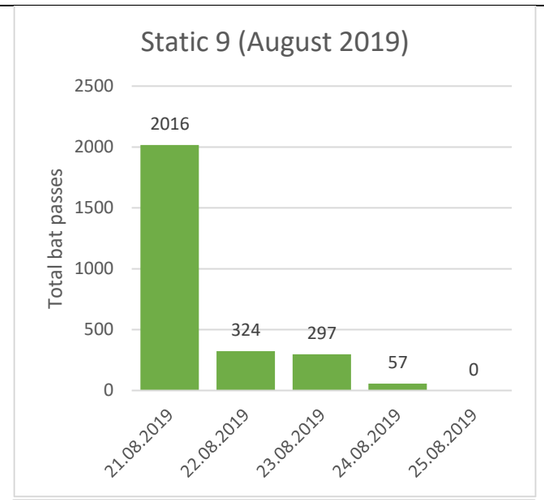
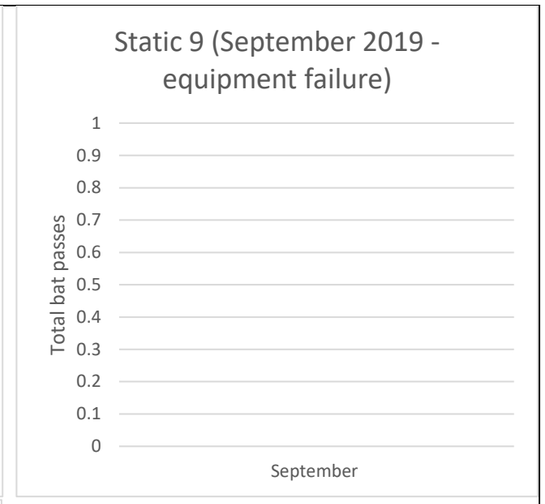
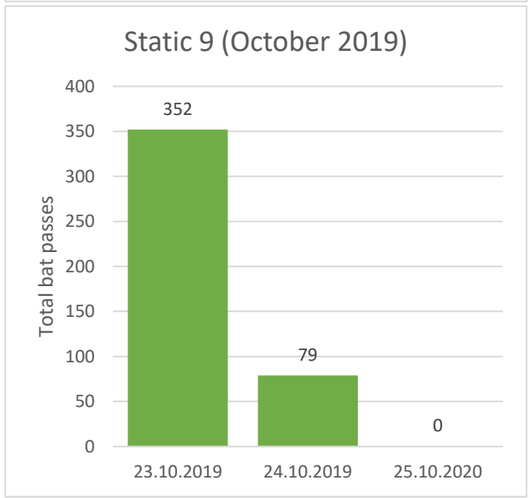
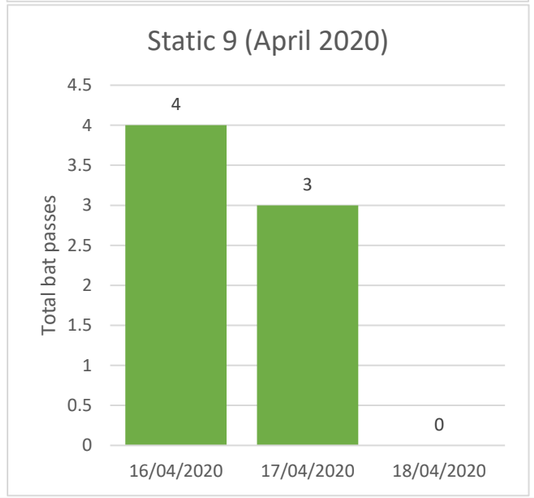
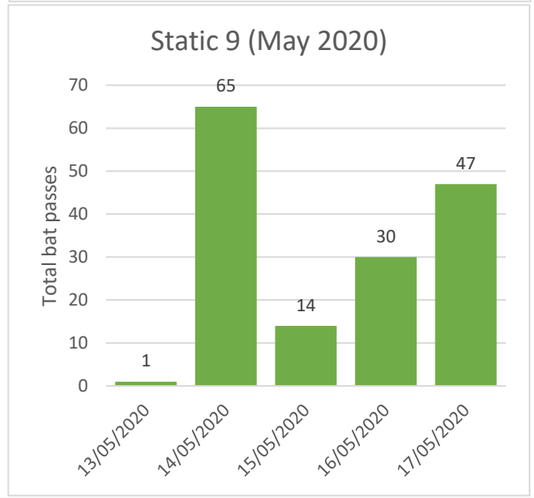
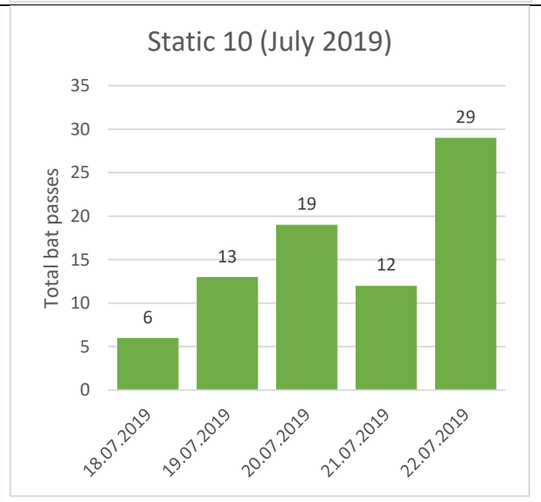
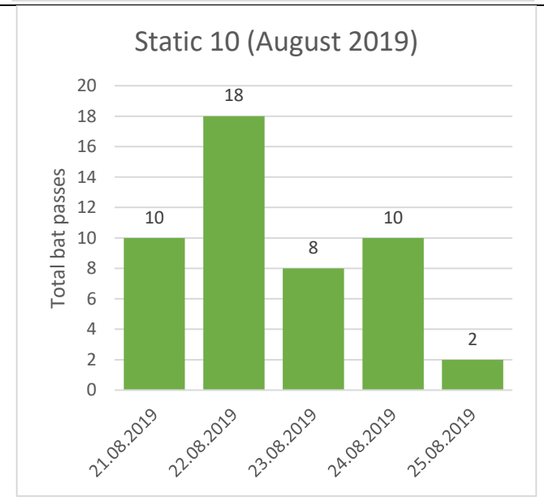
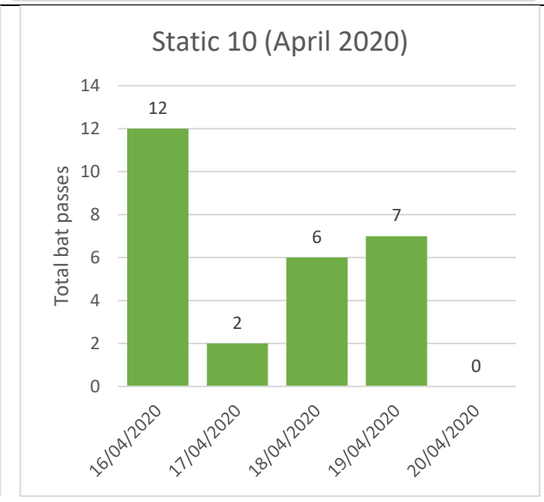
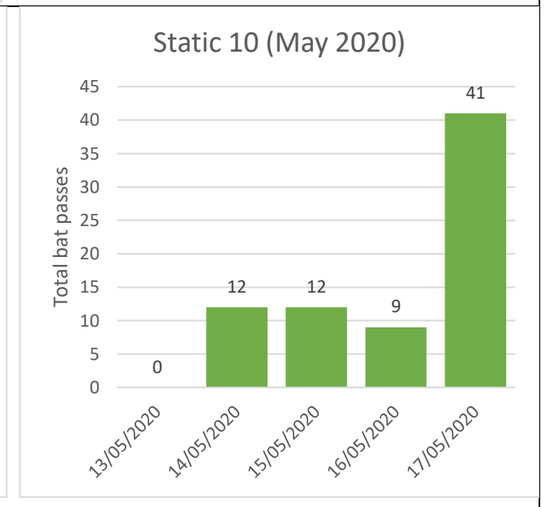
A	4	 Static 4 (June 2019) Total bat passes 0 2 4 6 8 10 12 14 16 18 20 10 18 11 7 2 19.06.2019 20.06.2019 21.06.2019 22.06.2019 23.06.2019  Static 4 (July 2019) Total bat passes 0 20 40 60 80 100 120 40 99 41 51 16 18.07.2019 19.07.2019 20.07.2019 21.07.2019 22.07.2019  Static 4 (August 2019) Title 0 50 100 150 200 250 300 350 131 121 227 303 251 21.08.2019 22.08.2019 23.08.2019 24.08.2019 25.08.2019  Static 4 (September 2019) Total bat passes 0 20 40 60 80 100 120 60 87 43 109 14 18.09.2019 19.09.2019 20.09.2019 21.09.2019 22.09.2019  Static 4 (October 2019 - equipment failure) Total bat passes 0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 October  Static 4 (April 2020) Total bat passes 0 5 10 15 20 25 30 25 2 3 5 0 16/04/2020 17/04/2020 18/04/2020 19/04/2020 20/04/2020  Static 4 (May 2020) Total bat passes 0 20 40 60 80 100 120 0 21 42 49 99 13/05/2020 14/05/2020 15/05/2020 16/05/2020 17/05/2020

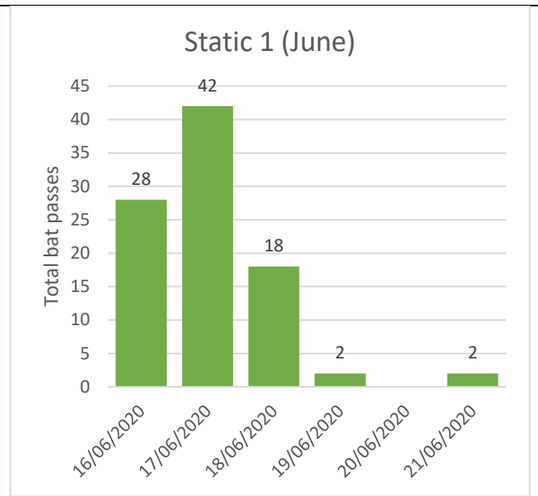
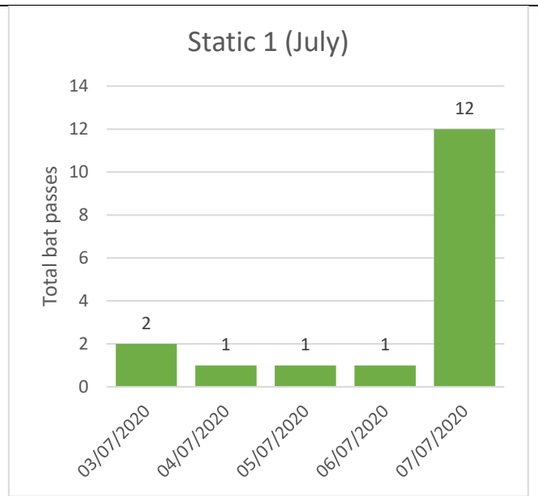
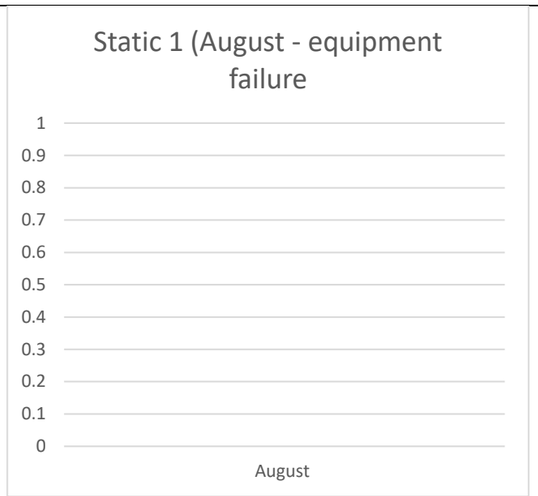
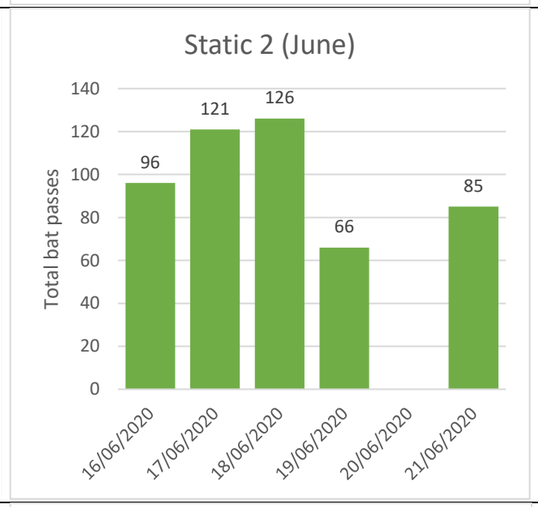
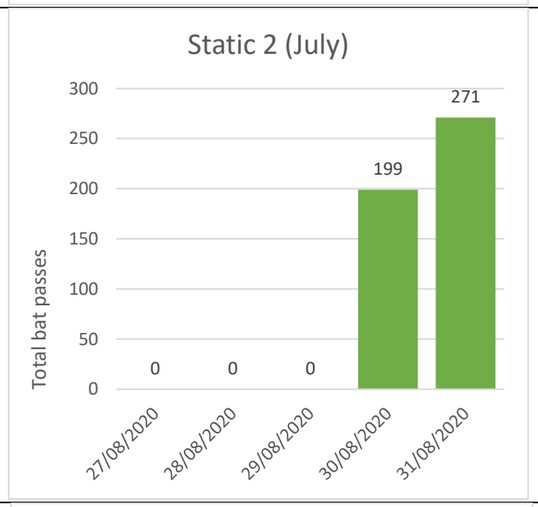
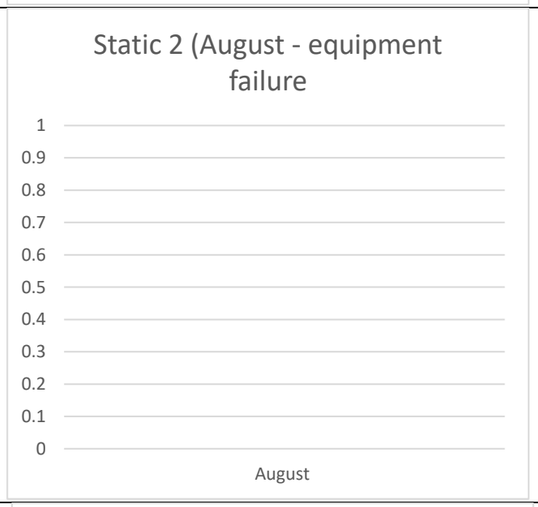
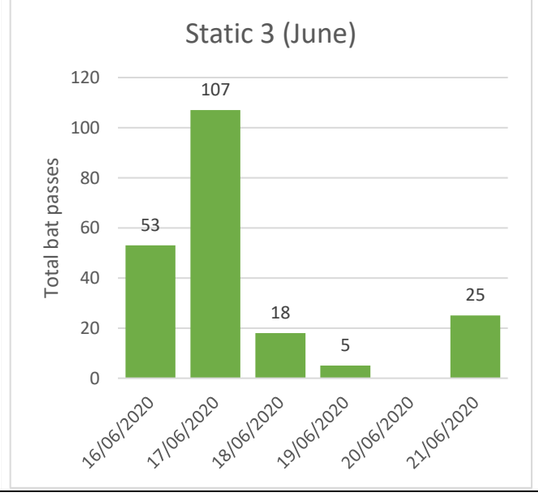
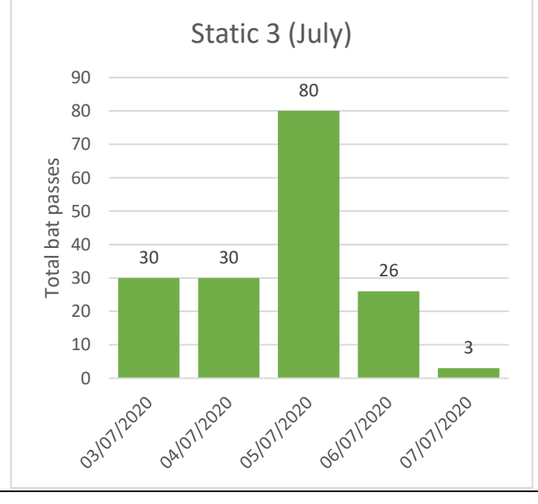
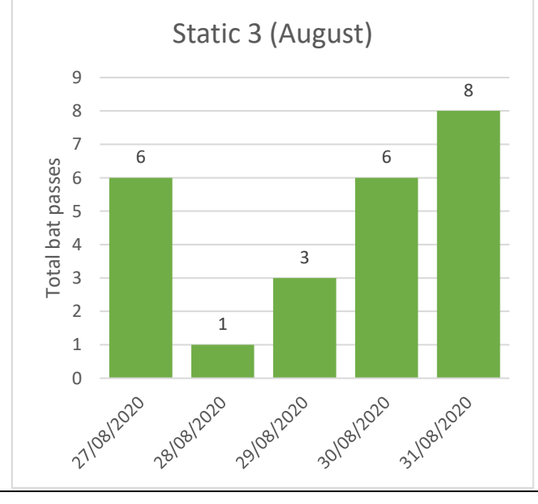
A	5	 Static 5 (June 2019) Total bat passes 500 450 400 350 300 250 200 150 100 50 0 0 0 438 28 69 19.06.2019 20.06.2019 21.06.2019 22.06.2019 23.06.2019  Static 5 (July 2019) Total bat passes 90 80 70 60 50 40 30 20 10 0 81 54 31 4 7 18.07.2019 19.07.2019 20.07.2019 21.07.2019 22.07.2019  Static 5 (August 2019) Total bat passes 70 60 50 40 30 20 10 0 24 28 34 63 21.08.2019 22.08.2019 23.08.2019 24.08.2019  Static 5 (September 2019 - equipment failure) Total bat passes 1 0.9 0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.1 0 September  Static 5 (October 2019) Total bat passes 1200 1000 800 600 400 200 0 999 280 1 23 334 23.10.2019 24.10.2019 25.10.2020 26.10.2020 27.10.2020  Static 5 (April 2020) Total bat passes 25 20 15 10 5 0 21 0 10 5 0 16/04/2020 17/04/2020 18/04/2020 19/04/2020 20/04/2020  Static 5 (May 2020) Total bat passes 300 250 200 150 100 50 0 2 62 41 100 273 13/05/2020 14/05/2020 15/05/2020 16/05/2020 17/05/2020

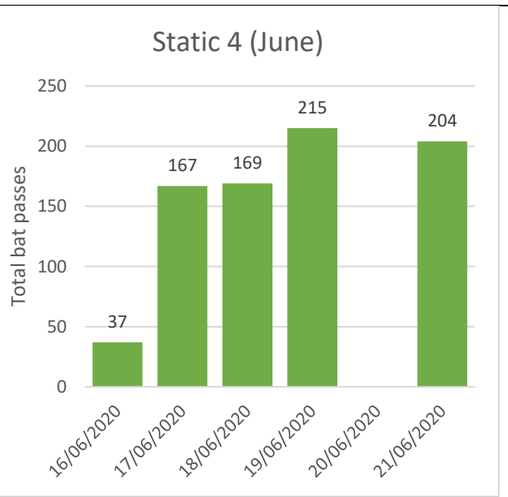
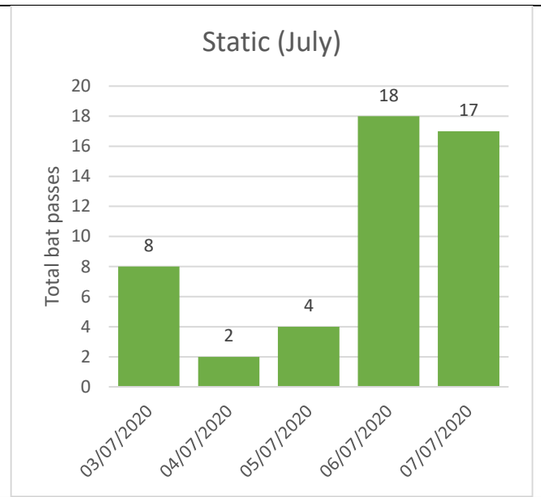
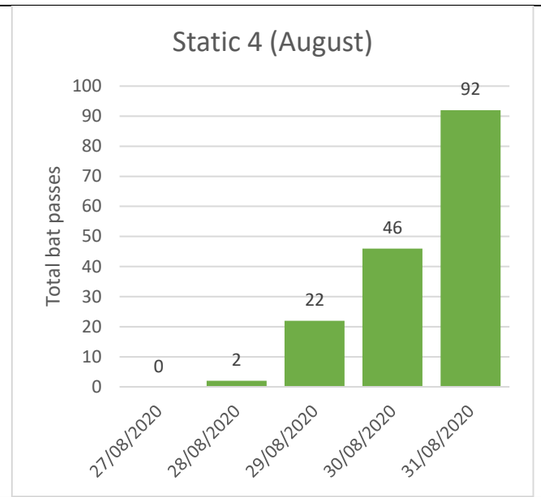
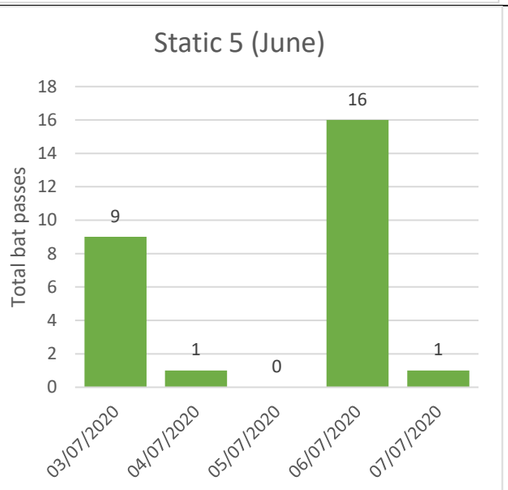
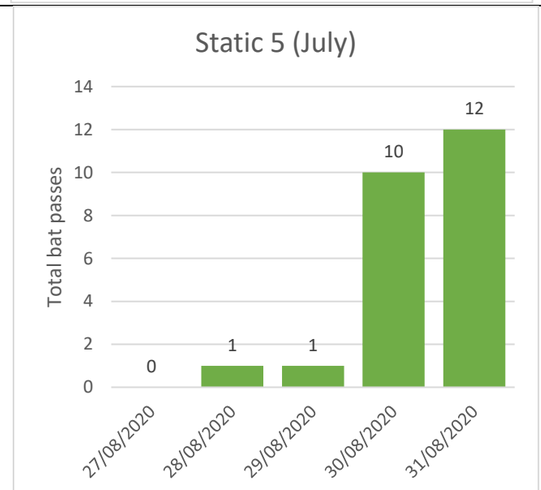
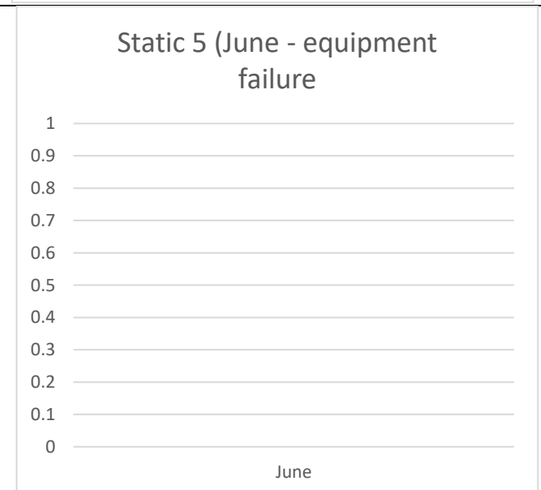
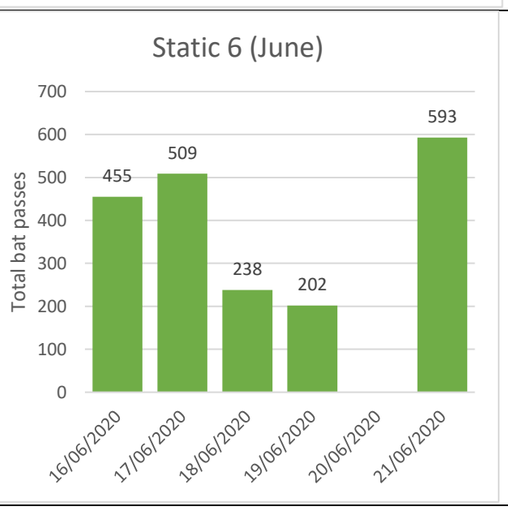
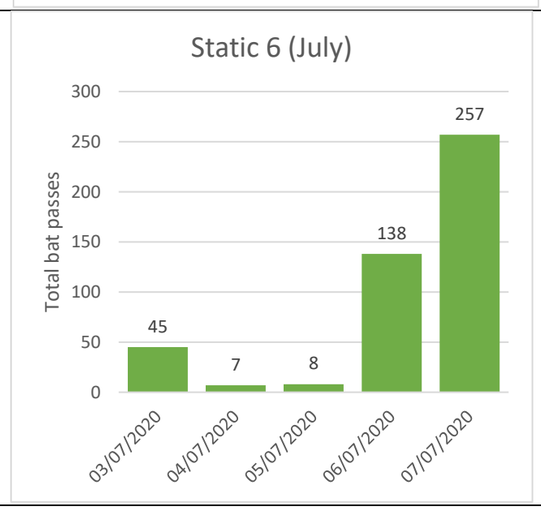
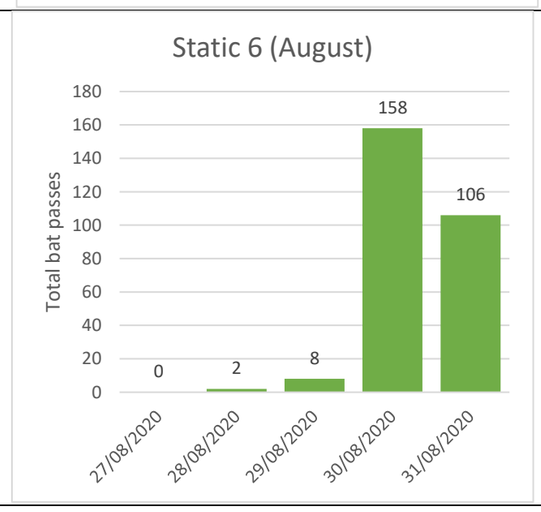
A	6	 Static 6 June 2019) Total bat passes 250 200 150 100 50 0 89 194 63 46 0 19.06.2019 20.06.2019 21.06.2019 22.06.2019 23.06.2019  Static 6 (July 2019) Total bat passes 80 70 60 50 40 30 20 10 0 34 4 47 16 69 18.07.2019 19.07.2019 20.07.2019 21.07.2019 22.07.2019  Static 6 (August 2019) Total bat passes 12 10 8 6 4 2 0 0 1 5 10 0 21.08.2019 22.08.2019 23.08.2019 24.08.2019 25.08.2019  Static 6 (September 2019 - equipment failure) Total bat passes 1 0.9 0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.1 0 September  Static 6 (October 2019) Total bat passes 4.5 4 3.5 3 2.5 2 1.5 1 0.5 0 0 0 0 0 4 23.10.2019 24.10.2019 25.10.2020 26.10.2020 27.10.2020  Static 6 (April 2020) Total bat passes 7 6 5 4 3 2 1 0 6 0 3 0 0 16/04/2020 17/04/2020 18/04/2020 19/04/2020 20/04/2020  Static 6 (May 2020) Total bat passes 70 60 50 40 30 20 10 0 0 16 18 19 62 13/05/2020 14/05/2020 15/05/2020 16/05/2020 17/05/2020

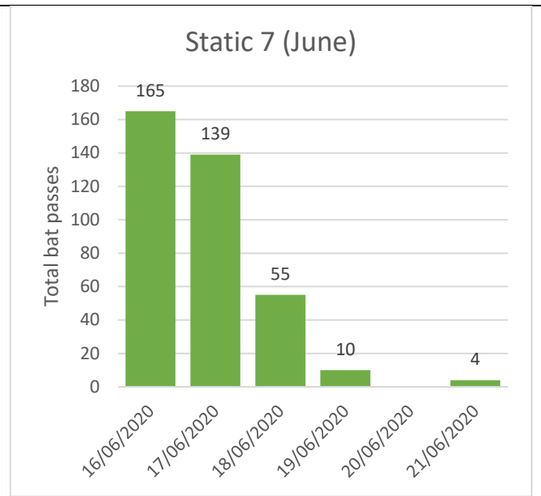
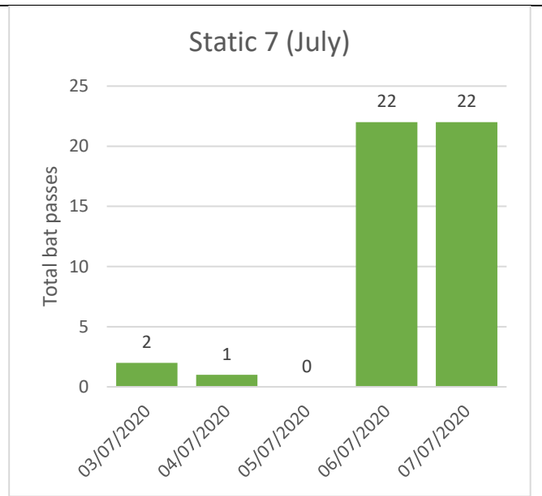
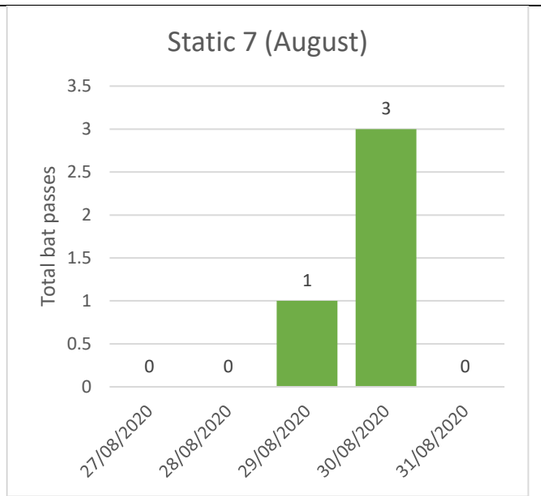
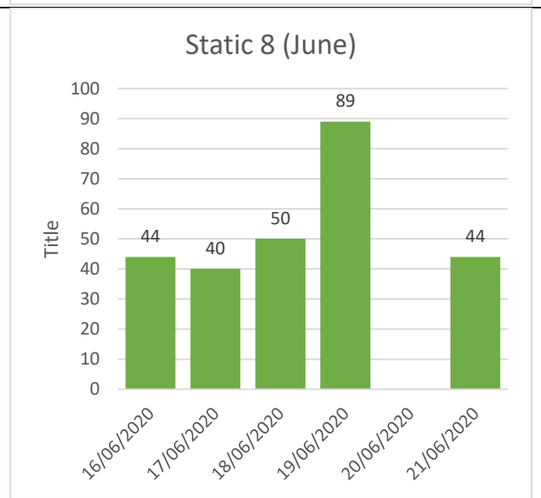
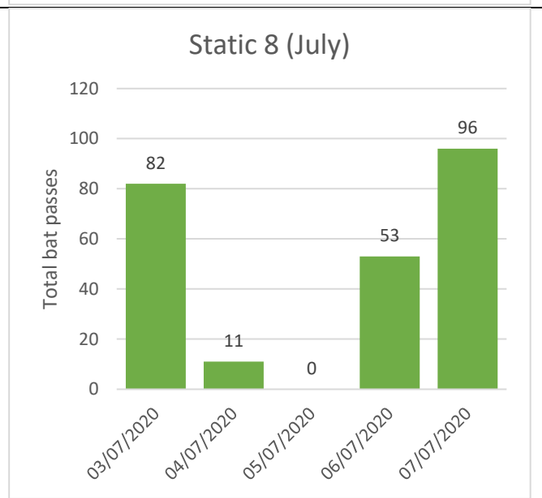
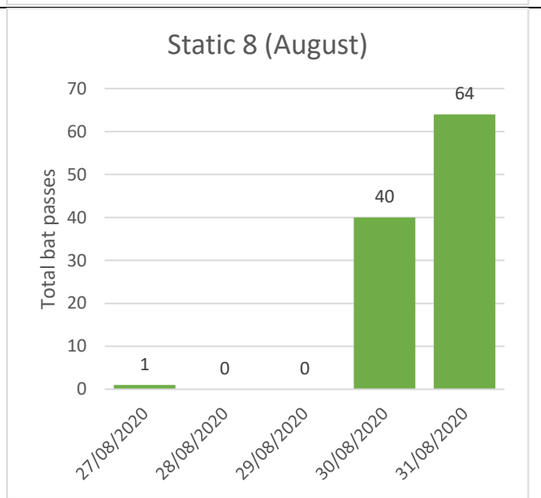
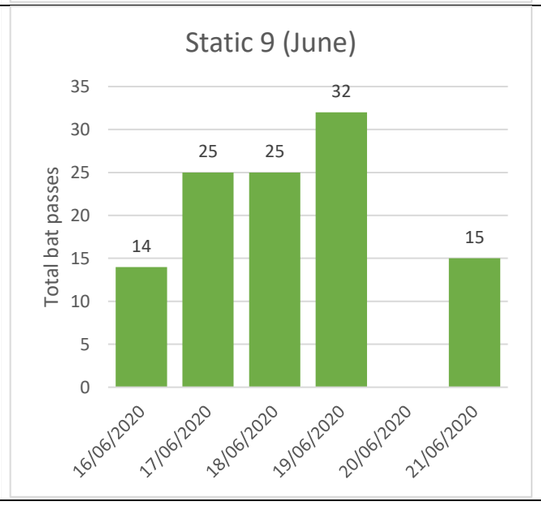
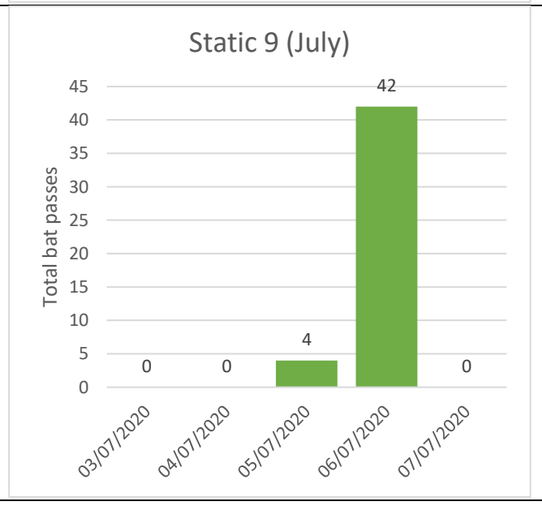
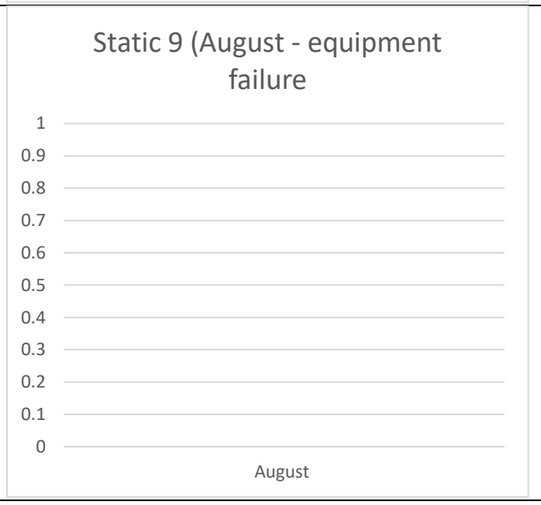
A	7	 Static 7 (June 2019 - equipment failure) Total bat passes 1 0.9 0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.1 0 June	 Static 7 (July 2019) Total bat passes 35 30 25 20 15 10 5 0 29 16 18 7 0 18.07.2019 19.07.2019 20.07.2019 21.07.2019 22.07.2019	 Static 7 (August 2019 - equipment failure) Total bat passes 1 0.9 0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.1 0 August	 Static 7 (September 2019) Total bat passes 120 100 80 60 40 20 0 101 93 28 66 31 18.09.2019 19.09.2019 20.09.2019 21.09.2019 22.09.2019	
		 Static 7 (October 2019) Total bat passes 45 40 35 30 25 20 15 10 5 0 40 0 0 0 30.10.2019 31.10.2019 01.11.2020 02.11.2020	 Static 7 (April 2020) Total bat passes 25 20 15 10 5 0 20 1 5 8 0 16/04/2020 17/04/2020 18/04/2020 19/04/2020 20/04/2020	 Static 7 (May 2020) Total bat passes 90 80 70 60 50 40 30 20 10 0 1 50 33 24 78 13/05/2020 14/05/2020 15/05/2020 16/05/2020 17/05/2020		

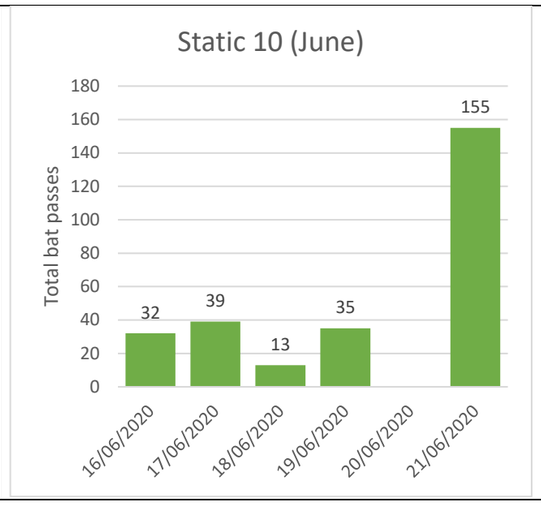
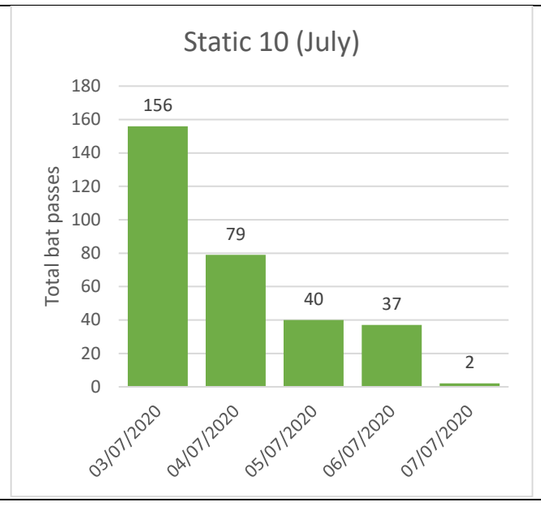
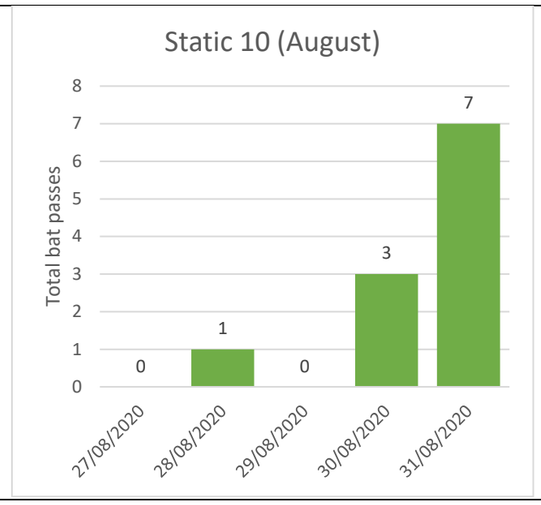
A	8	 Static 8 (June 2019) Total bat passes 0 50 100 150 200 250 300 350 59 38 286 0 184 19.06.2019 20.06.2019 21.06.2019 22.06.2019 23.06.2019  Static 8 (July 2019) Total bat passes 0 20 40 60 80 100 120 140 36 15 36 0 125 18.07.2019 19.07.2019 20.07.2019 21.07.2019 22.07.2019  Static 8 (August 2019) Total bat passes 0 50 100 150 200 250 30 35 98 197 28 21.08.2019 22.08.2019 23.08.2019 24.08.2019 25.08.2019  Static 8 (September 2019) Total bat passes 0 5 10 15 20 25 30 35 27 30 19 19 0 18.09.2019 19.09.2019 20.09.2019 21.09.2019 22.09.2019  Static 8 (October 2019) Total bat passes 0 5 10 15 20 25 30 35 40 45 50 43 2 0 0 2 23.10.2019 24.10.2019 25.10.2020 26.10.2020 27.10.2020  Static 8 (May 2020 - equipment failure) Total bat passes 0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 May  Static 8 (April 2020) Total bat passes 0 2 4 6 8 10 12 14 6 1 12 5 0 16/04/2020 17/04/2020 18/04/2020 19/04/2020 20/04/2020

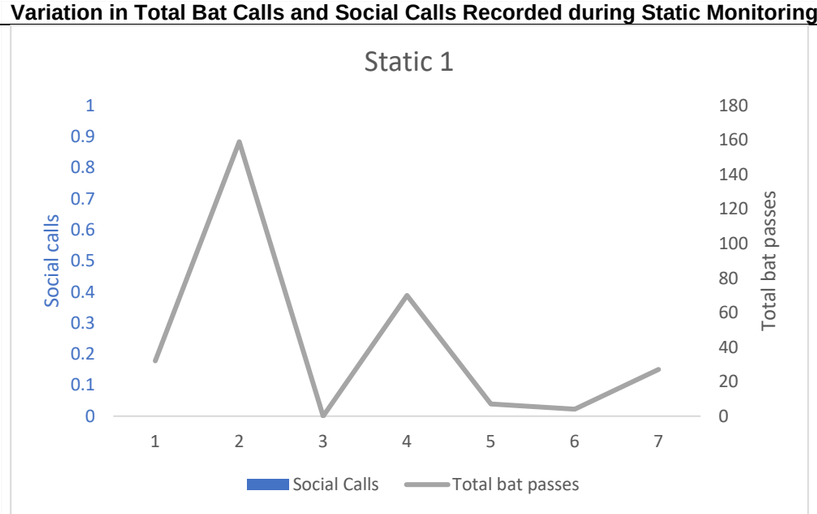
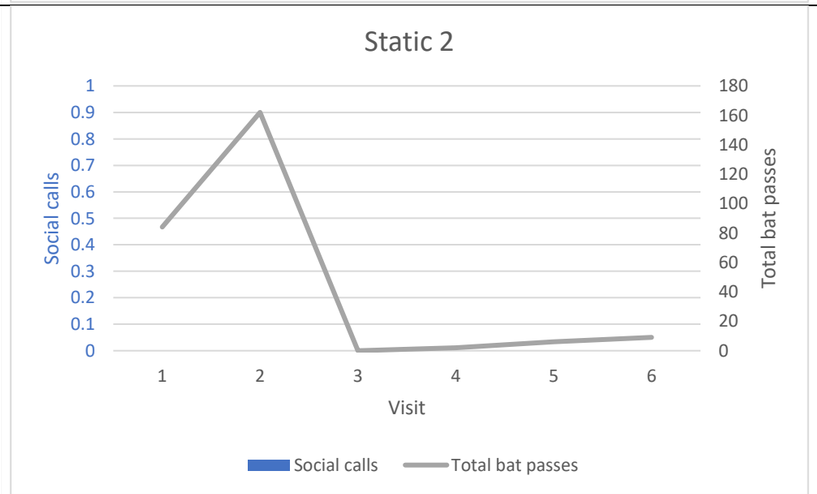
A	9	 Static 9 (June 2019) Total bat passes 300 250 200 150 100 50 0 11 14 87 240 216 19.06.2019 20.06.2019 21.06.2019 22.06.2019 23.06.2019  Static 9 (July 2019 - equipment failure) 1 0.9 0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.1 0 July  Static 9 (August 2019) Total bat passes 2500 2000 1500 1000 500 0 2016 324 297 57 0 21.08.2019 22.08.2019 23.08.2019 24.08.2019 25.08.2019  Static 9 (September 2019 - equipment failure) Total bat passes 1 0.9 0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.1 0 September  Static 9 (October 2019) Total bat passes 400 350 300 250 200 150 100 50 0 352 79 0 23.10.2019 24.10.2019 25.10.2020  Static 9 (April 2020) Total bat passes 4.5 4 3.5 3 2.5 2 1.5 1 0.5 0 4 3 0 16/04/2020 17/04/2020 18/04/2020  Static 9 (May 2020) Total bat passes 70 60 50 40 30 20 10 0 1 65 14 30 47 13/05/2020 14/05/2020 15/05/2020 16/05/2020 17/05/2020
A	10	 Static 10 (July 2019) Total bat passes 35 30 25 20 15 10 5 0 6 13 19 12 29 18.07.2019 19.07.2019 20.07.2019 21.07.2019 22.07.2019  Static 10 (August 2019) Total bat passes 20 18 16 14 12 10 8 6 4 2 0 10 18 8 10 2 21.08.2019 22.08.2019 23.08.2019 24.08.2019 25.08.2019  Static 10 (April 2020) Total bat passes 14 12 10 8 6 4 2 0 12 2 6 7 0 16/04/2020 17/04/2020 18/04/2020 19/04/2020 20/04/2020  Static 10 (May 2020) Total bat passes 45 40 35 30 25 20 15 10 5 0 0 12 12 9 41 13/05/2020 14/05/2020 15/05/2020 16/05/2020 17/05/2020

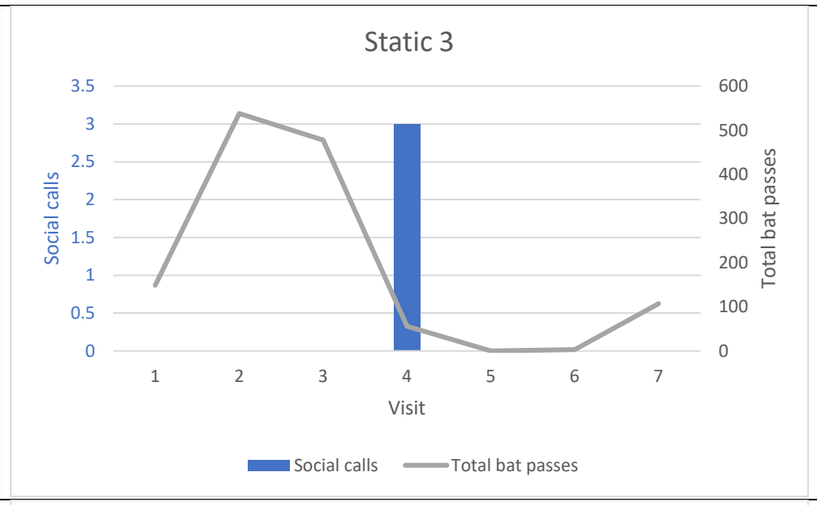
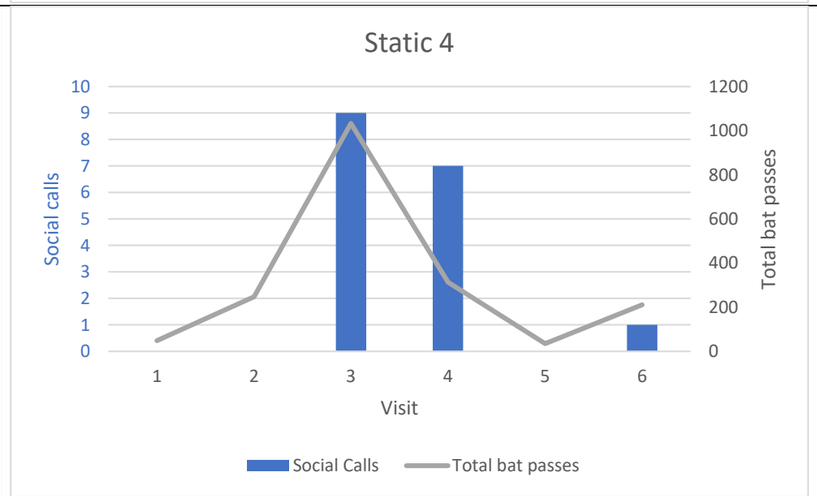
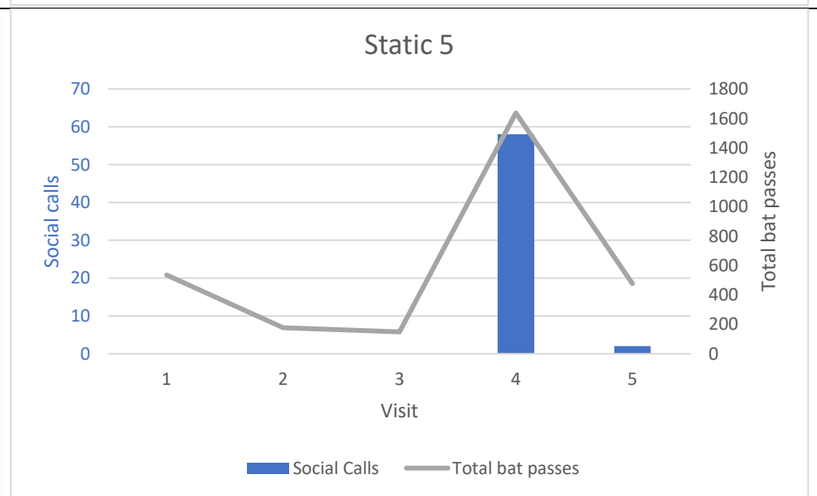
B	1	 Static 1 (June) Total bat passes 45 40 35 30 25 20 15 10 5 0 28 42 18 2 2 16/06/2020 17/06/2020 18/06/2020 19/06/2020 20/06/2020 21/06/2020	 Static 1 (July) Total bat passes 14 12 10 8 6 4 2 0 2 1 1 1 12 03/07/2020 04/07/2020 05/07/2020 06/07/2020 07/07/2020	 Static 1 (August - equipment failure 1 0.9 0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.1 0 August	
B	2	 Static 2 (June) Total bat passes 140 120 100 80 60 40 20 0 96 121 126 66 85 16/06/2020 17/06/2020 18/06/2020 19/06/2020 20/06/2020 21/06/2020	 Static 2 (July) Total bat passes 300 250 200 150 100 50 0 0 0 0 199 271 27/08/2020 28/08/2020 29/08/2020 30/08/2020 31/08/2020	 Static 2 (August - equipment failure 1 0.9 0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.1 0 August	
B	3	 Static 3 (June) Total bat passes 120 100 80 60 40 20 0 53 107 18 5 25 16/06/2020 17/06/2020 18/06/2020 19/06/2020 20/06/2020 21/06/2020	 Static 3 (July) Total bat passes 90 80 70 60 50 40 30 20 10 0 30 30 80 26 3 03/07/2020 04/07/2020 05/07/2020 06/07/2020 07/07/2020	 Static 3 (August) Total bat passes 9 8 7 6 5 4 3 2 1 0 6 1 3 6 8 27/08/2020 28/08/2020 29/08/2020 30/08/2020 31/08/2020	

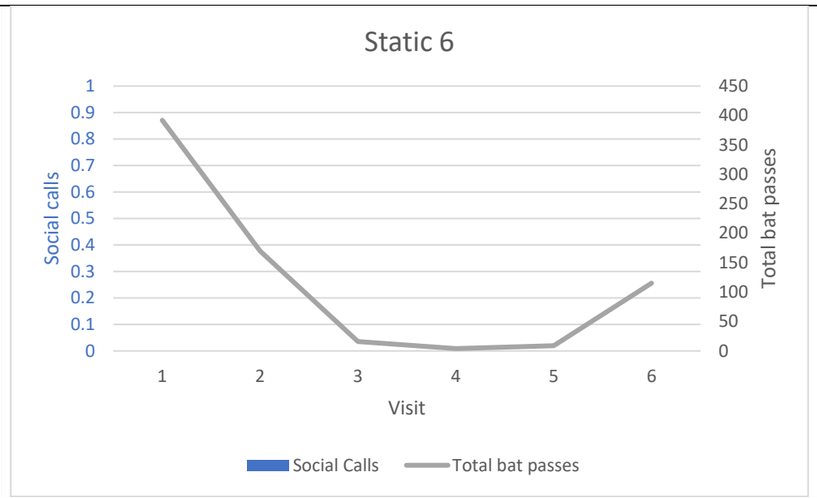
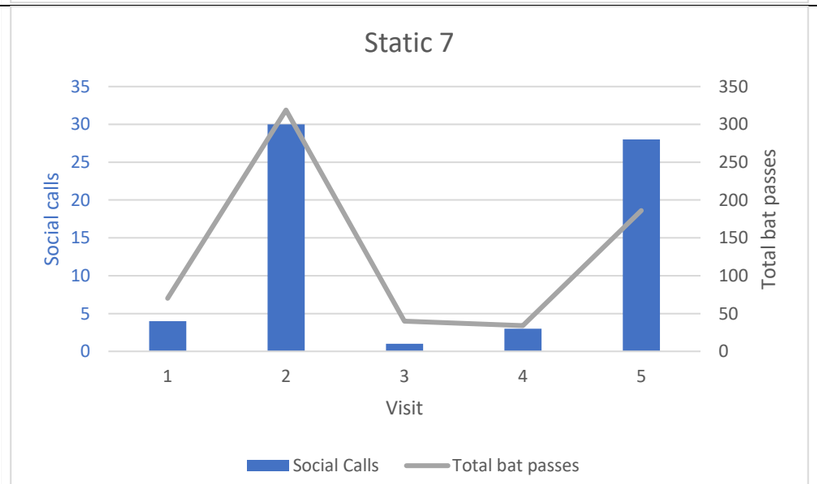
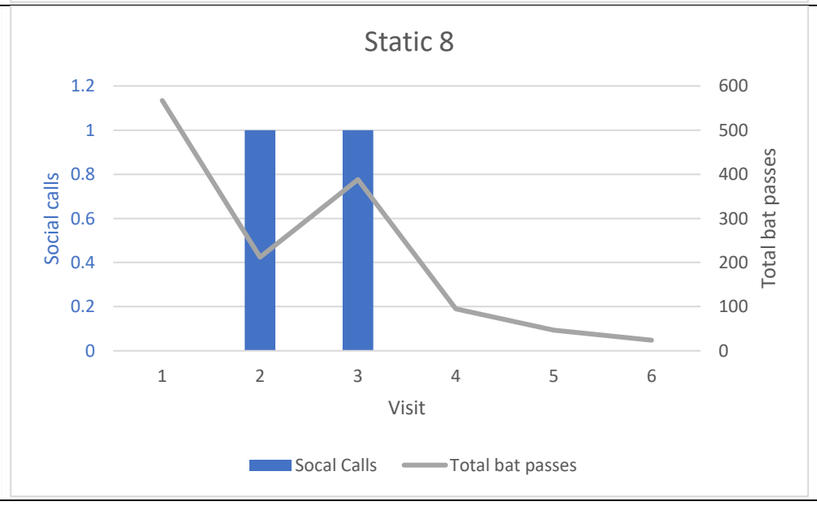
B	4	 Static 4 (June) Total bat passes 250 200 150 100 50 0 37 167 169 215 204 16/06/2020 17/06/2020 18/06/2020 19/06/2020 20/06/2020 21/06/2020	 Static (July) Total bat passes 20 18 16 14 12 10 8 6 4 2 0 8 2 4 18 17 03/07/2020 04/07/2020 05/07/2020 06/07/2020 07/07/2020	 Static 4 (August) Total bat passes 100 90 80 70 60 50 40 30 20 10 0 0 2 22 46 92 27/08/2020 28/08/2020 29/08/2020 30/08/2020 31/08/2020
B	5	 Static 5 (June) Total bat passes 18 16 14 12 10 8 6 4 2 0 9 1 0 16 1 03/07/2020 04/07/2020 05/07/2020 06/07/2020 07/07/2020	 Static 5 (July) Total bat passes 14 12 10 8 6 4 2 0 0 1 1 10 12 27/08/2020 28/08/2020 29/08/2020 30/08/2020 31/08/2020	 Static 5 (June - equipment failure 1 0.9 0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.1 0 June
C	6	 Static 6 (June) Total bat passes 700 600 500 400 300 200 100 0 455 509 238 202 593 16/06/2020 17/06/2020 18/06/2020 19/06/2020 20/06/2020 21/06/2020	 Static 6 (July) Total bat passes 300 250 200 150 100 50 0 45 7 8 138 257 03/07/2020 04/07/2020 05/07/2020 06/07/2020 07/07/2020	 Static 6 (August) Total bat passes 180 160 140 120 100 80 60 40 20 0 0 2 8 158 106 27/08/2020 28/08/2020 29/08/2020 30/08/2020 31/08/2020

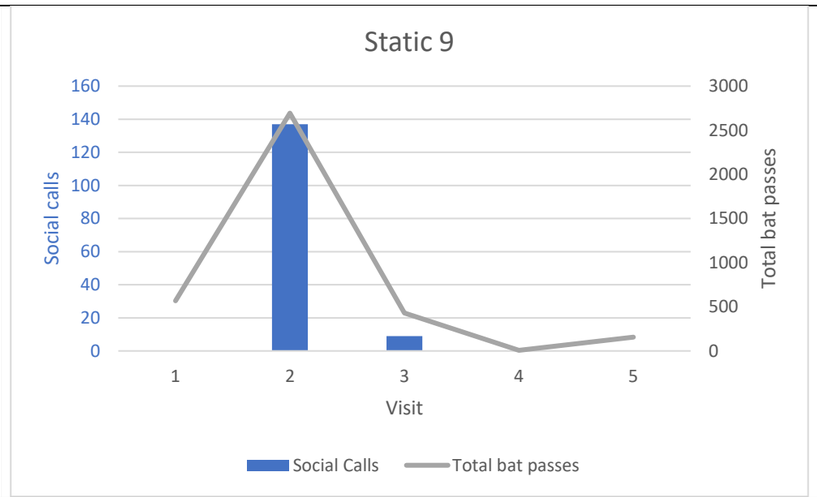
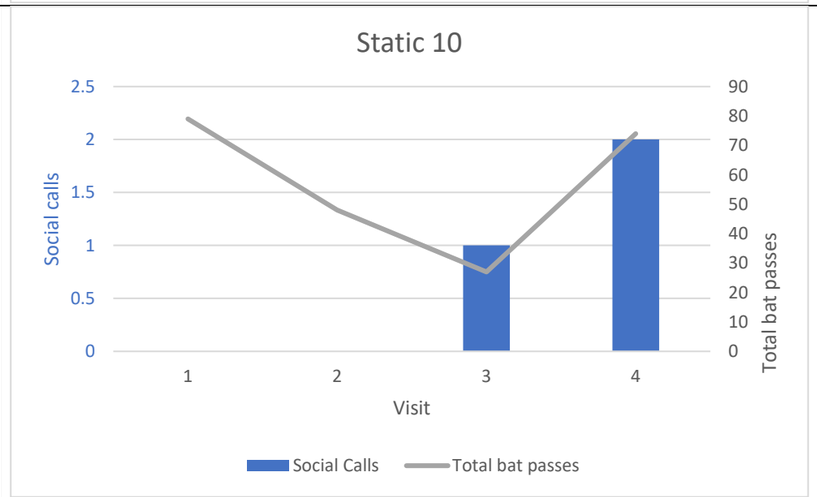
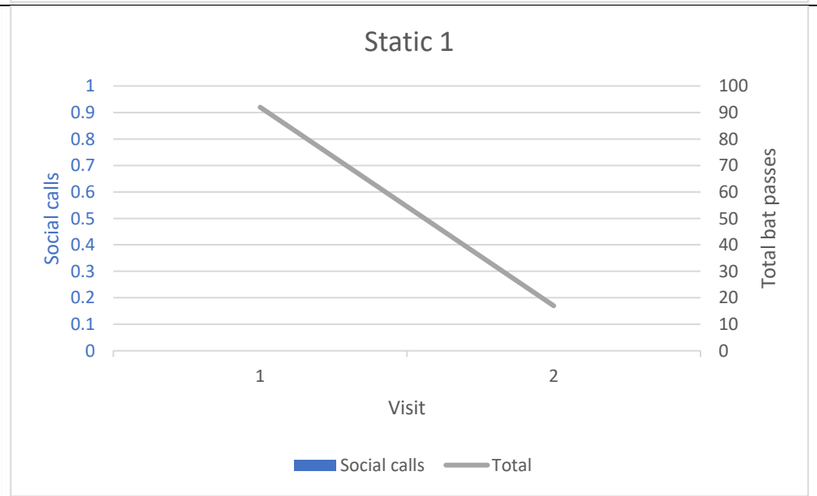
C	7	 Static 7 (June) Total bat passes 180 160 140 120 100 80 60 40 20 0 165 139 55 10 4 16/06/2020 17/06/2020 18/06/2020 19/06/2020 20/06/2020 21/06/2020	 Static 7 (July) Total bat passes 25 20 15 10 5 0 2 1 0 22 22 03/07/2020 04/07/2020 05/07/2020 06/07/2020 07/07/2020	 Static 7 (August) Total bat passes 3.5 3 2.5 2 1.5 1 0.5 0 0 0 1 3 0 27/08/2020 28/08/2020 29/08/2020 30/08/2020 31/08/2020	
C	8	 Static 8 (June) Title 100 90 80 70 60 50 40 30 20 10 0 44 40 50 89 44 16/06/2020 17/06/2020 18/06/2020 19/06/2020 20/06/2020 21/06/2020	 Static 8 (July) Total bat passes 120 100 80 60 40 20 0 82 11 0 53 96 03/07/2020 04/07/2020 05/07/2020 06/07/2020 07/07/2020	 Static 8 (August) Total bat passes 70 60 50 40 30 20 10 0 1 0 0 40 64 27/08/2020 28/08/2020 29/08/2020 30/08/2020 31/08/2020	
C	9	 Static 9 (June) Total bat passes 35 30 25 20 15 10 5 0 14 25 25 32 15 16/06/2020 17/06/2020 18/06/2020 19/06/2020 20/06/2020 21/06/2020	 Static 9 (July) Total bat passes 45 40 35 30 25 20 15 10 5 0 0 0 4 42 0 03/07/2020 04/07/2020 05/07/2020 06/07/2020 07/07/2020	 Static 9 (August - equipment failure 1 0.9 0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.1 0 August	

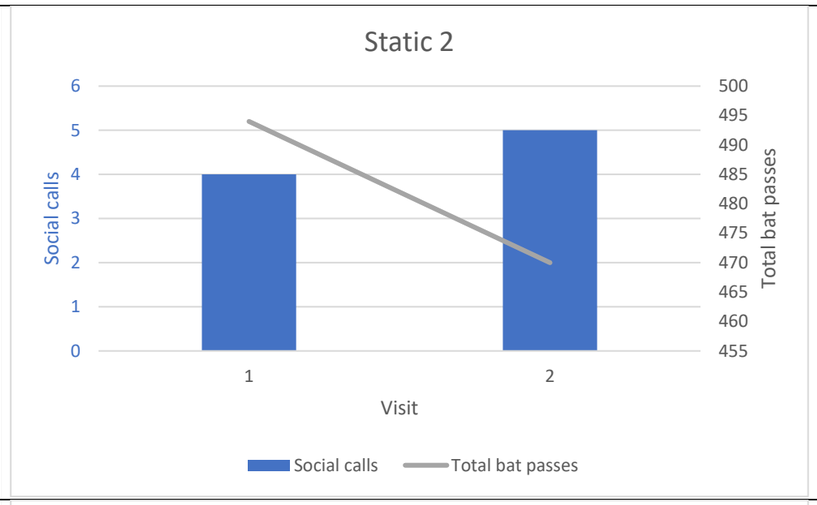
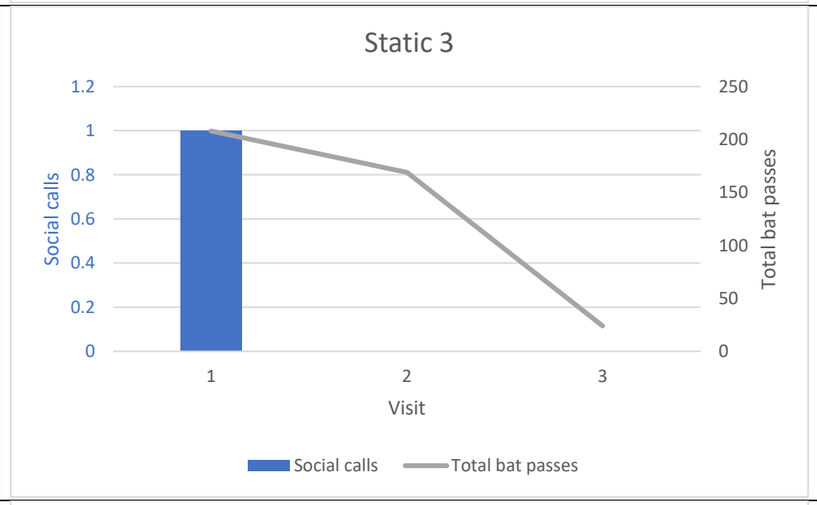
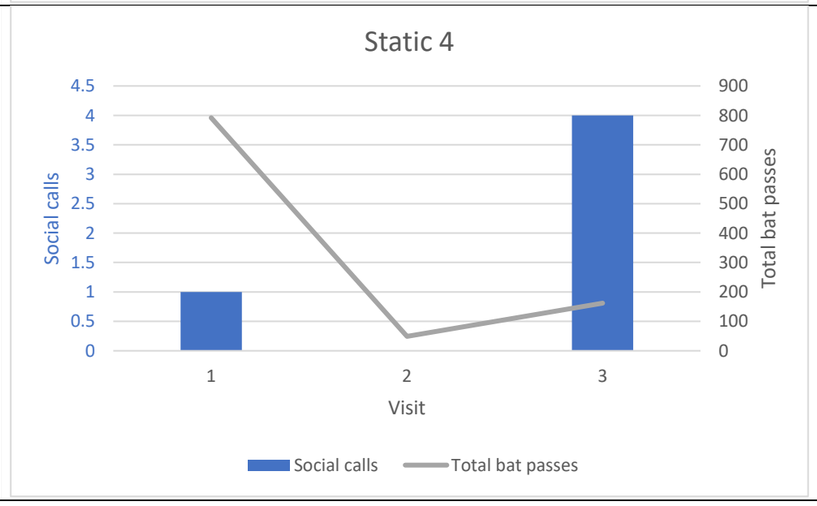
C	10	  

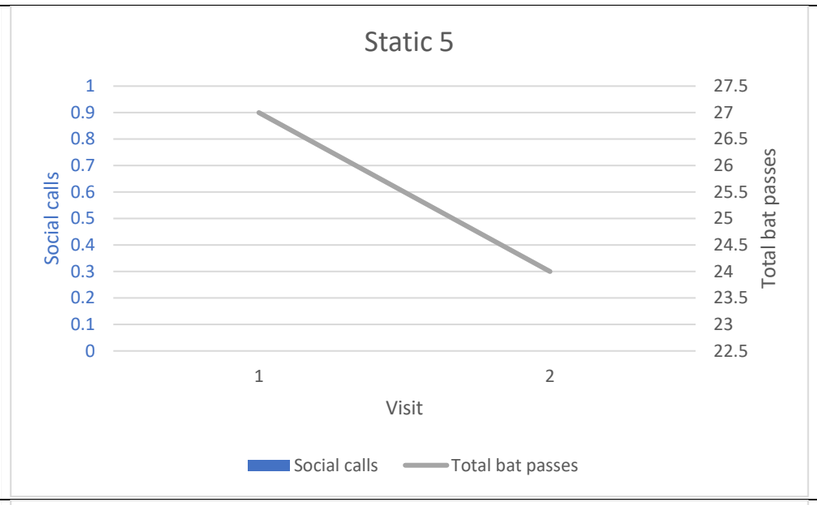
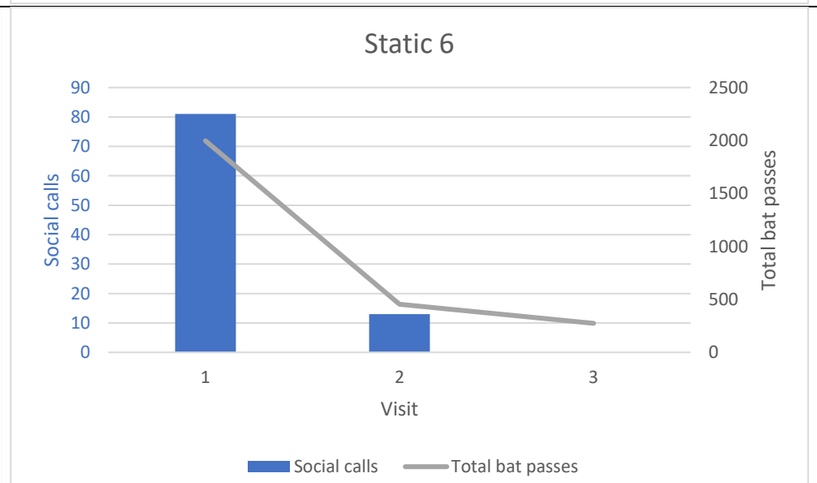
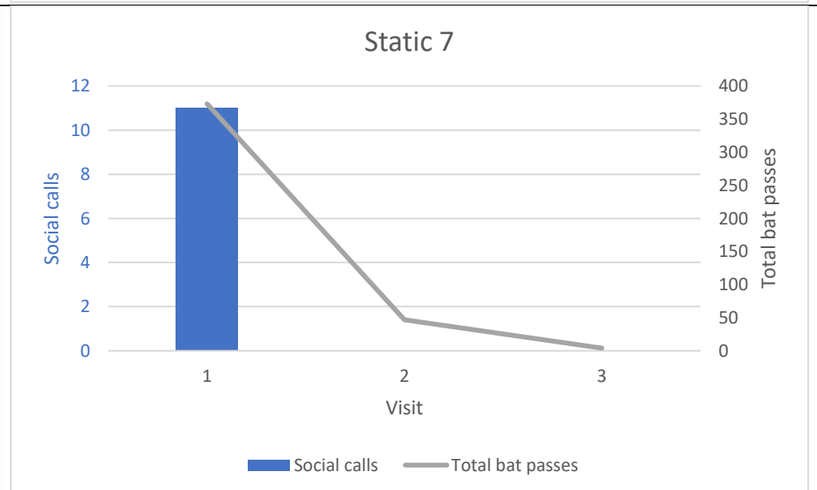
Zone	Static	**Variation in Total Bat Calls and Social Calls Recorded during Static Monitoring (for entire bat assemblage at all locations)**
A	1	
A	2	

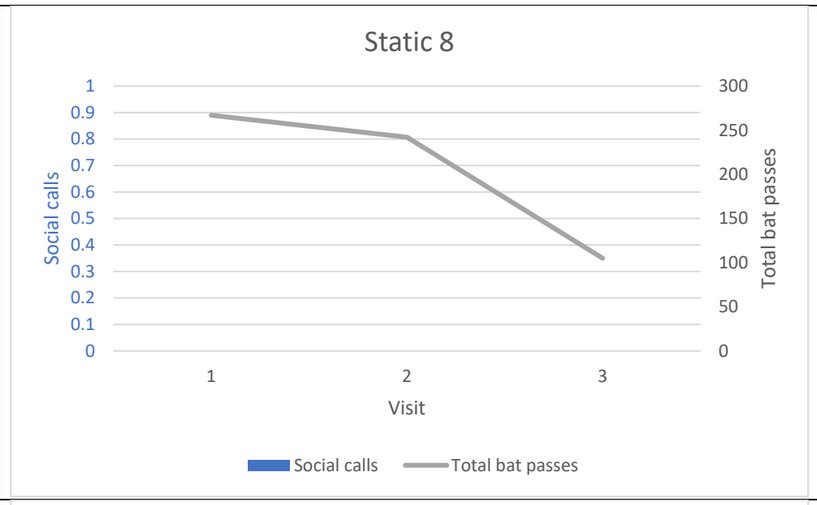
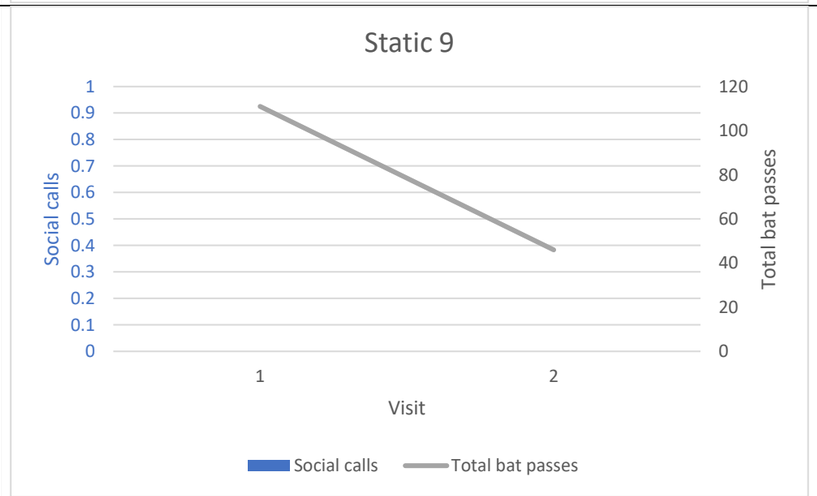
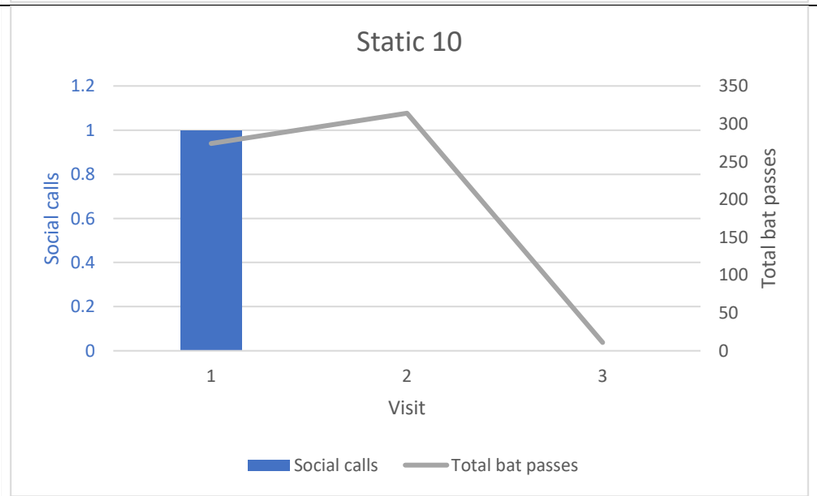
A	3	 Static 3 Social calls Total bat passes Visit Social calls Total bat passes	
A	4	 Static 4 Social calls Total bat passes Visit Social Calls Total bat passes	
A	5	 Static 5 Social calls Total bat passes Visit Social Calls Total bat passes	

A	6	 Static 6 Social calls Total bat passes Visit Social Calls Total bat passes	
A	7	 Static 7 Social calls Total bat passes Visit Social Calls Total bat passes	
A	8	 Static 8 Social calls Total bat passes Visit Socal Calls Total bat passes	

A	9	 Static 9 Social calls Total bat passes Visit Social Calls Total bat passes	
A	10	 Static 10 Social calls Total bat passes Visit Social Calls Total bat passes	
B	1	 Static 1 Social calls Total bat passes Visit Social calls Total	

B	2	 Static 2 Social calls Total bat passes Visit 0 1 2 3 4 5 6 455 460 465 470 475 480 485 490 495 500 1 2 Social calls Total bat passes	
B	3	 Static 3 Social calls Total bat passes Visit 0 0.2 0.4 0.6 0.8 1 1.2 0 50 100 150 200 250 1 2 3 Social calls Total bat passes	
B	4	 Static 4 Social calls Total bat passes Visit 0 0.5 1 1.5 2 2.5 3 3.5 4 4.5 0 100 200 300 400 500 600 700 800 900 1 2 3 Social calls Total bat passes	

B	5	 Static 5 Social calls Total bat passes Visit 1 2 0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 22.5 23 23.5 24 24.5 25 25.5 26 26.5 27 27.5 Social calls Total bat passes	
C	6	 Static 6 Social calls Total bat passes Visit 1 2 3 0 10 20 30 40 50 60 70 80 90 0 500 1000 1500 2000 2500 Social calls Total bat passes	
C	7	 Static 7 Social calls Total bat passes Visit 1 2 3 0 2 4 6 8 10 12 0 50 100 150 200 250 300 350 400 Social calls Total bat passes	

C	8	 Static 8 Social calls Total bat passes Visit 1 2 3 0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 0 50 100 150 200 250 300 Social calls Total bat passes	
C	9	 Static 9 Social calls Total bat passes Visit 1 2 0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 0 20 40 60 80 100 120 Social calls Total bat passes	
C	10	 Static 10 Social calls Total bat passes Visit 1 2 3 0 0.2 0.4 0.6 0.8 1 1.2 0 50 100 150 200 250 300 350 Social calls Total bat passes	

APPENDIX G INVERTEBRATE SURVEY REPORT

Date: March 2022

North Lincolnshire Green Energy Park

Technical Appendix G - Invertebrate Survey Report

November 2021

Control sheet

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Job number:	BOW17.961
Title:	NLGEP Technical Appendix G - Invertebrate Survey Report
Client:	North Lincolnshire Green Energy Park Ltd.
Prepared by:	Sophie King*, Ecologist*
Checked by:	Jeremy James, *Principal Ecologist*
Date of Issue:	November 2021
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This report has been prepared by an ecological specialist and does not purport to provide legal advice. You may wish to take separate legal advice.

The information which we have prepared and provided is true, and has been prepared and provided in accordance with the BS42020:2013 and the Chartered Institute of Ecology and Environmental Management's Code of Professional Conduct. We confirm that the opinions expressed are our true and professional bona fide opinions.

Bowland Ecology is accredited to Quality Guild (QG) standards in respect of our Quality, Environmental and Health and Safety procedures. The QG is an independent externally audited and accredited system that has been developed according to the principles of ISO9001, ISO14001 and OHAS18001.

Signed (Author) [redacted]	Signed (QA) [redacted]

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1. Introduction

1.1 Bowland Ecology Ltd. was commissioned to undertake terrestrial invertebrate surveys to inform the North Lincolnshire Green Energy Park (NLGEP) ('the Project'), a Nationally Significant Infrastructure Project (NSIP) located at Flixborough, North Lincolnshire. For the purposes of this report, the areas within the Project Order Limits are split into the following subsections:

- the Energy Park Land - an area within the Order Limits containing the core elements of the Project (Energy Recovery Facility, CO_2 capture, ash treatment and concrete block manufacturing facility, plastic recycling facility, visitor centre, hydrogen production and re-fuelling station), located north of Ferry Road West (B1216);

- the Railway Reinstatement Land - reinstatement of the existing Dragonby to Flixborough branch line and construction and operation of a new railhead to the south of Flixborough Wharf, with the primary purpose of facilitating the delivery and export of materials to and from the Energy Park;

- The Northern District Heat and Private Wire Network (DHPWN) Land – running from the southern end of the Energy Park Land, east along the A1077 (Phoenix Parkway) before looping around Normanby Road (Option A) or Bessermer Way (Option B) to the east; and

- The Southern DHPWN Land - running from the southern end of the Energy Park where the B1216 (Ferry Road West) joins, extending south through the agricultural land on the west side of the A1077. Both DHPWN will support the same buried utilities infrastructure; comprising insulated supply and return pipework for heat and cabling to supply electrical power.

1.2 Following extended Phase 1 habitat surveys, the Energy Park Land, Northern DHPWN Land, and the Southern DHPWN Land were deemed to be of low to negligible value for invertebrates. As such, they were not taken forward for further invertebrate surveys.

1.3 The Railway Reinstatement Land is a disused mineral railway spur running from Flixborough Wharf to Dragonby Rail Sidings. The disused railway comprises a complex mosaic of habitats including scrub, trees, open glades of calcareous grassland and ephemerals and short perennials as well as tall ruderals. This habitat mosaic has the potential to support a diverse assemblage of invertebrates, therefore it was identified as requiring further, more detailed invertebrate survey.

1.4 The aim of the survey was to establish the presence of invertebrate species of high nature conservation interest present within the survey area such as UK and local Biodiversity Action Plan species, IUCN, Red Data Book, and Nationally Scarce species.

2. Methodology

Desk Study

2.1 Local records on and within 5 km of the Order Limits were obtained following a data search with Greater Lincolnshire Nature Partnership (GLNP)[1].

Habitat Assessment

2.2 Suitable habitats for invertebrates were assessed following the extended Phase 1 habitat survey of the land within the Order Limits. An assessment of whether to take areas forward for further invertebrate survey was made considering the following factors:

- the suitability of habitats present to support a diverse range of invertebrate species;
- the scale of the impacts from the Project, including no impacts, habitat loss, habitat enhancement, and habitat creation; and
- the temporal scale of impacts from the Project, including permanent and temporary habitat loss or disturbance.

2.3 Based on this assessment, only the Railway Reinstatement Land was taken forward for further invertebrate survey.

Field survey

2.4 Two different survey methods were undertaken for the purposes of the field survey; sweep netting and direct searching. The methodologies were completed in combination during the survey.

2.5 *Sweep netting* - Terrestrial invertebrates were surveyed using a 40 cm diameter sweep net and mounted on a metre-long angling pole. The net was passed through and near low vegetation, overhanging tree branches and woody scrub, over partly bare ground, etc. Invertebrates caught with the sweep net were selectively removed with a pooter (or aspirator).

2.6 *Direct searching* - Conspicuous species such as butterflies, day-flying moths, adult dragonflies were identified in the field and direct searching for example, under stones, fallen wood and on flowers was also conducted.

2.7 The surveys were undertaken by Andy Godfrey MSc on the 19th and 23rd August 2019. The weather on the 19th was dry and sunny with 80% blue sky; the weather on the 23rd was sunny and dry with 90% clear sky. The survey area comprised a transect of the disused mineral railway line (see Figure 1).

2.8 Target groups for terrestrial invertebrates were identified which are considered by the surveyor to be good habitat indicators. These include Orthoptera (grasshoppers and allies), Odonata (damselflies and dragonflies), shieldbugs and grassbugs, selected Coleoptera (beetles), butterflies, day-flying moths, selected Diptera and selected aculeate Hymenoptera (ants, bees and wasps). These have generally been identified to species.

2.9 Vouchers of rare and uncommon species have been retained. All material was collected by and identified by Andy Godfrey.

[1] Records from 2000 onwards are included within this report.

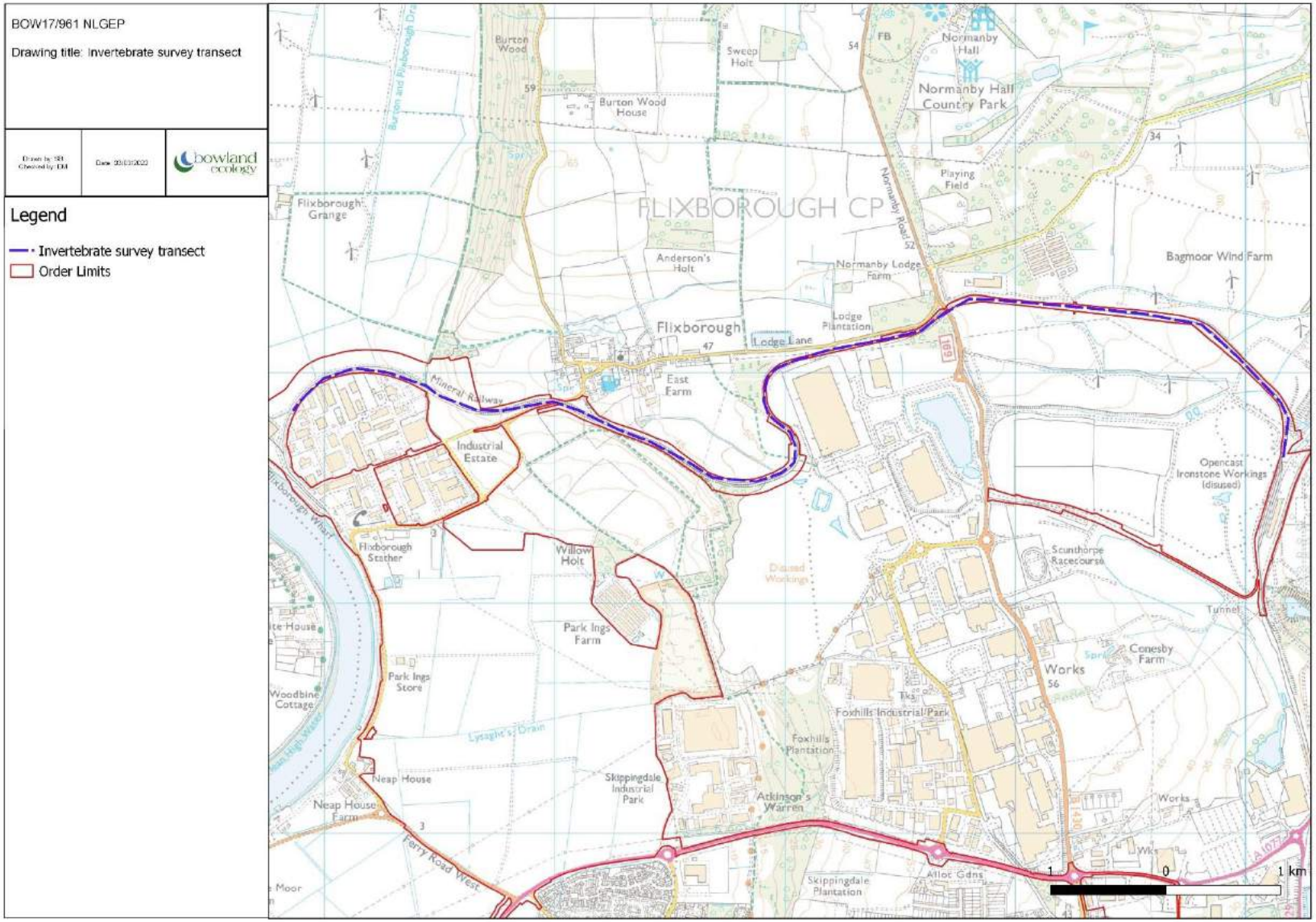

Figure 1. Plan showing the invertebrate survey area.

Rarity Statuses

2.10 Rarity statuses such as Red Data Book, Nationally Scarce (previously Notable) and Local have been developed and heavily used by Natural England, the Joint Nature Conservation Committee and associated organisations. Since 1995, International Union for Conservation of Nature and Natural Resources (IUCN) categories has been adopted by the Joint Nature Conservation Committee as the new standard for Red Lists in Britain. JNCC aims to work towards assessing the status of all native species against standard criteria based on the internationally accepted guidelines developed by the IUCN (see IUCN 2001, 2003). The way statuses are calculated is described in Appendix B.

UK Biodiversity Action Plan and Section 41 of the NERC Act 200

2.11 As a result of devolution, and new country level and international requirements, much of the work done by the Section 41 is now focused on country level, and the UK BAP was succeeded by the UK Post 2010 Biodiversity Framework. The list of UK Priority species, however, remains an important reference source and has been used to draw up statutory lists of priority species for England, Scotland, Wales and Northern Ireland as required under Section 41 (in the case of England) of the National Environment and Rural Communities (NERC) Act 2006.

Limitations

2.12 The timing of the survey was within the optimum period for terrestrial invertebrate survey (May to mid-September); however, recording earlier in the season would significantly add to the species list. However, the survey was conducted in excellent weather conditions and the effort expended in the present survey is considered sufficient to meet the aims of the survey.

3. Results

Desk Study

3.1 Species of Principal Importance as listed on Section 41 of the Natural and Rural Communities (NERC) Act, 2006 returned by the 5 km search radius comprise eight butterfly species and 43 moth species (see Table 1). Three butterfly species are listed in Schedule 5 of the Wildlife and Countryside Act, in Sections 9.5a and 9.5b. No invertebrates which are European protected species were returned by the desk study.

Table 1. Invertebrate desk study results

Taxon Group	Common Name	Taxon Name	No. of records	NERC S41	Sch 5
insect - butterfly	Grayling	*Hipparchia semele*	387	x	
insect - butterfly	Grizzled Skipper	*Pyrgus malvae*	1	x	
insect - butterfly	Large Heath	*Coenonympha tullia*	1		
insect - butterfly	Large Tortoiseshell	*Nymphalis polychloros*	1		x
insect - butterfly	Silver-studded Blue	*Plebejus argus*	1	x	x
insect - butterfly	Small Heath	*Coenonympha pamphilus*	322	x	
insect - butterfly	Wall	*Lasiommata megera*	161	x	
insect - butterfly	White-letter Hairstreak	*Satyrium w-album*		x	x
insect - moth	August Thorn	*Ennomos quercinaria*	1	x	
insect - moth	Autumnal Rustic	*Eugnorisma glareosa*	3	x	
insect - moth	Beaded Chestnut	*Agrochola lychnidis*	2	x	
insect - moth	Blood-vein	*Timandra comae*	5	x	
insect - moth	Brindled Beauty	*Lycia hirtaria*	2	x	
insect - moth	Broom Moth	*Ceramica pisi*	2	x	
insect - moth	Buff Ermine	*Spilosoma lutea*	24	x	
insect - moth	Centre-barred Sallow	*Atethmia centrago*	3	x	
insect - moth	Cinnabar	*Tyria jacobaeae*	86	x	
insect - moth	Dark Brocade	*Mniotype adusta*	1	x	
insect - moth	Dark Spinach	*Pelurga comitata*	3	x	
insect - moth	Dark-barred Twin-spot Carpet	*Xanthorhoe ferrugata*	13	x	
insect - moth	Deep-brown Dart	*Aporophyla lutulenta*	3	x	
insect - moth	Dot Moth	*Melanchra persicariae*	13	x	
insect - moth	Dusky Brocade	*Apamea remissa*	7	x	
insect - moth	Dusky Dart	*Euxoa tritici*	5	x	
insect - moth	Dusky Thorn	*Ennomos fuscantaria*	2	x	
insect - moth	Ear Moth	*Amphipoea oculea*	1	x	
insect - moth	Feathered Gothic	*Tholera decimalis*	2	x	
insect - moth	Forester	*Adscita statices*	9	x	
insect - moth	Garden Tiger	*Arctia caja*	5	x	
insect - moth	Ghost Moth	*Hepialus humuli*	7	x	
insect - moth	Green-brindled Crescent	*Allophyes oxyacanthae*	3	x	

insect - moth	Grey Dagger	*Acronicta psi*	6	x	
insect - moth	Hedge Rustic	*Tholera cespitis*	4	x	
insect - moth	Knot Grass	*Acronicta rumicis*	1	x	
insect - moth	Lackey	*Malacosoma neustria*	4	x	
insect - moth	Large Wainscot	*Rhizedra lutosa*	4	x	
insect - moth	Latticed Heath	*Chiasmia clathrata*	6	x	
insect - moth	Mottled Rustic	*Caradrina morpheus*	14	x	
insect - moth	Mouse Moth	*Amphipyra tragopoginis*	7	x	
insect - moth	Powdered Quaker	*Orthosia gracilis*	4	x	
insect - moth	Rosy Minor	*Litoligia literosa*	7	x	
insect - moth	Rosy Rustic	*Hydraecia micacea*	4	x	
insect - moth	Rustic	*Hoplodrina blanda*	34	x	
insect - moth	Sallow	*Cirrhia icteritia*	6	x	
insect - moth	Shaded Broad-bar	*Scotopteryx chenopodiata*	34	x	
insect - moth	Shoulder-striped Wainscot	*Leucania comma*	9	x	
insect - moth	Small Phoenix	*Ecliptopera silaceata*	6	x	
insect - moth	Small Square-spot	*Diarsia rubi*	13	x	
insect - moth	Spinach	*Eulithis mellinata*	2	x	
insect - moth	Streak	*Chesias legatella*	1	x	
insect - moth	White Ermine	*Spilosoma lubricipeda*	19	x	

3.2 No other priority or protected invertebrate species were returned by the desk study.

Field Survey

3.3 Detailed results of sweep netting and direct search surveys are presented in Appendix A. A total of 235 species were recorded during the surveys. Of the species recorded one is listed as a Species of Principal Importance (NERC Act, 2006). Additional species recorded include two ground bugs which were previously given extinct status, but which have re-established themselves in England in recent years, one Red Data Book 1 picture-wing fly *Tephritis praecox* which has recently colonised England, two Nationally Scarce species grass flies, one notable B weevil, the notable adonis ladybird *Hippodamia variegate* and the Least Concern long-winged conehead *Conocephalus discolour* and a soldierfly. The species are listed in Table 1 and briefly discussed below. Butterfly species recorded during the survey are presented on a map in Appendix C.

Table 1: Notable species recorded during surveys.

Species name	**Family**	**Order**
Principal Species of Interest		
Lasiommata megera	Nymphalidae	Lepidoptera
Extinct		
Stictopleurus abutilon	Rhopalidae	Hemiptera
Stictopleurus punctatonervosus	Rhopalidae	Hemiptera
Red Data Book 1		
Tephritis praecox	Tephritidae	Diptera
pNationally Scarce		
Lasiambia palposa	Chloropidae	Diptera

Siphonella oscinina	Chloropidae	Diptera
Notable B		
Ceutorhynchus geographicus	Curculionidae	Coleoptera
Notable		
Hippodamia variegata	Coccinellidae	Coleoptera
Least Concern		
Conocephalus discolor	Tettigoniidae	Orthoptera
Chorisops nagatomii	Stratiomyiidae	Diptera

3.4 The wall brown butterfly *Lasiommata megera* is a local butterfly which was given BAP status in the last review. Whilst it is widespread and not rare, it is sporadic and irregular in its occurrence. The caterpillars feed on a number of common grasses but this species does seem to be limited to areas with maximum sunlight and often on bare or partly substrates.

3.5 Two ground bugs *Stictopleurus abutilon* and *S. punctatonervosus* were very rare in England and both were thought to be extinct or rare vagrants but they re-appeared in the mid to late 1990s and they have recolonised, increased in abundance and spread since. Both are associated with early mosaic habitats.

3.6 The picture-winged fly is another recent colonist with only six records on the National Biodiversity Network (NBN) Atlas. There are at least two records for the Midlands and one for Breckland. This species is almost certainly associated with composite plants, many of which are associated with open situations.

3.7 *Lasiambia palposa* and *Siphonella oscinina* are both small black grass flies, both associated with open mosaic habitats (although there is some incorrect published information linking the latter to pine trees). The former may be predators of grasshopper egg pods whilst the latter has been reared from spider's eggs and from scale insects.

3.8 The distinctively marked weevil *Ceutorhynchus geographicus* is local and is phytophagous on viper's bugloss. Consequently, it occurs on disturbed ground, grassland and coastal habitats (i.e. wherever the food plant is found).

3.9 The adonis ladybird is a species which was formerly confined to coastal grasslands but has spread inland in the last 2-3 decades. It can be quite frequent on early mosaic habitats and should be downgraded from Notable.

3.10 The long-winged conehead is another species which had a much more restricted distribution in the UK formerly being restricted to counties south of the River Thames. It has increased in abundance in recent decades and spread north which has led to its being downgraded from 'Notable' status to 'Least Concern'.

3.11 The soldierfly *Chorisops nagatomii* was added to the British list in 1979 when it was separated from the more common C. tibialis. It is widespread in England and is not uncommon.

3.12 Two species recently downgraded and noted during the surveys include hawthorn jewel beetle *Agrilus sinuatus* and grey-backed snout-hoverfly *Rhingia rostrate*. The local ground bug *Chorosoma schillingi* was also recorded; this species is relatively

uncommon inland. The eastern end of the disused railway line also supported a small population of the local brown argus butterfly *Aricia agestis*.

3.13 The records suggest that the disused railway line is of high nature conservation value for invertebrates. This may partly reflect the sandy superficial deposits around Scunthorpe which create several high value habitats for nature conservation (best shown in the inland sand-dunes on nearby Risby Warren) and support a number of rare species. They also reflect the value of the open mosaic habitat along the railway line including the partly bare ground, calcareous flora, south facing embankment.

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Appendix A: List of Terrestrial Invertebrates Recorded with the Survey Area

Latin name
Adalia bipunctata
Adelphocoris lineolatus
Aedes detritus
Aelia acuminata
Aeshna grandis
Aglais urticae
Agrilus sinuatus
Andricus quercuscalicis
Anomoia purmunda
Anthocoris nemoralis
Anthocoris nemorum
Anthomyia liturata
Anthomyia procellaris
Anthomyza gracilis
Aphrophora alni
Araneus diadematus
Argyra argyria
Arianta arbustorum
Aricia agestis
Asteia amoena
Asteia concinna
Austrolimnophila ochracea
Baccha elongata
Bicellaria vana
Bombus lapidarius
Bombus pascuorum
Bombus terrestris
Borophaga subsultans
Botanophila fugax
Cabera exanthemata
Calliopum aeneum
Calliopum simillimum
Calliphora vicina
Calvia quatuordecimguttata
Campsicnemus curvipes
Celastrina argiolus
Cepaea nemoralis
Cephalops sp
Cerodontha denticornis
Ceutorhynchus geographicus

Latin name
Cheilosia pagana
Chlorops hypostigma
Chorisops nagatomii
Chorosoma schillingi
Chorthippus brunneus
Chromatomyia cf syngenesiae
Chrysoperla carnea
Chrysopilus cristatus
Chrysotus gramineus
Clusiodes albimana
Coccinella septpunctata
Coenosia infantula
Conocephalus discolor
Coptotriche marginea
Coremacera marginata
Crossopalpus nigritellus
Culiseta annulata/subochrea
Dasysyrphus albostriatus
Delia platura
Deraeocoris lutescens
Dicranopalpus ramosus
Dictyna arundinacea
Dilophus febrilis
Diplazon laetatorius
Dolichopus trivialis
Dolycoris baccarum
Drapetis infitialis
Drapetis pusilla
Eilema griseola
Elachiptera cornuta
Elachiptera tuberculifera
Elasmostethus interstinctus
Elasmucha grisea
Empis livida
Episyrphus balteatus
Erigone atra
Eriophyes macrorhynchus
Eriothrix rufomaculatus
Eristalis tenax
Eupeodes luniger
Fannia armata
Fannia pallitibia
Forficula auricularia
Formica lemani

Latin name
Glyphotaelius pellucidus
Gonepteryx rhamni
Harmonia ayxridis
Helicophagella crassimargo
Helina depuncta
Helina impuncta
Heliophanus flavipes
Helix aspersa
Helophilus pendulus
Heteromyza cf oculata
Heteronychia dissimilis
Heteronychia haemorrhoa
Heteronychia vagans
Himacerus mirmicoides
Hippodamia variegata
Hybos culiciformis
Hybos femoratus
Hydrotaea dentipes
Hylemya urbica
Hylemya vagans
Inachis io
Iteomyia major
Kleidocerys resedae
Lagria hirta
Lasiambia palposa
Lasiomma seminitidum
Lasiommata megera
Lasius niger
Leiobunum rotundum
Leiomyza dudai
Limonia chorea
Limonia morio
Limonia nubeculosa
Liocoris tripustulatus
Lonchoptera lutea
Lucilia caesar
Lycaena phlaeas
Lyonetia clerkella
Medetera saxatilis
Medetera truncorum
Meiosimyza rorida
Melanomya nana
Melanostoma mellinum
Melanostoma scalare

Latin name
Melinda viridicyanea
Minettia fasciata
Minettia longipennis
Molophilus griseus
Monacha cantiana
Muscina levida
Myoleja caesio
Myrmeleotettix maculatus
Nabis sp
Neomyia cornicina
Nephrotoma analis
Neuroctena anilis
Oniscus asellus
Opomyza florum
Oscinella frit
Oscinimorpha minutissima
Oulema melanopa
Palloptera ustulata
Palomena prasina
Paragus haemorrhous
Parapiophila flavipes
Pararge aegeria
Paroligolophus agrestis
Parydra fossarum
Pegomya sp
Pegoplata infirma
Pericoma fuliginosa
Phalacrotophora fasciata
Phalangium opilio
Phaonia angelicae
Phaonia pallida
Phaonia rufiventris
Phaonia tuguriorum
Phasia pusilla
Pherbellia cinerella
Philaenus spumarius
Philygria vittipennis
Phyto discrepans
Phytomyza cirsii
Phytomyza conyzae
Phytomyza eupatorii
Pieris napi
Pieris napi/rapae
Pieris rapae

Latin name
Platycheirus albimanus
Platycheirus angustatus
Platycheirus clypeatus
Platycheirus manicatus
Platycheirus peltatus
Platycheirus scutatus
Platypalpus australominutus
Platypalpus longicornis
Platypalpus longiseta
Platypalpus minuta s.l.
Platypalpus minutus s.s.
Platypalpus pallidiventris
Pollenia angustigena
Polygonia c-album
Porcellio scaber
Propylea quatuordecimpunctata
Psila roase/nigricornis
Psilopa nitidula
Ravinia pernix
Rhagio lineola
Rhingia rostrata
Rhizobius litura
Rhopalum clavipes
Rhopalus subrufus
Saltella sphondylii
Sapromyza sordida
Sapromyzosoma quadripunctata
Sarcophaga carnaria
Scaptomyza pallida
Scathophaga stercoraria
Schoenomyza litorella
Schwenkfeldina carbonaria
Setisquamalonchaea fumosa
Siphonella oscinina
Sphaerophoria scripta
Stenodema calcaratum
Stenodema laevigatum
Stictopleurus abutilon
Stictopleurus punctatonervosus
Stigmella aurella
Suillia variegata
Sybistroma obscurellum

Latin name
Syntormon pallipes
Syritta pipiens
Syrphus ribesii
Tephritis bardanae
Tephritis conura
Tephritis formosa
Tephritis praecox
Tephritis vespertina
Tetanocera hyalipennis
Teucophorus calcaratus
Thaumatomyia glabra
Thaumatomyia notata
Tibellus oblongus
Tipula fulvipennis
Tipula oleracea
Tomosvaryella sylvatica
Tricholauxania praeusta
Tricimba cincta
Vanessa atalanta
Vanessa cardui
Xanthochlorus galbanus

Appendix B: The 1994 IUCN Red List Categories and the Revised Status System

The categories are summarised in the dendrogram (Fig. 1). They have the advantage that the criteria are more rigorous than for the original system and are measures of threat rather than simply of localisation. This system was adopted in 1995 by the Joint Nature Conservation Committee as the new standard for Red Lists in Britain. The criteria can be applied both globally and nationally. Some criteria are inappropriate to most insects, being based on estimates of decline or on predictions that assume regular, detailed census. Those that are appropriate are listed below. New draft guidelines intended for use as national and regional levels (Gärdenfors *et al*. 1999) have not yet been accepted by JNCC and are not taken into account here.

Extinct in the Wild (Ex)

A taxon is considered extinct if there is good reason to believe that the species has become extinct in the wild in Britain. No precise threshold date is specified whereas the past definition was based on lack of records in the 20th Century.

Critically Endangered (CR)

A taxon is critically Endangered when it is facing an extremely high risk of extinction in the wild in the immediate future, as defined by any of the following criteria [C-D omitted]:

A. Population reduction in the form of either of the following:
   1. An observed, estimated, inferred or suspected reduction of at least 80% over the last 10 years or three generations, whichever is the longer, based on (and specifying) any of the following:
      (a) direct observation
      (b) an index of abundance appropriate for the taxon
      (c) a decline in area of occupancy, extent of occurrence and/or quality of habitat
      (d) actual or potential levels of exploitation
      (e) the effects of introduced taxa, hybridisation, pathogens, pollutants, competitors or parasites.
   2. A reduction of at least 80%, projected or suspected to be met within the next ten years or three generations, whichever is the longer, based on (and specifying) any of (b), (c), (d) or (e) above.

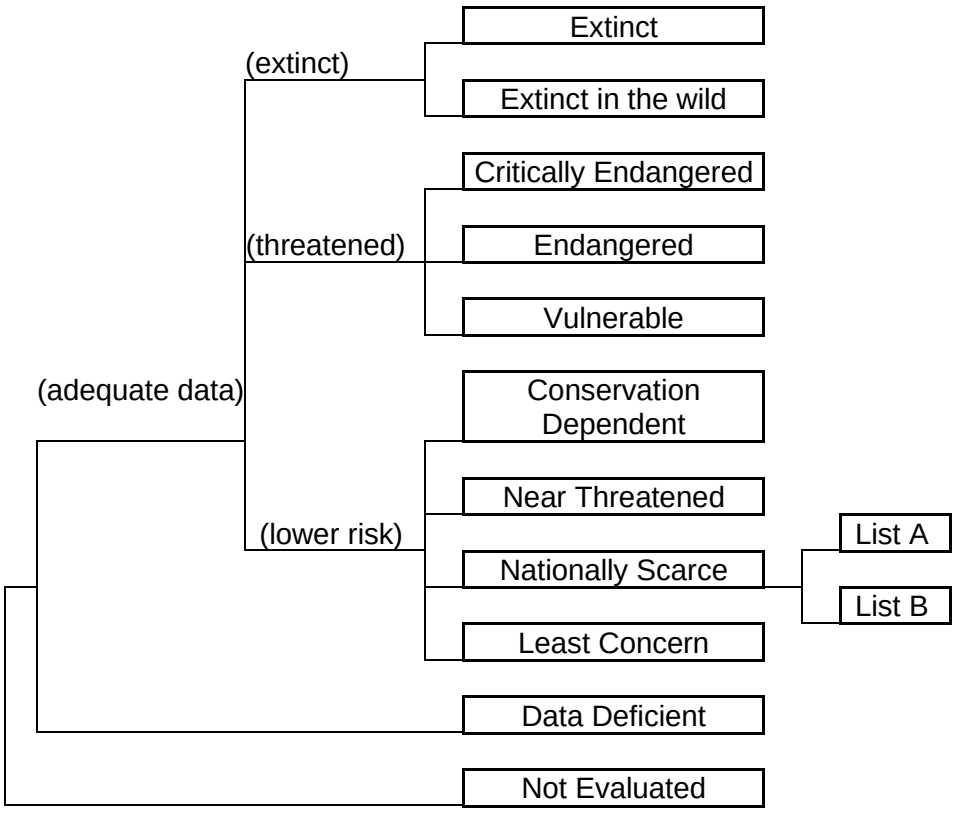
B. Extent of occurrence estimated to be less than 100 km² or area of occupancy estimated to be less than 10 km², and estimates indicating any two of the following:
   1. Severely fragmented or known to exist at only a single location.
   2. Continuing decline, observed, inferred, or projected, in any of the following:
      (a) extent of occurrence
      (b) area of occupancy
      (c) area, extent and/or quality of habitat
      (d) number of locations or subpopulations
      (e) number of mature individuals.
   3. Extreme fluctuations in any of the following
      (a) extent of occurrence
      (b) area of occupancy
      (c) number of locations or subpopulations
      (d) number of mature individuals.

E. Quantitative analysis showing the probability of extinction in the wild is at least 50% within 10 years or 3 generations, whichever is the longer.

Endangered (EN)
A taxon is Endangered when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future, as defined by any of the following criteria [C-D omitted]:

A. Population reduction in the form of either of the following:
   1. An observed, estimated, inferred or suspected reduction of at least 50% over the last 10 years or three generations, whichever is the longer, based on (and specifying) any of the following:
      (a) direct observation
      (b) an index of abundance appropriate for the taxon
      (c) a decline in area of occupancy, extent of occurrence and/or quality of habitat
      (d) actual or potential levels of exploitation
      (e) the effects of introduced taxa, hybridisation, pathogens, pollutants, competitors or parasites.
   2. A reduction of at least 50%, projected or suspected to be met within the next ten years or three generations, whichever is the longer, based on (and specifying) any of (b), (c), (d) or (e) above.

Figure 1: Decision tree for IUCN categories.



B. Extent of occurrence estimated to be less than 5000 km² or area of occupancy estimated to be less than 500 km², and estimates indicating any two of the following:
   1. Severely fragmented or known to exist at no more than five locations.

2. Continuing decline, observed, inferred or projected, in any of the following:
   (a) extent of occurrence
   (b) area of occupancy
   (c) area, extent and/or quality of habitat
   (d) number of locations or subpopulations
   (e) number of mature individuals.
3. Extreme fluctuations in any of the following
   (a) extent of occurrence
   (b) area of occupancy
   (c) number of locations or subpopulations
   (d) number of mature individuals.

E. Quantitative analysis showing the probability of extinction in the wild is at least 20% within 20 years or 5 generations, whichever is the longer.

Vulnerable (VU)

A taxon is Vulnerable when it is not Critically Endangered or Endangered but is facing a very high risk of extinction in the wild in the medium-term future, as defined by any of the following criteria [C and D1 omitted]:

A. Population reduction in the form of either of the following:
   1. An observed, estimated, inferred or suspected reduction of at least 20% over the last 10 years or three generations, whichever is the longer, based on (and specifying) any of the following:
      (a) direct observation
      (b) an index of abundance appropriate for the taxon
      (c) a decline in area of occupancy, extent of occurrence and/or quality of habitat
      (d) actual or potential levels of exploitation
      (e) the effects of introduced taxa, hybridisation, pathogens, pollutants, competitors or parasites.
   2. A reduction of at least 20%, projected or suspected to be met within the next ten years or three generations, whichever is the longer, based on (and specifying) any of (b), (c), (d) or (e) above.

B. Extent of occurrence estimated to be less than 20,000 km² or area of occupancy estimated to be less than 2000 km², and estimates indicating any two of the following:
   1. Severely fragmented or known to exist at no more than five locations.
   2. Continuing decline, observed, inferred or projected, in any of the following:
      (a) extent of occurrence
      (b) area of occupancy
      (c) area, extent and/or quality of habitat
      (d) number of locations or subpopulations
      (e) number of mature individuals.
   3. Extreme fluctuations in any of the following
      (a) extent of occurrence
      (b) area of occupancy
      (c) number of locations or subpopulations
      (d) number of mature individuals.

D. Population very small or restricted in the form of either of the following [only 2 relevant]:
   2. Population is characterised by an acute distribution in its area of occupancy (typically less than 100 km²) or in the number of locations (typically less than 5). Such a taxon would thus be prone to the effects of human activities (or stochastic events whose impact is increased by human activities) within a very short period of time in an unforeseeable future, and is thus capable of becoming Critically Endangered or even Extinct in a very short period.

E. Quantitative analysis showing the probability of extinction in the wild is at least 10% within 100 years.

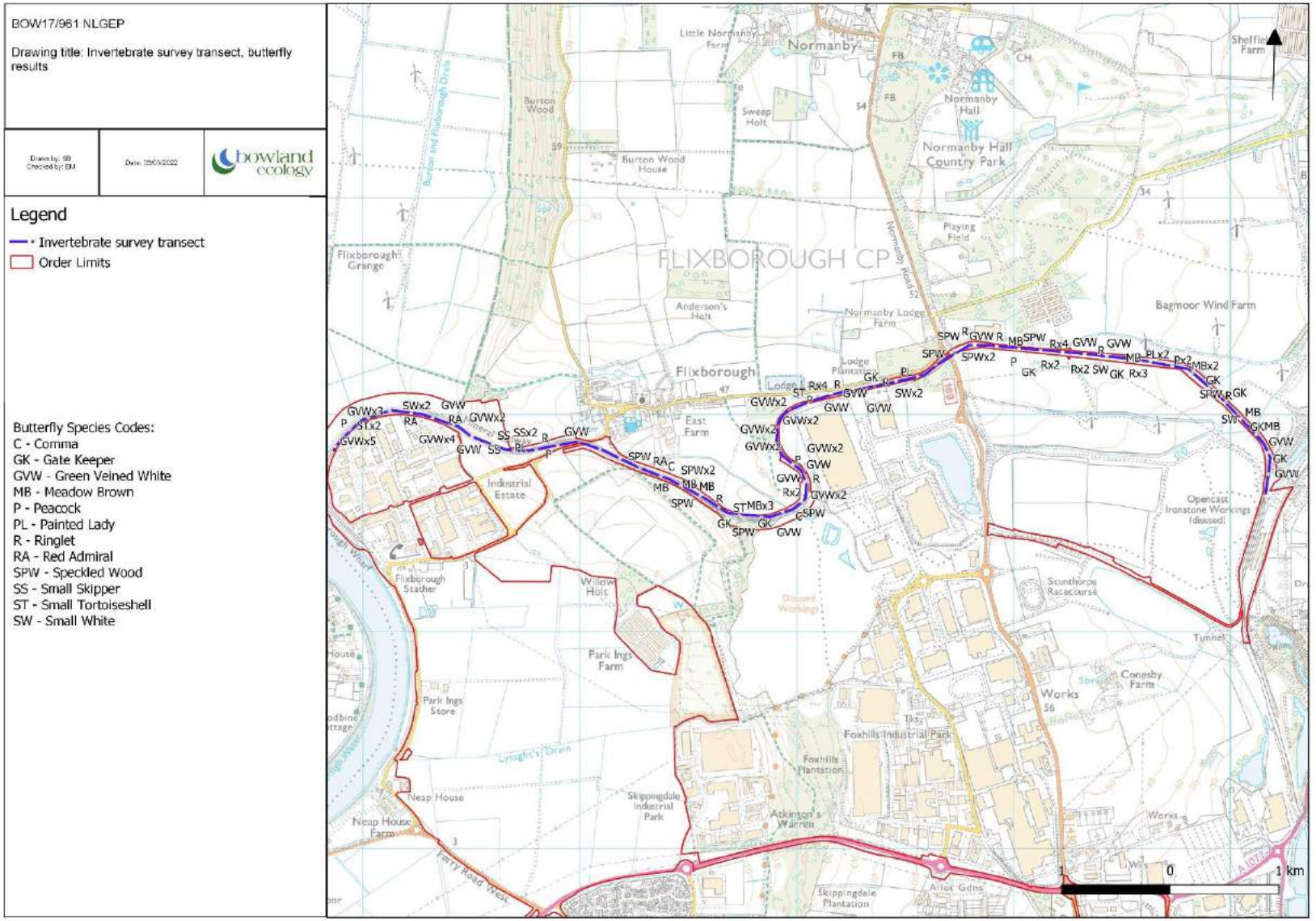
Lower Risk (LR)
A taxon is Lower Risk where it has been evaluated, does not satisfy the criteria for any of the categories Critically Endangered, Endangered or Vulnerable. Taxa included in the LR category can be separated into four subcategories.

1. **Conservation Dependent (LRcd).** Taxa, which are the focus of a continuing taxon-specific or habitat-specific conservation programme targeted towards the taxon in question, the cessation of which would result in the taxon qualifying for one of the threatened categories above within a period of five years.
2. **Near Threatened (LRnt).** Taxa which do not qualify for Conservation Dependent, but which are close to qualifying for Vulnerable - in Britain, defined as occurring in 15 or fewer hectads but not CR, EN or VU. The absolute count of hectads is, in this review, considered subordinate to evidence of decline on an extent not qualifying the species for CR, EN or VU.
3. **Nationally Scarce (LRns).** Taxa which do not qualify for Conservation Dependent or Near Threatened - in Britain defined as species occurring in 16 to 100 hectads but not CR, EN or VU. Nationally Scarce species are usually divided into lists A (**LRnsA** 16-30 hectads) and B (**LRnsB** 31-100 hectads) as in the previous system. This subcategory associates a level of threat with rarity status, whereas the previous National Scarcity listings were based solely on rarity. Those species, the populations of which occasionally occupy more than 30 or 100 hectads as LRnsA and LRnsB respectively, can still be listed if it is thought that their baseline populations frequently fall below these thresholds, or if the habitats occupied are considered under threat.
4. **Least Concern (LRlc).** Taxa, which do not qualify for Conservation Dependent, Near Threatened or National Scarce subcategories - in Britain, this covers all species found on evaluation not to fit into any of the other categories.

Data Deficient (DD)
A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution is lacking. Data Deficient is therefore not a category of threat or Lower Risk. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate. It is important to make positive use of whatever data are available. In many cases great care should be exercised in choosing between DD and threatened status. If the range of a taxon is suspected to be relatively circumscribed, if a considerable period of time has elapsed since the last record of the taxon, threatened status may well be justified.

Not Evaluated (NE)
A taxon is Not Evaluated when it has not yet been assessed against the criteria.

Appendix C: Butterflies Recorded During the Survey



APPENDIX H REPTILE SURVEY REPORT

Date: March 2022

North Lincolnshire Green Energy Park

Technical Appendix H: Reptile Survey Report

November 2021

Control Sheet

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Job number:	BOW17.961
Title:	NLGEP Technical Appendix H - Reptile Survey Report
Client:	North Lincolnshire Green Energy Park Ltd.
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This report has been prepared by an ecological specialist and does not purport to provide legal advice. You may wish to take separate legal advice.

The information which we have prepared and provided is true and has been prepared and provided in accordance with the BS42020:2013 and the Chartered Institute of Ecology and Environmental Management's Code of Professional Conduct. We confirm that the opinions expressed are our true and professional bona fide opinions.

Bowland Ecology is accredited to Quality Guild (QG) standards in respect of our Quality, Environmental and Health and Safety procedures. The QG is an independent externally audited and accredited system that has been developed according to the principles of ISO9001, ISO14001 and OHAS18001.

Signed (Author) [redacted]	Signed (QA) [redacted]

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1. Introduction

1.1 Bowland Ecology Ltd. was commissioned to undertake reptile surveys to inform the North Lincolnshire Green Energy Park (NLGEP) ('the Project'), a Nationally Significant Infrastructure Project (NSIP) located at Flixborough, North Lincolnshire. For the purposes of this report, the areas within the Project Order Limits are split into the following subsections:

- the Energy Park Land - an area within the Order Limits containing the core elements of the Project (Energy Recovery Facility, CO2 capture, ash treatment and concrete block manufacturing facility, plastic recycling facility, visitor centre, hydrogen production and re-fuelling station), located north of Ferry Road West (B1216);
- the Railway Reinstatement Land - reinstatement of the existing Dragonby to Flixborough branch line and construction and operation of a new railhead to the south of Flixborough Wharf, with the primary purpose of facilitating the delivery and export of materials to and from the Energy Park;
- the Northern District Heat and Private Wire Network (DHPWN) Land – running from the southern end of the Energy Park Land, east along the A1077 (Phoenix Parkway) before looping around Normanby Road (Option A) or Bessermer Way (Option B) to the east; and
- the Southern DHPWN Land - running from the southern end of the Energy Park where the B1216 (Ferry Road West) joins, extending south through the agricultural land on the west side of the A1077. Both DHPWN will support the same buried utilities infrastructure; comprising insulated supply and return pipework for heat and cabling to supply electrical power.

1.2 The Energy Park Land includes areas of the RMS Ports and occupied land within the Flixborough Industrial Estate, which is largely dominated by hardstanding, building and site infrastructure. Arable farmland is the dominant habitat within the Energy Park Land and features a network of interconnected arable field drains and associated marginal vegetation. This subsection also includes a mosaic of semi-natural habitats which includes dense hawthorn and willow scrub, scattered mature trees, hedgerows, extensive bracken cover, areas of dry swamp habitat dominated by common reed (*Phragmites australis*), a small area of semi-improved acid grassland, tall ruderals, and species-poor semi-improved grassland. Five bodies of standing water are present in this mosaic habitat. The River Trent and associated marginal vegetation, is present outside of the Order Limits.

1.3 The Railway Reinstatement Land is a disused mineral railway spur running from the Flixborough Wharf to Dragonby Rail Sidings. Habitats are dominated by scattered, dense and continuous scrub, with areas of deciduous woodland, grassland and disturbed ground.

1.4 The Northern DHPWN Land is dominated by hardstanding (roads), alongside adjacent hedgerows, grassland, deciduous woodland, dense and scattered scrub and allotments. The Phoenix Parkway Local Nature Reserve (LNR) and Local Wildlife Site (LWS) and The Atkinson's Warren LNR/LWS are adjacent to the Northern DHPWN Land. To the east and south, the adjacent habitats include hardstanding, buildings, gardens, ornamental planting and small areas of scrub and tall ruderal vegetation.

1.5 The Southern DHPWN Land is largely dominated by arable farmland, with associated field margins, arable field drains and marginal vegetation. There are small areas of plantation and semi-natural deciduous woodland scattered along the route. Adjacent to

the Southern DHPWN, the easement of the M181 features reinforced lateral drains which were recorded as dry ditches at the time of survey.

1.6 The purpose of the surveys was to investigate the potential presence of reptiles. This report includes a description of assessment methods and describes survey results and associated plans/figures.

2. Methodology

2.1 Local records of reptiles on and within 5 km of the Order Limits were obtained following a data search with Greater Lincolnshire Nature Partnership (GLNP). Records from 2000 onwards are included in this report.

2.2 A habitat assessment for reptiles was undertaken during a series of extended Phase 1 habitat surveys of the land within the Order Limits between 2018 and 2020. The preliminary habitat survey included an assessment of habitat suitability for reptiles (The Herpetological Conservation Trust, 2007). Key considerations for habitat assessment included:

- vegetation structure – ideal reptile habitat has a variable structure with a mixture of vegetation heights, tangled or thorny areas, mosaics, bare areas, edges ('ecotones') and basking sites;
- extent – habitat areas must be big enough area to support a population. Small habitat patches can be sufficient for lizards, whereas snakes need larger areas (although grass snakes can cross unsuitable habitat);
- aspect – sunny, sheltered locations, unshaded, south-facing;
- topography - undulating topography, banks, hummocks, hollows, south-facing slopes; generally, not north-facing slopes;
- connectivity – essential to allow colonisation when habitat is created, and recolonisation after local extinctions. For example, if an area of good habitat is surrounded by intensive arable farmland, reptiles might not be able to colonise it;
- history – habitat that has been recently created might look suitable, but it takes time for reptiles to colonise, and there must be connectivity with neighbouring areas where they are present; and
- scheme proposal – a review of the Project and anticipated impacts was undertaken, to inform a targeted reptile survey strategy.

2.3 Habitats identified by the habitat assessment as potentially suitable for reptiles and at risk from potential impacts of the Project were subject to reptile surveys using artificial refugia.

2.4 The methodology for the reptile survey followed the Herpetofauna Workers' Manual (Gent, T. & Gibson, S. 2003) and the Froglife reptile survey advice (Froglife, 1999). Two methods were employed to locate reptiles, including direct observation and artificial refuge survey. A total of nine survey visits were undertaken in suitable weather conditions (between 10°C and 17°C with little or no wind), comprising seven visits during September 2019, and two during April 2020 (see Table 1 for details on surveys and timings). The surveys were carried out by Claire Wilson MSs, BSc (Hons), MCIEEM (*CW*), Sophie King MSc, BSc (Hons) (*SK*), Lucy Pocock BSc (Hons) (*LP*) and Jack Taylor, BSc (Hons) (*JT*).

Table 1: Reptile survey dates, conditions, and surveyors

Visit	Date	Weather conditions	Surveyor
1	03/09/2019	15°C, 90% cloud cover, wind F1, warm, dry	*CW*
2	06/09/2019	16°C, 50% cloud cover, wind F2, warm, dry	*LP*
3	09/09/2019	12°C, overcast (80% cloud cover), wind F2, occasional light showers.	*LP*
4	13/09/2019	17°C, 10% cloud cover, wind F1-2, clear light breeze, warm	*SK*
5	17/09/2019	10.4°C, 10% cloud cover, wind F1, clear dry, slight breeze, cool	*SK, JT*

6	20/09/2019	14°C, no cloud cover, wind F2, clear light breeze, warm, dry	*SK, JT*
7	23/09/2019	warm (1°6C), dry, strong breeze (BF scale 3), overcast 60% cloud cover	*SK*
8	14/04/2020	12°C, 10% cloud cover, wind F1, clear light breeze, warm, dry	*SK*
9	20/04/2020	13°C, no cloud cover, wind F3, warm, dry	*SK*

2.5 A total of 100 artificial refugia comprising a mixture of; bitumen roofing sheets, roofing felt, and corrugated sheeting were placed at approximately 10 m intervals in suitable habitat on 28th July 2019. Refugia were placed along the railway line, in open sunny areas, adjacent to scrub, and on south facing slopes. The refugia were left in situ for approximately one month to allow any reptiles to habituate themselves to the artificial refugia. The refugia were removed on completion of the surveys.

Limitations

2.6 Due to time constraints, a full season of reptile surveys was not completed during one year. However, 9 visits were completed within the optimum periods within a 12 month period, cover late summer 2019 and spring 2020. This is not considered a constraint to the assessment as the survey identified the presence of common lizard.

3. Results

Desk study

3.1 The 5 km search radius returned seven records of common lizard (*Zootoca vivipara*); two of which are within the Southern DHPWN Land; three are close to the Dragonby Sidings and Railway Reinstatement Land; and the remaining two records are from within Scunthorpe, 0.9 km south- west of the Northern DHPWN Land at the closest point. Two records of grass snake (*Natrix natrix*) were returned from desk study, the closest record is approximately 4 km south-east of the Order Limits.

Habitat Assessment

Energy Park Land

3.2 The majority of the Energy Park Land comprises intensively farmed arable fields. The field margins, field drains with associated marginal vegetation, and boundary hedgerows provide potentially suitable basking, foraging and refuge habitat, particularly for grass snake. However, this area was not taken forward for reptile survey as the impact assessment concluded that a combination of minimising the loss of habitat and Reasonable Avoidance Measures (RAMs), would sufficiently mitigate against impacts to reptiles.

3.3 The mosaic of semi-natural habitats to the east of the Energy Park Land is considered potentially suitable for reptile species. Habitats of note in this area include species-poor semi-improved acid grassland, marginal vegetation, tall ruderal vegetation, bracken, dense and scattered scrub, and woodland. It is understood that no habitat loss will occur in this area, therefore it was not taken forward for further reptile survey. No reptile surveys were conducted in the Energy Park Land.

Railway Reinstatement Land

3.4 The existing railway line provides potentially suitable basking, foraging and refuge habitat for reptiles. Habitats within the Railway Reinstatement Land include scrub, woodland and grassland, alongside the railway infrastructure; and sleepers and stone ballast. Following the assessment, the eastern section of the railway line was taken forward for further survey (see Appendix A), as it offered the greatest suitability for reptile presence.

Northern DHPWN Land

3.5 Suitable basking, foraging and refuge habitat for reptiles within proximity of the Northern DHPWN Land is associated with the Atkinson's Warren Local Nature Reserve (LNR) and Local Wildlife Site (LWS), the Phoenix Parkway LNR/LWS and an area of allotments. Species which may be present include grass snake and slow worm (*Anguis fragilis*). However, it should be noted that only small strips of suitable habitat are present within the Order Limits. The area was not taken forward for further reptile survey as:

- only minimal areas next to the road will be impacted by the Project; and
- it is highly unlikely that large numbers of these species are present within the Order Limits, as there are far more extensive areas of habitat locally.

Southern DHPWN Land

3.6 Scrub and woodland are adjacent to the Southern DHPWN Land, which is dominated by arable land. The impact assessment scoped out the requirement for reptile surveys within this subsection as there will only be minimal loss of habitat. Any loss is not expected to have an impact on the local population of reptiles (if present). In addition, standard precautionary mitigation measures (RAMs) in respect of reptiles are considered to be sufficient given the scale of the impact.

Reptile Survey Results

3.7 During the 9 surveys within the Railway Reinstatement Land, common lizard was recorded on 4 occasions, with a peak count of 3 common lizard recorded during the 6th September 2019 and 20th September 2019 visits. Occasional field mouse (*Apodemus sylvaticus*) were also recorded, alongside a peak count of 5 common toad (*Bufo bufo*). The results of the reptile surveys are presented in Table 2, below. A map showing the survey results is presented in Appendix A.

Table 2. Reptile survey dates and results

Survey Date	Surveyor(S)	Species	No.
03/09/2019	CW	-	0
06/09/2019	LP	common lizard mouse	3 2
09/09/2019	LP	common toad mouse	5 1
13/09/2019	SK	-	0
17/09/2019	SK, JT	common lizard	1
20/09/2019	SK, JT	common lizard	3
23/09/2019	SK	-	0
14/04/2020	SK	common lizard	1
20/04/2020	SK	-	0

3.8 Overall, of the habitats identified within the Order Limits, the Railway Reinstatement Land is considered to be of local significance for common lizard. Standard mitigation including pre-works site checks, careful timing of works and vegetation management should be employed to avoid impacts to local reptile populations.

3.9 The Project should consider enhancement opportunities for reptile populations including habitat creation and management measures. This could include installation of refugia in areas with confirmed reptile presence; and management of habitats including adjacent areas to benefit local reptile populations.

References

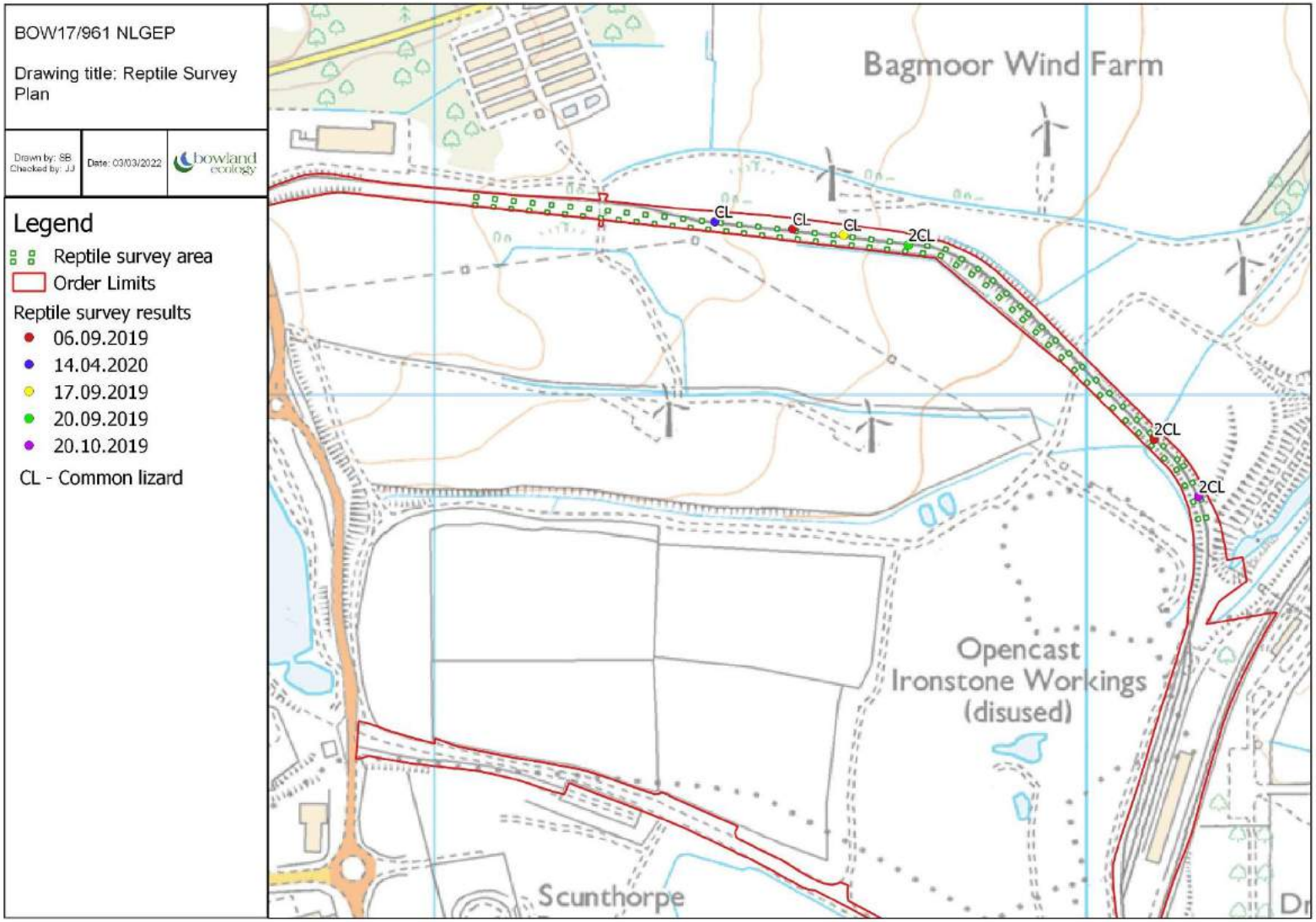
Froglife (1999). Froglife Advice Sheet 10: reptile survey. Froglife, London

Gent, A. H. and Gibson, S. D., Eds. (2003) Herpetofauna Workers' Manual, Joint Nature Conservation Committee, Peterborough.

Natural England (2011) Reptile Mitigation Guidelines; Technical Information Note TIN 102.

The Herpetological Conservation Trust, (2007) Reptile Habitat Guide, The National Amphibian and Reptile Recording Scheme.

Appendix A: Reptile Survey Results Plan



Appendix B: Legal Information

This report provides guidance of potential offences as part of the impact assessment. This report does not provide detailed legal advice and for full details of potential offences against protected species the relevant acts should be consulted in their original forms i.e. The Wildlife and Countryside Act, 1981, as amended, The Countryside and Rights of Way Act 2000, The Natural Environment and Rural Communities Act, 2006 and The Conservation of Habitats and Species Regulations 2017.

Species	Legislation	Offences	Notes on licensing procedures and further advice
Species that are protected by European and national legislation			
Reptiles	Wildlife and Countryside Act 1981 (as amended)[4] S.9(1) (part); S.9(5)	Intentionally kill or injure any common reptile species.	No licence is required in England. However, an assessment for the potential of a site to support reptiles should be undertaken prior to any development works which have potential to affect these animals. https://www.gov.uk/reptiles-protection-surveys-and-licences

APPENDIX I BIODIVERSITY NET GAIN REPORT

Date: March 2022

Technical Appendix I: NLGEP Biodiversity Net-Gain Assessment

1. *Introduction and Background*

1.1 Bowland Ecology was commissioned to undertake a Biodiversity Net-Gain (BNG) Assessment to inform the North Lincolnshire Green Energy Park ('the Project'). The Project occupies 262 ha and is located north-west of Scunthorpe, south of Flixborough and immediately east of the River Trent, Lincolnshire (central NGR: SE 868 135). The Application Land is dominated by arable farmland with frequent ditches and field margins, alongside occasional pockets of scrub, hedgerows, grassland and broadleaved woodland. The Project has been sub-divided into four key areas:

- the Energy Park Land - an area within the Order Limits containing the core elements of the Project (Energy Recovery Facility, CO_2 capture, ash treatment and concrete block manufacturing, plastic recycling facility, visitor centre, hydrogen production and re-fuelling station), located north of Ferry Road West (B1216);

- the Railway Reinstatement Land - the reinstatement of the Dragonby to Flixborough branch line and construction and operation of a new railhead to the south of Flixborough Wharf, with the primary purpose of facilitating the delivery and export of materials to and from the Energy Park Land;

- the Northern District Heat and Private Wire Network (DHPWN) Land – running from the southern end of the Energy Park Land east along the A1077 (Phoenix Parkway), before looping around Normanby Road (Option A) or Bessermer Way (Option B) to the east; and

- the Southern DHPWN Land - running from the southern end of the Energy Park Land where the B1216 (Ferry Road West) joins and extending south through the agricultural land on the west side of the A1077. Both areas of DHPWN Land will support the same buried utilities infrastructure; comprising insulated supply and return pipework for heat and cabling to supply electrical power.

1.2 Ecological surveys undertaken to inform the Project are presented within the Ecology and Nature Conservation chapter of the Environmental Statement (ES) (**Document Reference 6.2.10**). The ES chapter and associated appendices detail full survey methods and results and provide a detailed assessment of significant effects and mitigation requirements. Ecological receptors include a range of statutory and non-statutory designated sites, Habitats of Principal Importance (HPI), and protected species.

1.3 The national policy on Biodiversity Net Gain (BNG), as set out in the Environment Act 2021[1], will require development to deliver at least a 10% net gain in biodiversity. Although this policy is not mandatory for Nationally Significant Infrastructure Projects, the Project has been designed to meet with this target.

1.4 BNG can be quantified using the Department for Environment, Food and Rural Affairs (Defra) Biodiversity Metric 3.0 (hereafter referred to as the 'Metric'). The Metric has been used to produce a Project-wide BNG assessment for the combined Energy Park Land, Railway Reinstatement Land, and Northern and Southern DHPWN Land. This

[1] Environment Act (2021) House of Commons (Sessions 2019-21, 2021-22).

report presents the assessment methodology; descriptions of the baseline habitats and proposed habitat creation; the Metric headline results and discussion; and associated GIS plans. Details of the Metric calculations are available in a separate spreadsheet on request[2].

2. *Assessment Methodology*

2.1 The Metric uses information on baseline (pre-intervention) and proposed (post-intervention) habitats, hedgerows and watercourses to calculate the change in biodiversity units for each of these three categories. The changes in biodiversity units for habitats (area), hedgerows (length) and watercourses (length) are discrete and cannot be summed, traded or converted. Individual areas/lengths of habitat, hedgerow and watercourses are assigned a score, generated in accordance with a Technical Supplement[3]. In-built criteria to determine the number of baseline biodiversity units comprise habitat type, area/length, distinctiveness, condition, strategic significance, and connectivity. Post-intervention habitats are scored using the same criteria, in addition to the difficultly of creating or restoring a habitat, the time taken to reach target condition and the spatial risk (distance between the site of habitat loss and site where creation/enhancement is provided).

2.2 This BNG assessment uses survey data gathered from Extended Phase 1 Habitat surveys of the Application Land. Across the four key areas of the Project, habitat types were identified (these were converted to types in the UK Habitat Classification (UKHab)[4] as used by the Metric), and information on their current condition was recorded. Hedgerows and watercourses (ditches) were also surveyed, and their condition recorded in line with the Technical Supplement. All habitats were mapped using QGIS software, and their areas/lengths calculated for manual input into the Metric calculation spreadsheet.

Limitations

2.3 The assessment is based on the Project plans and what are considered to be feasible condition targets for habitat creation and enhancement. It is expected that the precise configuration of new habitats (e.g. ponds, reedbed and lowland meadow with the proposed wetland area) will be modified during the later design stages. As the plans develop, advice will be sought from the Project ecologist and the Metric will be adjusted accordingly to ensure that the revised plans do not significantly reduce the anticipated gain in biodiversity units.

2.4 The Metric is designed to provide a practical and consistent approach to help inform decision making. It is therefore a straightforward tool, using habitats as a proxy for biodiversity. The numeric outputs of the Metric calculator are meant to be indicative, rather than precisely measuring anticipated changes in biodiversity.

2.5 The Metric does not consider, override or undermine any existing planning policy or legislation, including the mitigation hierarchy and should always be used in conjunction with expert ecological advice[3]. Whilst the use of habitats as a proxy is considered suitable for widespread species found in typical examples of various habitat types, protected and locally important species require separate consideration. The use of

[2] North Lincolnshire Green Energy Park Biodiversity Metric 3.0 Auditing and accounting for biodiversity Calculation tool.xlsm

[3] Panks, S., White, N., Newsome, A., Potter, J., Heydon, M., Mayhew, E., Alvarez, M., Russell, T., A, Scott, S.J., Heaver, M., Scott, S.H., Treweek, J., Butcher, B., and Stone, D. (2021) Biodiversity metric 3.0: Auditing and accounting for biodiversity – Technical Supplement User Guide. Natural England.

[4] UK Habitat Classification Working Group (2018) *UK Habitat Classification – Habitat Definition V1.0*

habitat units also means that the value of certain species-specific biodiversity gains, including the planned installation of artificial bird nest boxes and bat roosting sites, cannot be quantified by the Metric.

3. *Habitat Baseline, Loss, Creation and Enhancement*

3.1 This section sets out the area or length of each habitat present within the Order Limits and the corresponding habitat units that were determined by the Metric calculation spreadsheet. The baseline state is presented first, followed by the proposals for habitat creation and enhancement. The Project does not incorporate any off-site areas; all creation and enhancement measures are contained within the Order Limits. Existing and proposed habitats are mapped in Appendices A and B.

Baseline habitats and habitat loss

3.2 Baseline habitats, hedgerows and rivers (ditches) are summarised in Table 1 below. Arable land is the most abundant habitat type across the entire Project, accounting for 164 ha (63% of the total area). This is followed by developed sealed surfaces (25 ha; 10%), species-poor modified grassland (17 ha; 6%), mixed scrub (14 ha; 5%), and other neutral grassland (11 ha; 4%). These habitats occur across the Energy Park Land and within the Northern and Southern DHPWN Land (see Appendix A). Other habitats are present within a block of semi-natural mosaic habitat to the east of the Energy Park Land, as well as within the Railway Reinstatement Land, and the periphery of the Northern DHPWN Land. These include bracken; small areas of broadleaved and mixed woodland; tall ruderal vegetation; scrub; and grassland. HPI comprise native hedgerows (totalling 3 km), linear strips of Lowland Calcareous Grassland totalling 3.5 ha within the Railway Reinstatement Land and a small area of remnant Lowland Dry Acid Grassland within the eastern habitat mosaic. The network of field ditches, which vary in condition from poor to moderate, give a total length of 8.65 km.

3.3 Table 1 also indicates the extent to which habitats will be removed to facilitate the Project. Dominant habitats are those that will be impacted most, with 64 ha of arable land to be lost, equating to a significant loss of 129 biodiversity units. Other notable losses include modified grassland and mixed scrub, accounting for a loss of 17 and 33 biodiversity units respectively. The anticipated removal of Lowland Calcareous Grassland within the Railway Reinstatement Land will result in the loss of 12 biodiversity units, owing to the high distinctiveness of this HPI. Additional habitats to be lost include small areas of other broadleaved woodland, other neutral grassland, ruderal vegetation and non-priority ponds, totalling 8.4 biodiversity units. There are no significant losses associated with the Northern and Southern DHPWN Land, as impacts to install the underground cable are temporary and habitats are dominated by those that are considered to naturally recover in under 2 years (therefore are indicated as retained within the Metric). Overall, in the absence of compensatory habitat creation and/or enhancement, the Project will lead to a loss of 199.48 biodiversity units from the habitat baseline. With regard to hedgerows and watercourses, a total of 1.29 km of hedgerow will be lost from the Energy Park and Northern DHPWN Land respectively, leading to a loss of 4.90 biodiversity units. The removal of 0.57 km of poor condition field drains within the Energy Park Land will equate to a loss of 2.28 biodiversity units.

Table 1: Summary of the extent and loss of habitat units for baseline habitats, hedgerows and watercourses

Baseline habitat (UKHab types)	**Area (ha)/length (km)**	**Area/length to be lost (ha/km)**	**Units lost**
Habitats			
Cereal crops	163.71	64.23	128.46
Developed land; sealed surface	25.31	5.08	0
Modified grassland	16.64	4.27	17.08
Mixed scrub	14.05	5.21	33.28
Other neutral grassland	10.96	0.7	2.8
Artificial unvegetated, unsealed surface	10.2	8.3	0
Bracken	5.8	0.1	0.2
Other woodland; broadleaved	3.61	0.3	1.2
Lowland calcareous grassland	3.47	1.34	12.06
Ruderal/Ephemeral	3.21	1.8	3.6
Bramble scrub	1.5	0	0
Reedbeds	0.9	0	0
Other lowland acid grassland	0.5	0	0
Hawthorn scrub	0.4	0	0
Ponds (Non-Priority Habitat)	0.4	0.2	0.8
Other woodland; mixed	0.3	0	0
Vegetated garden	0.05	0	0
Temporary lakes, ponds and pools	0.04	0	0
Ponds (Priority Habitat)	0.03	0	0
Total - habitats	**261.08**	**91.53**	**199.48**
Hedgerows			
Native Hedgerow - Associated with bank or ditch	0.18	0.18	1.44
Hedge Ornamental Non-Native	0.23	0	0
Native Hedgerow	2.82	1.11	3.38
Total - hedgerows	**3.23**	**0.67**	**3.46**
Watercourses			
Ditches	8.65	0.57	2.28

Habitat creation

3.4 The proposed areas of habitat creation are summarised in Table 2 below. This incorporates developed land (sealed and unsealed surfaces including buildings, hardstanding, access roads and the railway trackbed) associated with the proposed scheme. These developed areas cover approximately 26 ha and do not deliver any biodiversity units as they are scored zero in the Metric. Other areas of habitat creation designed into the Project provide mitigation for effects on ecology and landscape; key areas delivering significant biodiversity units are described below (see also Appendix B). Areas of habitat creation are also covered in the ES Chapter (**Document Reference 6.2.10**), the indicative Landscape and Biodiversity Plans (**Document Reference 4.10**), and the Outline Landscape and Biodiversity Management and Monitoring Plan (OLBMMP) (**Document Reference 5.7**). The Project Design Principals

and Codes (**Document Reference 5.12**) provide a framework for implementing the proposed habitat creation measures.

Table 2: Summary of the extent and habitat units delivered by habitat creation

Habitat creation (UKHab types)	**Area/length (ha/km)**	**Units delivered**
Developed land; sealed surface	15.14	0
Other woodland; broadleaved	14.16	66.38
Artificial unvegetated, unsealed surface	5.84	0
Urban trees	6.53	25.06
Other neutral grassland	9.19	71.62
Lowland meadows	19.1	84.57
Modified grassland	2.19	9.16
Mixed scrub	7.5	61.49
Ponds (Non-Priority Habitat)	4.41	44.28
Reedbeds	3.21	25.25
Lowland calcareous grassland	3.16	9.20
Wet woodland	1.1	3.80
Total - habitats	**91.53**	**400.81**
Hedgerows		
Native Hedgerow	0.62	2.07
Native Species Rich Hedgerow	0.87	6.81
Total - hedgerows	**1.49**	**8.88**
Watercourses		
Ditches	2.78	18.61

Key areas of habitat creation

3.5 An extensive area (14 ha) of native semi-natural woodland will be created on arable farmland within the Railway Reinstatement Land, which includes the planting of a 5-10 m band extending approximately 1.2 km along the northern side of the railway, to the south and south-east of Flixborough (Appendix B). These woodland areas will deliver 66 biodiversity units and aim to achieve moderate condition in line within the Metric condition assessment criteria. As such, focus will be given to criteria which can be supported by relatively young woodland, including high species richness within the canopy, dense understorey, and ground flora; creating structural variation including areas of temporary open space; and ensuring negative effects from browsing damage, tree mortality and presence of invasives are appropriately managed. An additional 6.5 ha of native species-rich urban tree planting will be established throughout the Project, targeting good condition. Once established, urban woodland will deliver a total of 25 biodiversity units.

3.6 Multiple areas and types of grassland will be created throughout the Project (see Appendix B). Some areas of managed amenity grassland (2 ha), classed as modified grassland, are necessary within the Energy Park, such as along roadside verges. These will aim to achieve fairly good condition in line with the Metric criteria, providing 9 biodiversity units. Also surrounding the Energy Park are areas of proposed other neutral grassland in good condition, shown as wildflower underplanting within the proposed landscaping plans. This species-rich grassland covers a total of 9 ha and will deliver 72 biodiversity units (Table 2). It will surround and complement areas of new woodland and scrub, enabling the establishment of well-developed habitat margins

with a graded sward height, providing suitable cover and foraging habitat for a range of species including birds, amphibians, bats, and other mammals. In addition, areas of good condition Lowland Meadow HPI are proposed, including along the enhanced Lysaght's drain corridor (Appendix B). These areas will be monitored and managed in line with the Lowland Grassland Management Handbook[5] to meet the condition criteria under the UKHab description, aiming for a species richness of up to 35 plant species per 2 m^2. A proportion of the lowland meadow is located within the proposed 'wetland' area, east of the River Trent and proposed railhead (Appendix B). Here, the presence of floodplain species associated with National Vegetation Communities MG4 and MG8 will be targeted. In total, the Project will aim to deliver 19 ha of Lowland Meadow HPI, equalling 85 biodiversity units. Within the Railway Reinstatement Land, Lowland Calcareous Grassland HPI will be created to compensate for the loss of existing areas during construction. New calcareous grassland will be established along the embankments of the reinstated railway, facilitated by the targeted removal of encroaching scrub where necessary, as well as on ground adjacent to the proposed woodland planting. Overall, creation of Lowland Calcareous Grassland will cover 3 ha and deliver 9 biodiversity units.

3.7 New areas of scattered and dense native scrub have been incorporated into the Project, as both standalone areas below pylons and within new woodlands as a dense understorey layer. Scrub will also form a mosaic with Lowland Meadow at the southern extents of the Energy Park Land (see Appendix B), providing suitable cover and variable edge habitat for a range of species. In line with the Metric assessment criteria, created scrub will aim to be in good condition, including the provision of native species-rich stands; varied age classes; an absence of invasive non-native species; well-developed edges; and clearings or rides to provide structural diversity. In total, newly created scrub will cover 7.5 ha and deliver 61 biodiversity units.

3.8 A large area immediately adjacent to the main Energy Park buildings comprises proposed wetland habitats and SUDS features in place of agricultural cropland (see Appendix B). In addition to floodplain meadow described above, this area will support areas of reedbed (3 ha; 25 biodiversity units), ponds (4 ha; 44 biodiversity units), and wet woodland (1 ha; 4 biodiversity units). Ponds and reedbed habitat will be of good condition and provide suitable habitat for amphibians, reptiles, birds including waterfowl, foraging bats and invertebrates. Areas of standing water will form a complex with other habitats, providing a range of maximum depths and surface areas; support wide marginal zones (preferably less than 1:20); and feature underwater bars and shoals for a diverse range of aquatic flora.

3.9 Hedgerow creation includes four newly planted native species-rich hedgerows within the Energy Park Land, which will be managed to achieve good condition. Where native moderate condition hedgerows are likely to be removed within the Northern DHPWN Land, they will be reinstated on completion of the DHPWN works. Both new and reinstated hedgerows will have appropriate topsoil replaced and will be planted with a suitable range of native shrub species using transplants of local origin. Hedgerows within the Energy Park Land will be of good condition and include over five woody species within each 30 m length. In total, reinstatement and new hedgerow planting will total 1.49 km and deliver 8.8 biodiversity units.

3.10 Newly created ditches of moderate condition will include swales within the proposed wetland area and ditches along both sides of the new access road. Appropriate

[5] Crofts, A. and Jefferson, R.G. (1999) The Lowland Grassland Management Handbook. English Nature and The Wildlife Trusts, Peterborough.

monitoring and maintenance will ensure ditches support clean water, with a range of native aquatic flora and marginal fringes.

On-site habitat enhancement

3.11 In addition to habitat creation, on-site habitat enhancement will also contribute to the delivery of biodiversity units. This will encompass a variety of habitats located within the block of semi-natural mosaic habitat to the east of the Energy Park Land; Lowland Calcareous Grassland HPI located within the Railway Reinstatement Land; and several ditches and associated habitats within the Energy Park Land. Table 3 below summarises each habitat type to be enhanced, the proposed habitat, change in condition, area/length and habitat units delivered. Further details are set out below.

Table 3: Summary of habitat enhancement

Baseline habitat (UKHab types)	**Proposed habitat (UKHab types)**	**Condition change**	**Area/length (ha/km)**	**Habitat units delivered**
Bracken	Other lowland acid grassland	Lower Distinctiveness Habitat to Moderate	4	27.29
Mixed scrub	Mixed scrub	Fairly Poor to Good	2.5	29.36
Lowland calcareous grassland	Lowland calcareous grassland	Fairly Poor to Fairly Good	2.13	22.12
Bramble scrub	Mixed scrub	Poor to Good	1.5	15.84
Other neutral grassland	Lowland meadows	Lower Distinctiveness Habitat to Fairly Good	1.81	21.44
Reedbeds	Reedbeds	Poor to Good	0.8	9.89
Other lowland acid grassland	Other lowland acid grassland	Moderate to Fairly Good	0.5	5.23
Hawthorn scrub	Hawthorn scrub	Poor to Good	0.4	4.22
Ruderal/Ephemeral	Ruderal/Ephemeral	Poor to Good	0.4	1.87
Ponds (Non-Priority Habitat)	Ponds (Non- Priority Habitat)	Fairly Poor to Good	0.2	2.03
Temporary lakes, ponds and pools	Temporary lakes, ponds and pools	Poor to Good	0.04	0.48
Total - habitats			**14.28**	**139.77**
Watercourses				
Ditches	Ditches	Poor to Moderate	0.05	0.32
Ditches	Ditches	Moderate to Fairly Good	0.07	0.65
Ditches	Ditches	Poor to Good	2.10	15.25
Total - watercourses			**2.22**	**16.22**

3.12 Existing areas of retained neutral grassland and lowland calcareous grassland within the Railway Reinstatement Land will be enhanced through the removal of invading scrub and the introduction of wildflower seed mixes using the most suitable establishment methods selected for each location. Ongoing management, as outlined within the oLBMMP (**Document Reference 5.7**), will aim to improve areas to fairly good condition based on the criteria set out in the Metric. A total of 2 ha of lowland calcareous grassland will be enhanced, aiming to deliver 22 biodiversity units.

3.13 The block of semi-natural mosaic habitat comprises an area of common land located adjacent to Phoenix Parkway LNR. This supports areas of dense bracken, acid grassland, mature scrub, scattered trees and wetland habitats. A key component of habitat management in this area is the reduction in vigour and extent of bracken, aiming to encourage the establishment of moderate condition Lowland Acid Grassland HPI in a proportion of the area (4 ha; 27 biodiversity units). The management of willow, bramble and hawthorn scrub will focus on maintaining a varied canopy structure, with patches of young and older scrub, glades and sinuous edge habitats (scrub enhancement total 4.4 ha; 49 biodiversity units). Areas of remnant grassland within the mosaic comprise neutral grassland and a small patch of Lowland Acid Grassland HPI, both of which are proposed to be enhanced to fairly good condition (grassland enhancement total 2.3 ha; 27 biodiversity units). Small areas of pond and reedbed habitat (1 ha; 12 biodiversity units) within the area will also be managed to improve their habitat condition, in line with the Great Crested Newt Conservation Handbook[6] and Kirby (2013)[7].

3.14 Other areas with enhancement proposals include temporary pools which are associated with the main Lysaght's Drain, running east to west through the Energy Park Land. The drain and associated corridor will be enhanced and managed to provide improved aquatic and terrestrial habitats and offer greater habitat connectivity between the Energy Park Land and the eastern mosaic area, where shorter sections of ditches will also be enhanced. Overall, ditch improvements cover 2 km and will deliver 16 biodiversity units under the watercourses category (Table 3).

4. *Metric Spreadsheet Calculator Results and Evaluation*

4.1 This section summarises the overall change in the number of habitat, hedgerow and watercourse units, as shown in Table 4 below.

Table 4: Headline results from the Metric calculation spreadsheet

Biodiversity category	Baseline (units)	Post-intervention (units)	Total net unit change	Total net % change
Habitats	611.79	695.85	84.07	13.74
Hedgerows	11.69	15.67	3.98	34.08
Watercourses	37.71	62.78	25.07	66.49

4.2 The value of the biodiversity units for habitats changes from **611.79** (baseline) to **695.85** (post-intervention including habitat enhancement and creation). Overall, this represents a gain of **84.07** habitat units, giving an outcome of **13.74%** net-gain. Under hedgerows, the biodiversity units increase from **11.69** to **15.67** units, resulting in a net-gain of **34.08%**. The greatest increase in biodiversity units is for watercourses, with the baseline changing from **37.71** to **62.78** units post-intervention, resulting in a net-gain of **66.49%**.

[6] Langton, T.E.S., Beckett, C.L., and Foster, J.P. (2001), Great Crested Newt Conservation Handbook, Froglife, Halesworth.
[7] Kirby, P. (2013) Habitat management for invertebrates: a practical handbook. Pelagic Publishing.

4.3 The Metric demonstrates a net-gain in biodiversity overall, with hedgerows and watercourses achieving well above the minimum target of 10%. Habitat delivery also exceeds 10% at 13.7%. This is despite the Order Limits incorporating large areas to the east of the Energy Park Land which will simply be retained as arable cropland, neutral grassland and unenhanced ditches (see Appendices A and B). The inclusion of these areas within the calculator is a significant constraint on achieving a higher net-gain percentage for habitats, i.e. if they were excluded, the net-gain for habitats would be considerably higher. Nevertheless, the current habitat reinstatement, creation and enhancement proposals exceed the 10% net-gain target, are considered appropriate for the Project and locality, and provide suitable compensation for anticipated impacts on biodiversity losses. Species-specific compensation, management and monitoring will also be undertaken (e.g. bat and bird boxes) and the numeric Metric output should not form the sole basis of decisions regarding appropriate compensation and management interventions.

5. *Conclusion*

5.1 Considering the principles and intended use of the Metric, the result clearly demonstrates that the Project will lead to a significant net-gain in biodiversity. Although the individual gains for habitats, hedgerows and watercourses cannot be simply summed, it is apparent that the overall percentage net gain in biodiversity will be greater than 10%.

5.2 The habitat creation, enhancement and monitoring objectives set out within the oLBMMP (**Document Reference 5.7**) will be taken forward post-application and form the basis of future Ecological Management Plans. Whilst the proposed habitat creation plans will broadly follow the GIS plans presented in this report, the details will probably be adjusted in the later design stages. Updating Metric analyses will be undertaken by the Project ecologist to ensure the revised plans do not significantly reduce the anticipated gains in biodiversity units.

Date: 08/03/2022

Prepared by: Sarah Birtley, MBiolSci (Hons), *Senior Ecologist*

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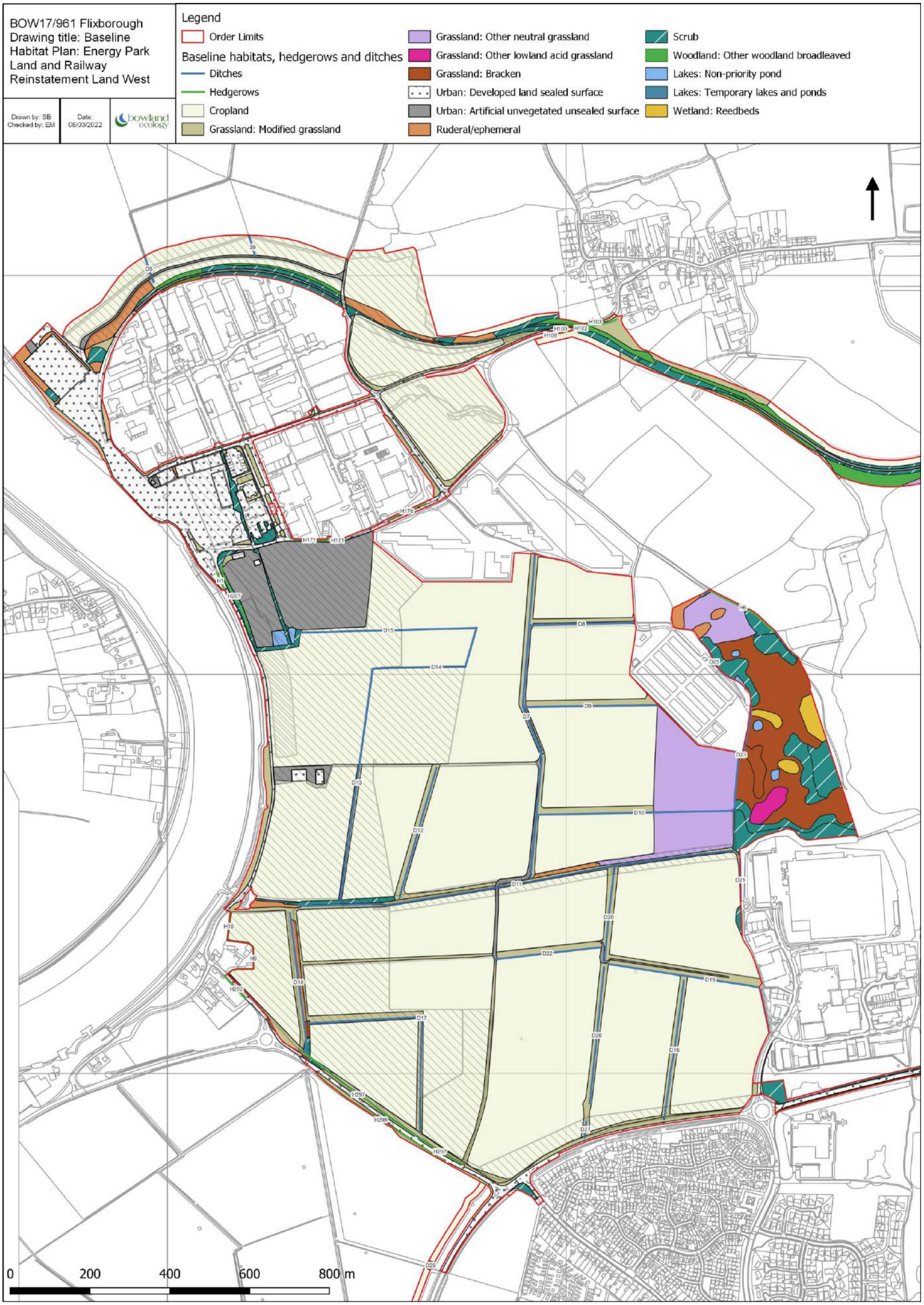
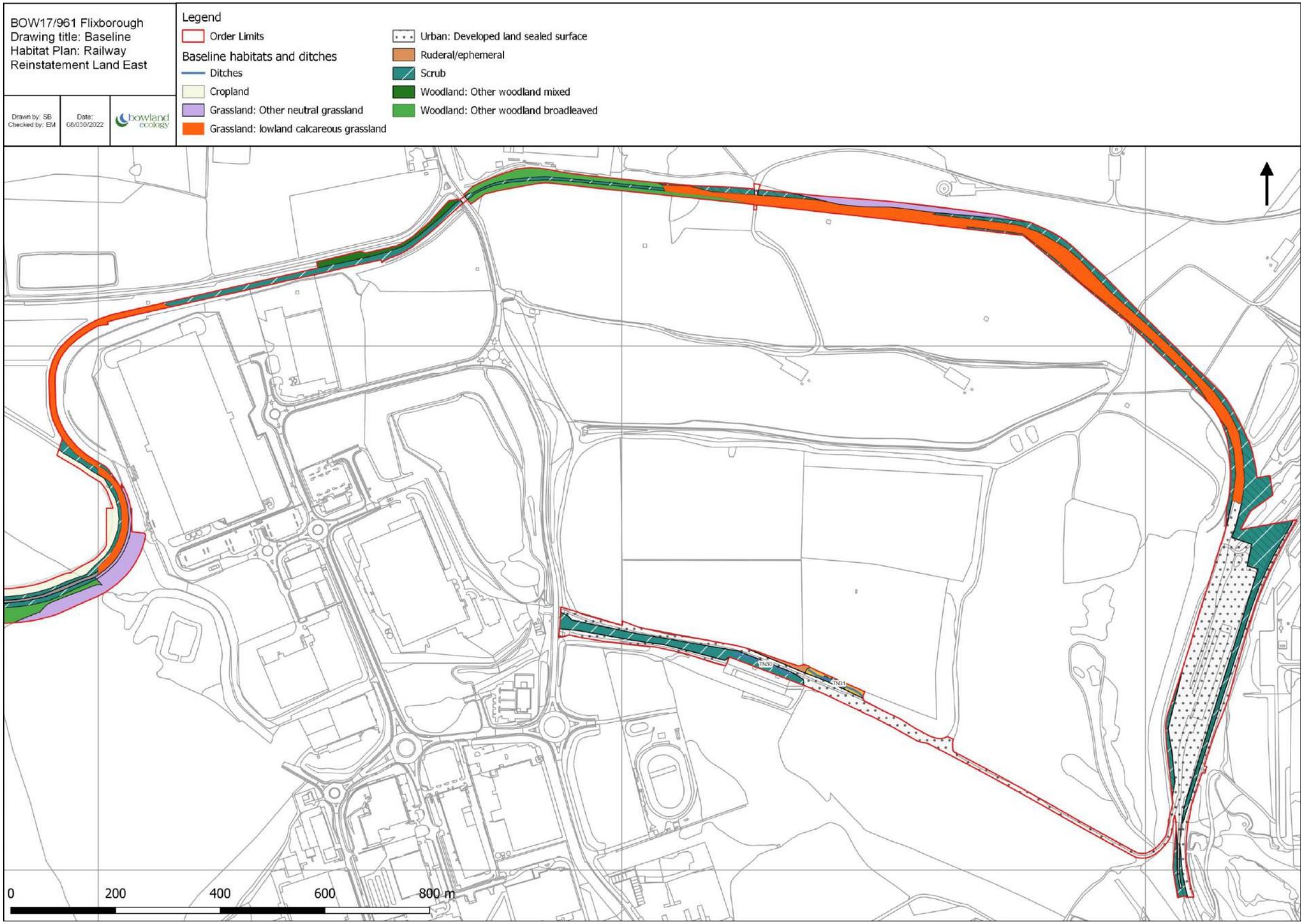
Appendix A – On-site Baseline Habitat Plans




BOW17/961 Flixborough
Drawing title: Baseline Habitat Plan: Railway Reinstatement Land East
Drawn by: SB
Checked by: EM
Date: 08/03/2022
Legend
Order Limits
Baseline habitats and ditches
Ditches
Cropland
Grassland: Other neutral grassland
Grassland: lowland calcareous grassland
Urban: Developed land sealed surface
Ruderal/ephemeral
Scrub
Woodland: Other woodland mixed
Woodland: Other woodland broadleaved
0
200
400
600
800 m

BOW17/961 Flixborough
Drawing title: Baseline Habitat Plan: Northern DHPWN Land

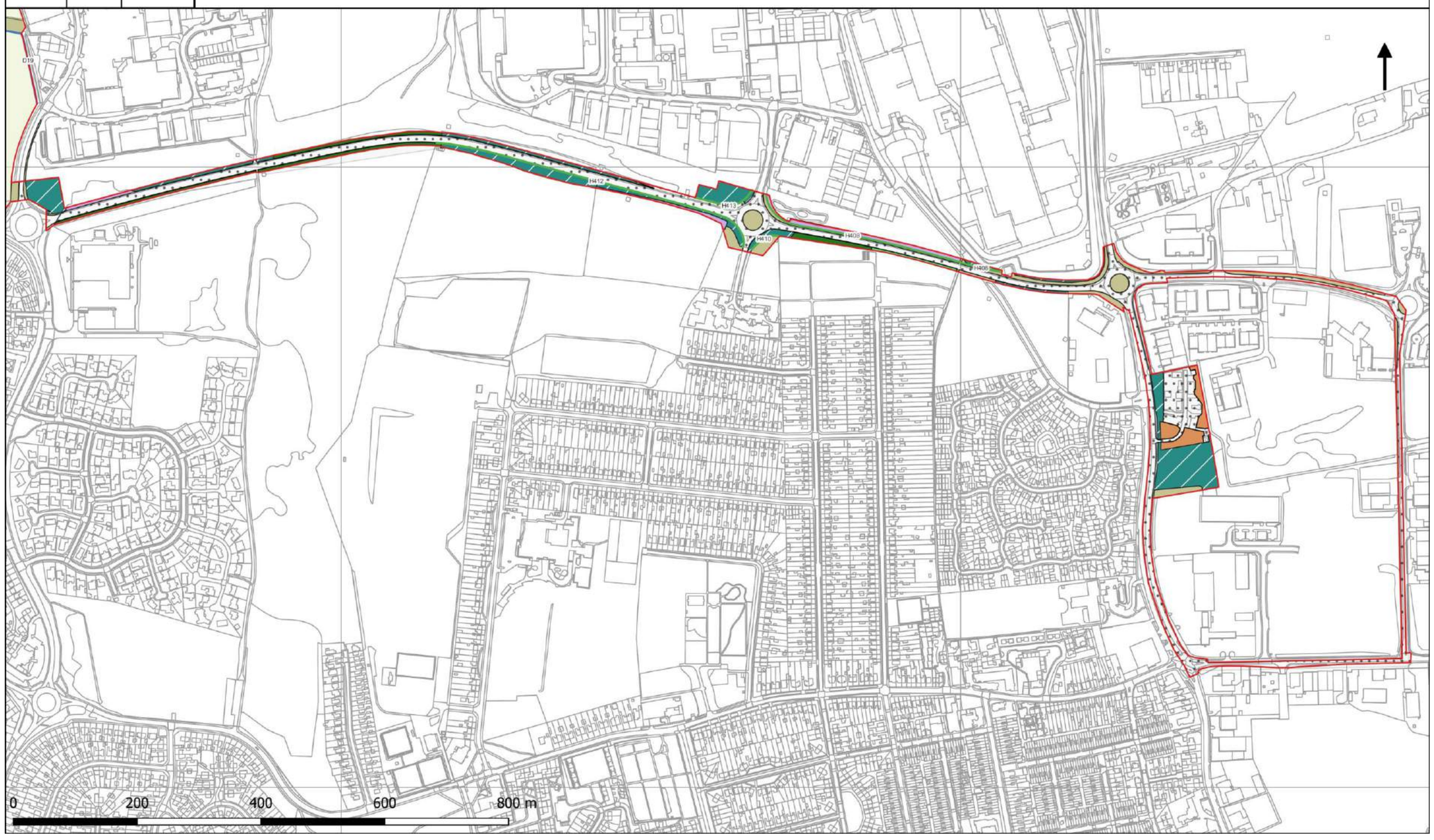
Drawn by: SB
Checked by: EM
Date: 08/03/2022

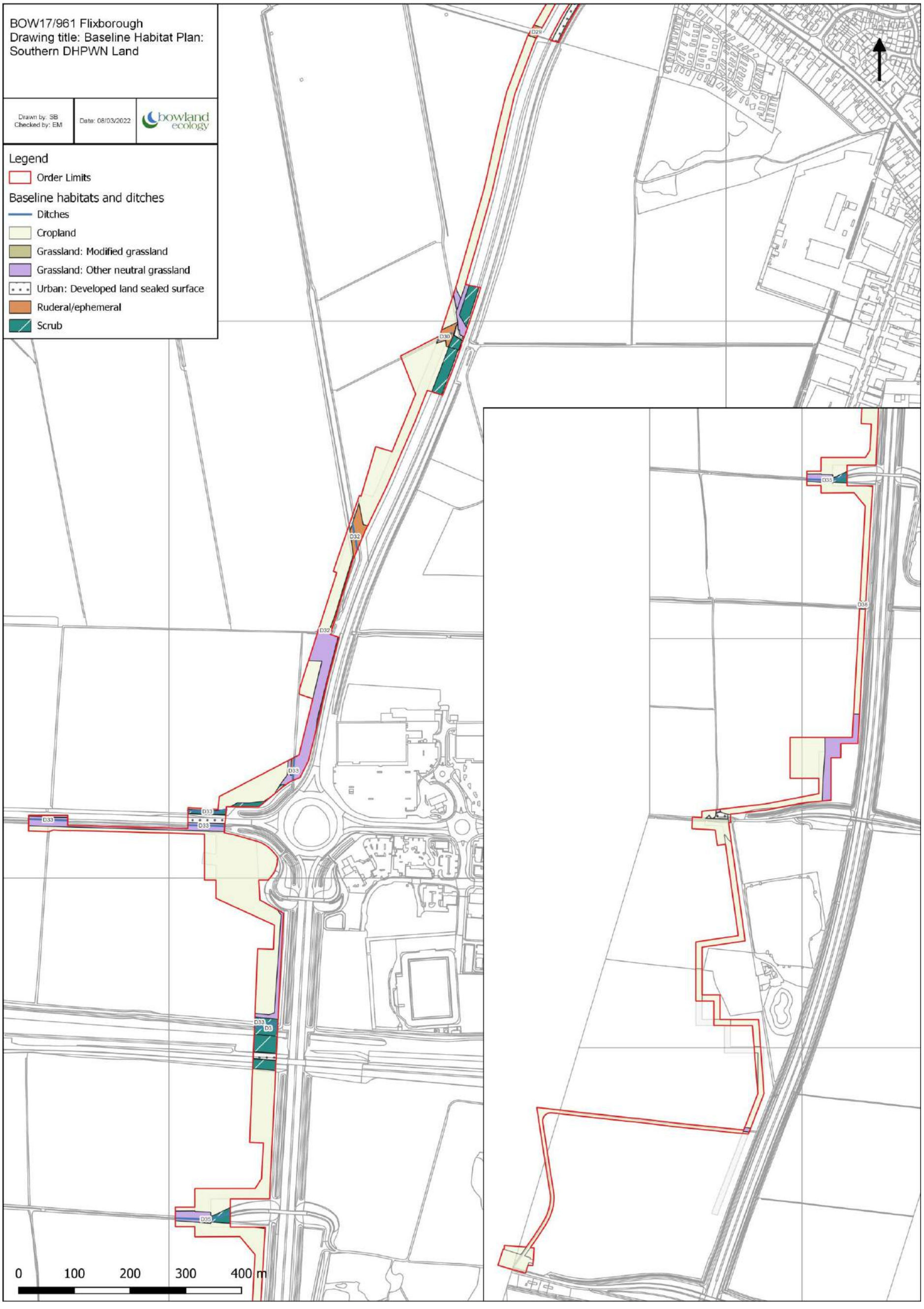
Legend

Order Limits

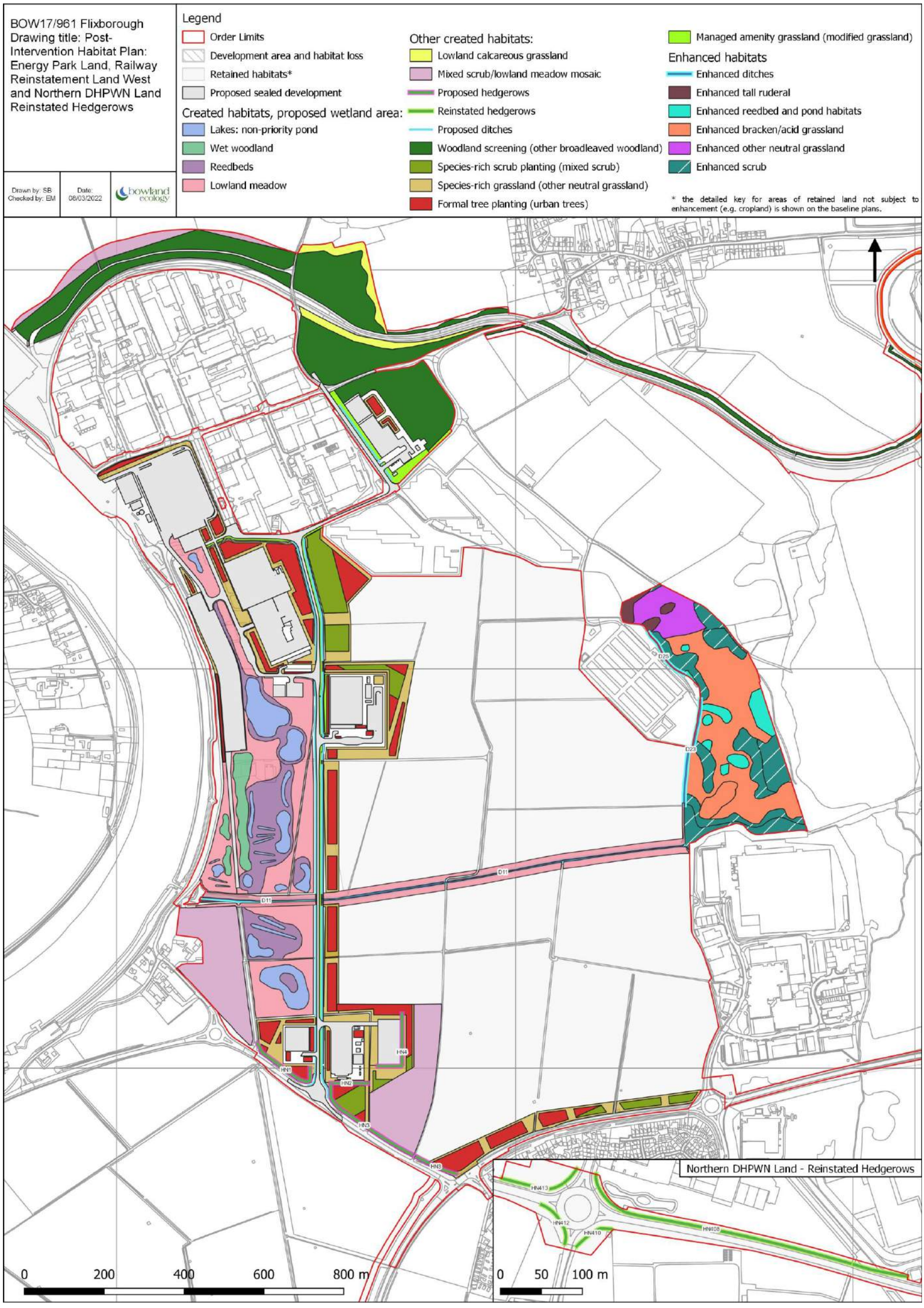
Baseline habitats and hedgerows

Hedgerows
Cropland
Grassland: Modified grassland
Grassland: Other neutral grassland
Urban: Developed land sealed surface
Urban: allotments
Ruderal/ephemeral
Scrub
Woodland: Other woodland mixed
Woodland: Other woodland broadleaved




BOW17/961 Flixborough
Drawing title: Baseline Habitat Plan: Southern DHPWN Land
Drawn by: SB
Checked by: EM
Date: 08/03/2022
bowland ecology
Legend
Order Limits
Baseline habitats and ditches
Ditches
Cropland
Grassland: Modified grassland
Grassland: Other neutral grassland
Urban: Developed land sealed surface
Ruderal/ephemeral
Scrub
D29
D30
D32
D33
D35
D36
0
100
200
300
400 m

Appendix B – On-site Post-Intervention Habitat Plans



BOW17/961 Flixborough
Drawing title: Post-Intervention Habitat Plan: Railway Reinstatement Land East

Drawn by: SB
Checked by: EM
Date: 08/03/2022

Legend

Order Limits
Habitat loss
Retained habitats*

Habitat creation: landscaping proposals
Woodland screening (other broadleaved woodland)

Habitat creation
New lowland calcareous grassland

Habitat enhancement
Enhanced lowland calcareous grassland
Enhanced other neutral grassland

* the detailed key for areas of retained land not subject to enhancement (e.g. cropland) is shown on the baseline plans.