8 CHAPTER 8: ECOLOGY & ORNITHOLOGY

8.1 INTRODUCTION

This Chapter of the Environmental Statement (ES) evaluates the effects of the Retford Circular Economy Project (the Proposed Development) on important ecological features on land south of Lound, Nottinghamshire (the Site). This assessment was undertaken by Arcus Consultancy Services Limited (Arcus), part of the ERM Group.

The Proposed Development is described in **Volume 1**, **Chapter 5: Project Description**.

This Chapter includes the following elements:

- Legislation, Policy and Guidance;
- Assessment Methodology and Significance Criteria;
- Baseline Conditions;
- Imbedded mitigation;
- Assessment of likely Effects;
- Mitigation measures and Residual Effects;
- Cumulative Effect Assessment;
- Summary of likely Effects; and
- Statement of Significance.

This Chapter of the EIA Report is supported by the following figures in, presented in **Volume 2**:

- Figure 8.1: Survey Areas and Access Restrictions;
- Figure 8.2: Site Boundary and Designated Sites; and
- Figure 8.3: SSSI Features in Relation to the Site.

The chapter is supported by the following Technical Appendices (TAs), presented in **Volume 3**:

- Technical Appendix 8.1: Ecology Survey Report;
- Technical Appendix 8.2: Badger Annex [Confidential];
- Technical Appendix 8.3: Ornithology Survey Report;
- Technical Appendix 8.4: Biodiversity Net Gain Assessment;
- Technical Appendix 8.5: Outline Restoration Strategy; and
- Technical Appendix 8.6: Outline Monitoring and Mitigation Plan.

8.2 LEGISLATION, POLICY AND GUIDANCE

8.2.1 Legislation

The following legislation has been considered in the preparation of this assessment:

- The Town and Country Planning (Environmental Impact Assessment) Regulations 2017[1];
- The Wildlife and Countryside Act 1981 (as amended)[2];
- The Conservation of Habitats and Species Regulations 2017 ('Habitat Regulations')[3];

[1] The Town and Country Planning (Environmental Impact Assessment) Regulations 2017. Available from: https://www.legislation.gov.uk/uksi/2017/571/contents [Accessed November 2022]
[2] The Wildlife and Countryside Act 1981 (as amended). Available from: http://www.legislation.gov.uk/ukpga/1981/69 [Accessed November 2022]
[3] The Conservation of Habitats and Species Regulations 2017 [Online] Available at: https://www.legislation.gov.uk/uksi/2017/1012/contents/made [Accessed November 2022]

- The Natural Environment and Rural Communities (NERC) Act 2006[4];
- UK Post-2010 Biodiversity Framework (2012)[5].

8.2.2 Policy

The following national and local policies have been considered in preparation of this assessment:

- National Planning Policy Framework (NPPF)[6]; and
- Nottinghamshire Minerals Local Plan[7].

8.2.3 Guidance

The following documents and resources have been considered in preparation of this assessment:

- Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (Chartered Institute of Ecology and Environmental Management (CIEEM), 2022)[8];
- Birds of Conservation Concern (BoCC) 5: the population status of birds in the United Kingdom, Channel Islands and Isle of Man[9];
- Nottinghamshire's Birds of Conservation Concern (2016)[10];
- Nottinghamshire Local Biodiversity Action Plan[11];
- Bird taxonomy and nomenclature throughout this report is based on the British List; as maintained by the British Ornithologists' Union (BOU)[12].

8.3 ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

8.3.1 Scoping Responses and Consultations

Consultation was sought during the baseline studies, with meetings organised with key consultees summarised in **Table 8.1**.

Table 8.1: Consultation Record

Consultee	Type and Date	Summary of Consultation
Natural England (NE) Andy Stubbs	Online meeting 29/07/2021	• Primary concern is SSSI and potential impacts on the designated features (bird assemblages). • NE agree that scope of surveys is sufficient to inform impact assessment and are pleased with results and

[4] Natural Environment and Rural Communities Act 2006. Available from: http://www.legislation.gov.uk/ukpga/2006/16/contents [Accessed November 2022]
[5] Four Countries' Biodiversity Group (2010) UK Post-2010 Biodiversity Framework [Online] Available from: http://data.jncc.gov.uk/data/587024ff-864f-4d1d-a669-f38cb448abdc/UK-Post2010-Biodiversity-Framework-2012.pdf [Accessed November 2022]
[6] Gov.uk *National Policy Planning Framework 2019* [online] Available from: https://www.gov.uk/government/publications/national-planning-policy-framework—2 [Access November 2022]
[7] Nottinghamshire County Council (2021) Nottinghamshire Minerals Local Plan. Available online from: https://www.nottinghamshire.gov.uk/planning-and-environment/minerals-local-plan/adopted-minerals-local-plan
[8] CIEEM (2022) *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine, version 1.2 (Updated April 2022)*. Chartered Institute of Ecology and Environmental Management, Winchester.
[9] Stanbury, A., Eaton, M., Aebischer, N., Balmer, D., Brown, A., Douse, A., Lindley, P., McCulloch, N., Noble, D. and Win, I. (2021) The status of our bird populations: the fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain. *British Birds 114, 723–747*.
[10] Cornish, C., Crouch, N., & Parkin, D.T. Nottinghamshire's Birds of Conservation Concern (Revised and Updated 2016). Available to download from: https://www.nottsbirders.net/recording.html [Accessed November 2022]
[11] Available online at: https://nottsbag.org.uk/lbap/lbap-introduction-and-sections-1-to-6/ [Accessed November2022]
[12] Details available online at: https://www.bou.org.uk/british-list/

Consultee	Type and Date	Summary of Consultation
Ian Evans	Engaged through the DAS procedure.	surveys to-date (2021) and as long as all ecology features (both within and outside the Site) are given due consideration within impact assessment. • Wet grassland recommended by NE and interconnected wetland habitats included within the Outline Restoration Strategy (TA 8.5). • The very small overlap between the SSSI boundary and the Site is not insurmountable, as long as due consideration is given to SSSI features (minimising/avoiding impacts) and habitats (e.g., replacing in a suitable condition). • Key considerations- project is over a long time period (20-25 years), so baseline likely to change, reactive stance will therefore be required to some extent and ecology surveys will be ongoing. Each phase will likely require numerous surveys to reassess the baseline and inform the mitigation. • Restoration is vital and needs to be future proof and work for a changing climate, which will be incorporated in to the final restoration plan. • Biodiversity Net Gain needs consideration.
Nottinghamshire Wildlife Trust (NWT) Janice Bradley	Online meeting 26/08/2021	• SSSI and nature reserve is sensitive, important to work with NWT and other consultees to manage and mitigate impacts and determine robust restoration. • Nathusius Pipistrelle bats recorded on site and are of particular importance for the county and are known to occur in the Trent Valley. • Key considerations for impact assessment – short- and medium-term habitat loss, disturbance, and legally protected species. NWT concerns include potential effects of noise, light and dust. • Key considerations during project – long term project, ongoing ecology surveys to revise the baseline, with reactive mitigation measures throughout. • Restoration – incremental restoration of each phase, balancing interests of parties, future proof and/or reactive. • Restoration expectations include wet grassland and reed beds, wet woodland, small ponds; species rich grassland and keep sheep grazing; as much as possible. Must maximize priority biodiversity habitats. • NWT are applying for funding to enhance habitats within reserve adjacent to the Site boundary.
NWT Janice Bradley	Site visit 25/01/2022	• NWT provided update on beaver project and proposed enhancements in adjacent nature reserve. • NWT suggested noise thresholds to be considered within the impact assessment. • Extraction proposed to start from east and move south-west. • Could be impacts on visitors to nature reserve. • Concept design for restoration is evolving, currently a fade from pasture to wet grassland towards the NWT boundary (including reed-lined ponds, soakaway ponds and wet grassland). • Wet grassland restoration should take precedence over creation of more modern features (e.g. woodland, hedgerows, etc). • Acceptable to remove woodland and if required to be replaced elsewhere, careful thought will be needed for the location.

Consultee	Type and Date	Summary of Consultation
Nottinghamshire County Council (NCC) Joel Marshall Nick Crouch	Online meeting 15/03/2022	• Ecological constraints include badger, bats, reptiles and birds. • Ongoing ecological surveys required throughout development to update baseline and determine licenced activities. • Large open extents of wet grassland and reed beds recommended to avoid smaller compartments of habitats. • Good opportunity to undertake good quality, large-scale habitat restoration and creation. • Ecology should take precedence to landscape enhancements. • Areas on site to be flooded for part of the year, scrapes, shallow waterbodies and ditches recommended. • Ecology and environmental impacts are being significantly considered (going above and beyond survey scope).

A scoping report was submitted to NCC in October 2022. Details of comments and responses relevant to ecology are provided in **Table 8.2**.

Table 8.2: Scoping Responses

Consultee	Summary of Consultation Response	Response to Consultee
NCC – Principal Planning Officer	An outline restoration plan is expected to be submitted after taking into account views of key consultees.	An Outline Restoration Strategy is included as Technical Appendix (TA) 8.5.
	The Ecology chapter is expected to follow the CIEEM Guidelines for Ecological Impact Assessments and be supported with the technical appendixes containing the various survey and assessment work.	This chapter follows the CIEEM guidelines[8].
	The ES should identify the baseline conditions currently existing at the site and surroundings and assess the potential direct and indirect impacts of the development. The ES should identify and include details of all mitigation measures required to prevent, reduce, or offset the impacts and any residual impacts.	Baseline conditions are summarised in section 8.4 of this Chapter, with more detail in the TA 8.1 – 8.4.
	The applicant is strongly advised to review the detailed response and survey requests and recommendations from Nottinghamshire Wildlife Trust, which is appended.	The Nottinghamshire Wildlife Trust response has been reviewed and comments are included within this table.
	Ongoing liaison with NE will be essential, including through their Discretionary Advice Service if appropriate.	As per Table 8.1, earlier in this Chapter, NE were engaged through the DAS and it is anticipated further communications will be required during all stages of the Proposed Development.
	The woodland surrounding much of the PFA extraction area(s) appears to offer a greater biodiversity value than the heavily grazed pasture fields. From an ecological perspective this could be retained (and enhanced) wherever possible.	Retention and enhancement of areas of woodland is proposed as part of the restoration, and areas that will be lost will be compensated for with a mix of appropriate habitats.

Consultee	Summary of Consultation Response	Response to Consultee
	Mineral Local Plan Policy SP2 requires biodiversity led forms of restoration and this should therefore inform the entire approach to the development.	An Outline Restoration Strategy is included as TA 8.5.
	As well as those habitats mentioned above, opportunities to create wetland scrapes (as present in the nearby Idle Valley Nature Reserve), ridge and furrow and ephemeral pools and ponds should also be explored.	Such features will be incorporated into wet grassland, as necessary.
	The production of an outline restoration design, allowing final details of planting etc of each phase later on, is acceptable subject to it containing sufficient detail (see Minerals Local Plan Policy DM12 where there is also additional provisos for where restoration is reliant on importation of waste). The outline details can briefly set out how the habitats might be established and thereafter maintained- again further and final details can be required later.	An Outline Restoration Strategy is included as TA 8.5.
	Some assurance is needed as to the long term management arrangements for the restored site and habitats as noted by the NWT.	Potential management options are considered in TA 8.5: Outline Restoration Strategy.
	The application and ES should also be supported by a Biodiversity Net Gain calculation and report to demonstrate at least a 10% net gain (and ideally significantly more given the generally low ecological value of much of the application site).	A BNG Assessment is presented in TA 8.4, with the restored Site providing in excess of 10 % gain overall.
	The EIA Regulations include a requirement to assess any significant cumulative effects with other existing and/or approved developments.	Cumulative effects are considered in section 8.8
NCC – Natural Environment Manager	Impacts on the adjacent Sutton and Lound Gravel Pits SSSI will be one of the key issues which needs to be considered.	Sutton and Lound Gravel Pits SSSI is assessed in section 8.7 Assessment of Potential Effects, of this ES Chapter, as a feature of national importance.
	All efforts should be made to retain existing woodland wherever possible, particularly around the site margins, and to enhance this as part of the proposals.	Retention and enhancement of areas of woodland is proposed as part of the restoration, and areas that will be lost will be compensated for with a mix of appropriate habitats.
	A phased, biodiversity-led restoration (as proposed) offers a significant opportunity to deliver valuable habitats to complement those within the SSSI and LWS. As well as those habitats mentioned in section 3.1.3 of the EIA SR, opportunities to create wetland scrapes (as present in the nearby Idle Valley Nature Reserve) should be explored.	An Outline Restoration Strategy is included as TA 8.5.
Natural England (NE) – Senior Planning Advisory	A robust assessment of environmental impacts and opportunities based on relevant and up to date environmental information should be undertaken prior to a decision on whether to grant planning permission.	The assessment, as per legislation, policy and prevailing guidance, is presented within this ES Chapter.

Consultee	Summary of Consultation Response	Response to Consultee
	Should the proposal be amended in a way which significantly affects its impact on the natural environment then, in accordance with Section 4 of the Natural Environment and Rural Communities Act 2006, Natural England should be consulted again.	Given the nature of the Proposed Development, it is anticipated that NE will be consulted throughout the application and determination process as necessary.
	Schedule 4 of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017, sets out the information that should be included in an Environmental Statement (ES) to assess impacts on the natural environment.	Such information is included herein, and the assessment follows prevailing guidance.
	The ES should fully consider the implications of the whole development proposal. This should include an assessment of all supporting infrastructure.	The ES considers at parts of the Site during all phases of the Proposed Development, where relevant.
	An impact assessment should identify, describe, and evaluate the effects that are likely to result from the project in combination with other projects and activities that are being, have been or will be carried out.	Cumulative effects are considered in section 8.8 of this Chapter.
	The Environmental Statement should include a full assessment of the direct and indirect effects of the development on the features of special interest within the SSSI and identify appropriate mitigation measures to avoid, minimise or reduce any adverse significant effects. The consideration of likely significant effects should include any functionally linked land outside the designated site.	All direct and indirect effects are considered both within and outside of the Site boundary.
	The ES should consider any impacts upon local wildlife and geological sites, including local nature reserves.	Potential impacts are considered where relevant within the ES.
	The ES should assess the impact of all phases of the proposal on protected species.	The ES considers effects at all stages of the Proposed Development in section 8.7 of this Chapter.
	The area likely to be affected by the development should be thoroughly surveyed by competent ecologists at appropriate times of year for relevant species and the survey results, impact assessments and appropriate accompanying mitigation strategies included as part of the ES.	Methods and results of baseline surveys are detailed in TA 8.1, TA 8.2 and TA 8.3, and summarised within the ES. Professional/competent ecologists have been used at all current/future stages of the Proposed Development.
	By demonstrating that DLL will be used, impacts on GCN can be scoped out of detailed assessment in the Environmental Statement.	GCN are considered absent from the Site and surrounds, and would not be impacted by the Proposed Development. DLL is not currently available in Nottinghamshire, but appropriate mitigation would be incorporated should the baseline change.

Consultee	Summary of Consultation Response	Response to Consultee
	The ES should assess the impacts of the proposal on any ancient woodland, ancient and veteran trees, and the scope to avoid and mitigate for adverse impacts. It should also consider opportunities for enhancement.	No ancient woodland, ancient and veteran trees are located within the Site.
	The ES should use an appropriate biodiversity metric such as Biodiversity Metric 3.0 together with ecological advice to calculate the change in biodiversity resulting from proposed development and demonstrate how proposals can achieve a net gain.	A BNG Assessment (version V3.1) is presented in TA 8.4.
Nottingham Wildlife Trust - Head of Nature Recovery	Data trawl - existing records for protected sites should be undertaken to 2.5 km radius of the application area – the applicant has only used a 2 km search area, which does not include the full potential Zone of Influence (in accordance with CIEEM guidelines), given the potential impacts from complex hydrological and hydrogeological pathways. There are water-dependent SSSIs in the wider area which should be considered, such as Mattersey Marsh SSSI.	The search and assessment areas have been considered in collaboration with technical specialists, and assessment of some effects, such as potential hydrogeology and Air Quality, are considered in other chapters of the ES. The ecological/ornithological assessment completed is appropriate.
	Vegetation - phase I survey with target notes and more detailed Phase II survey of areas of botanical interest identified during the phase I - this should include any areas of adjacent land near the application site that might be affected by dust or other emissions that could be damaging to valuable plant assemblages.	Survey methods and results are detailed in TA 8.1, and summarised herein.
	Bats - survey of all possible structures that may support roosts, including both day time visual inspections and evening emergence surveys undertaken at the correct times of year by suitably licensed persons. If potential tree roosts are to be lost, a dawn swarming survey should be undertaken. Surveys to identify key foraging areas that may be disrupted by light, noise or disturbance should be undertaken in order to inform a rigorous impact assessment on this EPS, which has important populations in the area and on the adjacent SSSI/LWS, as identified in the surveys to date.	Appropriate bat surveys were undertaken; the assessment methodology is provided in TA 8.1. TA 8.6, the Monitoring and Mitigation Plan, provides a framework to ensure the baseline condition is updated as required, to identify any changes and ensure mitigation measures remain suitable over the lifetime of the Proposed Development.
	Badgers - surveys of the whole site and adjacent land (up to 250m) for field signs and setts. Should evidence of use of the site be found, then a bait-marking exercise should be undertaken to identify foraging areas and social group boundaries, given the very long period of proposed disturbance and disruption.	All due consideration of badger are presented in TA 8.2: Confidential Badger Annex.
	Amphibia - surveys of suitable waterbodies within 250m of the site boundary and also of potential hibernacula and other over-wintering habitat, including aquatic surveys to include torching and netting as appropriate. I note the applicant has undertaken eDNA surveys, but these were only used to detect GCN, not other amphibians, which are declining BAP priority	Abundance has not been identified through survey, but presence has been assumed and potential effects on other amphibian species are given due consideration within the assessment, as per the valuation of features in section

Consultee	Summary of Consultation Response	Response to Consultee
	species and it is essential that any risks to these species are identified.	8.5 and assessment in section 8.7 of this Chapter.
	Reptiles - surveys for grass snakes, common lizards, and slow worms, to include the use of hand searching and refugia – I note this has been undertaken for the proposed extraction area and that grass snakes were found, it is essential that a mitigation plan for any herptiles found is put in place.	Robust mitigation is proposed for all features, where relevant, including safeguards to identify and react to changing status within the Site, as per TA 8.6 (Outline Monitoring and Mitigation Plan).
	Invertebrates - identification of habitats of potential value for invertebrates, followed by surveys for key groups e.g. ground beetles, spiders, dead wood specialists etc. as appropriate. I note that direct impact on invertebrates has been scoped out, but the potential for indirect impacts from emissions and dust on valuable invertebrate assemblages adjacent to the development site should be assessed, which may require further surveys.	A provisional assessment of suitability for invertebrates is presented in TA 8.1. These results have informed the assessment (see section 8.5) and influenced elements of the Outline Restoration Strategy (TA 8.5).
	Birds - over-wintering and breeding bird surveys to standard methodologies have been undertaken, although the Scoping Report does not state how wide an area was covered. It is essential that sufficient evidence is available to inform a robust assessment of the potential impacts of noise, dust, emissions, and hydrological changes on all valuable bird assemblages in the wider area, particularly in Sutton and Lound Gravel Pits SSSI.	As a feature of the SSSI, the bird assemblages at and around the Site are given due importance in the assessment. Areas surveyed are detailed in section 8.3.4 of this Chapter and TA 8.3. Valuation of features is in section 8.5 of this Chapter. The assessment is presented in section 8.7 of this Chapter.
	Riparian and other mammals – surveys have been undertaken for water voles and otters within the proposed extraction site and in the immediate vicinity. It should be noted that otters are EPS and a highly precautionary approach should be taken to prevent disturbance to this species or disruption to foraging behaviour, which should be rigorously assessed. Polecat are present in the area, a very rare mammal, and beavers, all of which will require assessment to ensure that there would be no impacts from noise, disturbance, light etc.	An assessment of the potential impacts upon riparian mammals is provided in section 8.7 of this Chapter.
	I note the applicant has stated they will follow CIEEM guidance with regard to impact assessment, which is to be welcomed. For the avoidance of doubt, the ecological impact assessment should include: a) Definition of the direction of any impact, its magnitude, temporal scale and sensitivity of receptors b) Direct impacts c) Indirect impacts (including hydrological/hydrogeological, dust, gaseous emissions, noise, vibration, light, traffic, other disturbance)	This chapter follows prevailing CIEEM guidance[8]. A Biodiversity Net Gain Assessment is presented in TA 8.4.

Consultee	Summary of Consultation Response	Response to Consultee
	d) Proposals for avoidance of impact, including alternatives e) Proposed mitigation f) Residual impacts that cannot be mitigated g) Ecological compensation for residual impacts h) A BNG assessment where a substantive increase in biodiversity value should be expected, in accordance with the MLP.	
	I note that the Scoping Report does not state what criteria or thresholds would be used to assess the impact of noise on birds, bats or other scarce mammals. It is essential that the latest evidence of these impacts should be used, and there is a wealth of published research that we would expect the applicant to use.	Potential aural and visual disturbance vary greatly depending subject to stimuli, species and situation. Such effects have been given due consideration in the assessment, in section 8.7 of this Chapter.
	The restoration scheme could have the potential to contribute to priority BAP habitat targets for the County, however in order to do this the scheme should: a) Detail the proposed habitats in terms of the rationale behind their choice, their intended composition and the target habitat (preferably using the National Vegetation Classification as a descriptive tool). b) Describe the methods of hydrological restoration, substrate preparation, plant establishment, plant type and form, provenance of material, establishment maintenance and long term aftercare. c) Provide assurance of the long term funding for management of the habitats of at least 30 years, as there can be no claim for the benefits of the scheme in terms of biodiversity gain if the habitats are degraded or destroyed once the aftercare period ceases.	An Outline Restoration Strategy is included as TA 8.5.
	Were this scheme to proceed, NWT would expect to see extensive wet grasslands, reedbeds, ponds and species rich grassland restored on this site, based on the underlying edaphic conditions and in accordance with Notts BAP and UK BAP/Sn41 priorities for this Natural Character Area. The final topography should be designed to accommodate diverse range of wetland features including clusters of ponds suited to amphibians, as well as ridges, furrows and ephemeral pools and scrapes in wet grasslands, so as to meet those priority habitats identified in the BAP.	An Outline Restoration Strategy is included as TA 8.5.

8.3.2 Scope of Assessment

The assessment evaluates the potential effects enacting on Important Ecological Features (IEFs) during the Proposed Development, including Site Establishment, Phased Extraction and Phased Restoration stages. The Zone of Influence (ZoI) considered will vary subject to the nature of the potential effect and the ecology of the IEF.

Key issues for consideration are:

- Direct loss or modification of breeding, foraging, and/or sheltering habitat within the Site, including a small area (1.47 ha, equating to approximately 0.46 % of the total SSSI land area) which falls within the SSSI boundary;
- Disturbance to and/or displacement of interest features of the SSSI, both within the Site and within the SSSI itself;
- Disturbance and indirect effects through pollution, including those associated with both aerial and hydrological pathways, on the ecological features outside the Site boundary;
- Potential hydrogeological effects on nearby designated sites and water-dependant ecological features;
- Statutory protected ecological features where mitigation is required to ensure legal compliance; and
- Cumulative effects of the Proposed Development with other developments that may also impact on the same ecological features.

8.3.3 Elements scoped out of assessment

Features of less than local value (see section 8.3.6.1) are scoped out of the assessment but have been given consideration where there is potential for legal offences as a result of the Proposed Development.

Features that are not present or very unlikely to be present within the ZoI of the Proposed Development are scoped out of assessment, with due consideration given to potential changes to the baseline condition over the lifetime of the Proposed Development.

Where embedded mitigation (summarised in section 8.6) is sufficient to address potential adverse effects on features of local or greater importance, these effects have also been scoped out of the assessment.

8.3.4 Study Area / Survey Area

The study areas used for this assessment are receptor specific. All field survey areas included the entirety of the Site and, dependent on target feature, may have included a variable buffer beyond, where accessible (see **Figure 8.1**), as per **Table 8.3**.

Table 8.3: Survey areas and buffers considered within this assessment

Feature/s	Physical survey area	Assessment consideration
Internationally designated sites	n/a	The Site + 10 km
Nationally designated sites	The Site	The Site + 2 km[13]
Locally designated sites	The Site	The Site + 2 km
Habitats	The Site only	The Site and designated sites to 2 km
Badger	The Site + 30 m	The Site + 30 m
Bats (roosting/foraging)	The Site	The Site and directly connected habitat
Birds (breeding)	The Site + 250 m	The Site + 250 m and the entirety of the SSSI
Birds (winter)	The Site + 500 m, with inclusion of some waterbodies beyond	The Site + 500 m and the entirety of the SSSI

[13] Buffers as considered in this chapter. Assessments for different effects on the same features may be considered differently in other chapter, for example, potential hydrogeological or air quality effects.

Feature/s	Physical survey area	Assessment consideration
Great crested newt (GCN)	The Site + 250 m	n/a
Invertebrates	The Site	The Site and directly connected habitat
Otter	The Site	n/a
Reptiles,	The Site	The Site and directly connected habitat
Water vole	The Site	n/a

Cumulative effects may occur when effects rising from multiple developments, activities or pressures enact on the same feature or population. For this assessment, cumulative effects are considered within approximately 5 km of the Site as this is considered proportionate to the nature of developments in the region, likely dispersal distances of features, and the ZoI for potential pollution effects.

8.3.5 Methodology to Identify the Baseline

The following sources of information have been used to inform the baseline description set out in this Chapter. Further details of all data sources and surveys, including methods, dates and details, are provided in **Appendices 8.1** to **8.3**:

- Desk Study data have been sourced from a variety of locations, including:
  - Natural England's Multi Agency Geographic Information for the Countryside[14] (MAGIC);
  - Nottinghamshire Biological and Geological Records Centre[15] (NBGR)
  - Nottingham Wildlife Trust (NWT);
  - British Trust for Ornithology (BTO) Wetland Bird Survey[16,17] (WeBS) data;
  - The Birds of Nottinghamshire[18] (Reece, *et al.* 2019); and
  - Derbyshire and Nottinghamshire Entomological Society[19] (DaNES).
- Field Surveys were carried out to identify the baseline condition, including:
  - Extended Phase 1 Habitat Survey (February 2021 and June 2021)
  - Non-breeding Bird Surveys (October 2020–March 2021; January–February 2022);
  - Breeding Bird Surveys (March–July 2021);
  - Badger Surveys (January 2022 and November 2022);
  - Water Vole Surveys (June 2021 and August 2021);
  - GCN habitat suitability and eDNA (February 2021 and April 2021);
  - Bat Surveys, including transects/static recorders (April 2021–October 2021), and roost assessment (November 2022);
  - Reptile Surveys (May 2021–July 2021); and

[14] Multi Agency Geographic Information for Countryside (MAGIC) [Online] Available at: https://magic.defra.gov.uk/home.htm [Accessed November 2022]
[15] Nottingham City Council [Online] Available at: https://www.nottinghamcity.gov.uk/leisure-and-culture/events-markets-parks-and-museums/parks-and-open-spaces/nottinghamshire-biological-and-geological-record-centre-nbgrc/ [Accessed November 2022]
[16] Frost, T.M., Calbrade, N.A., Birtles, G.A., Hall, C., Robinson, A.E., Wotton, S.R., Balmer, D.E. and Austin, G.E. (2021) *Waterbirds in the UK 2019/20: The Wetland Bird Survey.* BTO/RSPB/JNCC. Thetford
[17] Data were provided by WeBS, a Partnership jointly funded by the British Trust for Ornithology, Royal Society for the Protection of Birds and Joint Nature Conservation Committee, in association with The Wildfowl & Wetlands Trust, with fieldwork conducted by volunteers
[18] Reece, *et al.* (2019) *The Birds of Nottinghamshire*. Liverpool, Liverpool University Press,.
[19] Derbyshire and Nottinghamshire Entomological Society [Online] Available at: http://www.danes-insects.org.uk/ [Accessed November 2022]

- Invertebrate Habitat Assessment (November 2022).

Survey methods, dates, and details are included in **Appendix 8.1, Appendix 8.2**, and **Appendix 8.3**. Surveys broadly followed standard guidance and best practice but any deviation from this is addressed in the respective Appendix.

8.3.6 Methodology for the Assessment of Effects

The significance of the potential effects of the Proposed Development has been classified by professional consideration of the sensitivity of the receptor and the magnitude of the potential effect. The approach used for the Ecological Impact Assessment (EcIA) follows guidance produced by CIEEM and comprises the following stages:

- Evaluation of the importance of features identified during the Desk Study and Baseline Surveys – those considered to be IEFs are scoped into the assessment, while those considered to be of local importance or not present are scoped out;
- Identification and characterisation of potential effects on IEFs;
- Assessment of potential effects on IEFs, both from the Proposed Development alone and in combination with other developments in the surrounding area (cumulative effects);
- Identification of measures required to avoid and mitigate (reduce) adverse effects; and
- Assessment of the significance of any residual effects after mitigation.

Further details relating to the methods used for evaluating the importance of ecological/ornithological features, characterising potential impacts, and assessing the significance of residual effects are provided below.

8.3.6.1 Sensitivity of Receptors

The baseline conditions, including the importance of environmental features on or near to the Site, or the sensitivity of potentially affected IEFs, are assessed in line with best practice guidance, legislation, statutory designations and professional judgement.

Features can be important for a variety of reasons, and may relate, for example, to rarity, the extent to which they are threatened throughout their range, or to their rate of decline. The level of importance of features identified during the Desk Study and Baseline Surveys has been determined using the criteria defined in **Table 8.4**. These criteria have been determined with reference to CIEEM guidance, and include a consideration of relevant legislation, conservation status, population size and distribution, level of Site use.

In some cases, recent information relating to the size (and/or distribution) of local and regional populations can be limited or unavailable. Where this is the case and it is not clear whether a population is important locally or regionally (or regionally/nationally/ internationally, as applicable), a precautionary approach is used and the population is assessed as being of the higher level of importance.

Statutory protection does not in itself qualify a feature as important. Mitigation may be required to ensure legal compliance for common or widespread features that are not considered important in the context of the Site.

Table 8.4: Examples for evaluation of the importance of IEFs

Importance level	Criteria / Examples
International	• An internationally designated site within the Site or ZoI, i.e. SPA or SAC, including proposed/candidate sites. • The regular presence within the Site or ZoI of a qualifying feature of an existing or proposed statutory site of international importance. Generally, features recorded in notable numbers are included, for example more than 1 % of the cited SPA population, with an element of professional judgement.

Importance level	Criteria / Examples
	• Species in internationally important numbers (>1 % of biogeographic populations).
National (England)	• A SSSI or a National Nature Reserve (NNR) or a site meeting criterion for national designation. • Non-avian species present in nationally important numbers (>1 % UK population). • The regular presence within the Site or ZoI of a feature of a statutory site of national importance, i.e. SSSI, or the regular presence of a group of species which form part of a designated assemblage feature of a SSSI. Importance may be linked to frequency and numbers of observations in the context of published population information for the SSSI. • The regular presence within or around the Site of a breeding species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), where the species is not a cited interest of a statutory site but is present in nationally important numbers. • The regular presence within or around the Site of nationally important numbers of a species of conservation concern. • Large areas of priority habitats or habitats listed on Annex I of the Habitats Directive and smaller areas of such habitats that are essential to maintain the viability of the habitat. • Presence of bat species listed on Annex II of the Habitats Directive.
Regional (County)	• Local Nature Reserve (LNR) within the Site or ZoI. • A cited interest of an existing or proposed internationally designated site, with potential connectivity to the Site, which is present within or around the Site infrequently or in low numbers (e.g. generally <1 % of the cited designation population). • Breeding species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), that nest, or likely nest, within the Site or ZoI. • The regular presence within or around the Site of regionally important numbers of a bird species of conservation concern or species/habitats listed on the Nottinghamshire Local Biodiversity Action Plan (Notts SoCC/HoCC). • Areas of semi-natural woodland greater than 0.25 ha in size. • Species present in regionally important numbers (>1 % Nottinghamshire population).
Local	• Local Wildlife Sites (LWS) or equivalents that may be designated according to criteria at the local authority level, within the Site or ZoI. • Nature reserve managed to enhance biodiversity value and interest. • A locally important population/assemblage of a species of conservation concern or species of principal importance (NERC Act, 2006) that regularly occurs within or around the Site. • A small population or irregular presence of a Notts SoCC/HoCC. • Areas of habitat or species considered to appreciably enrich the ecological resource within the local context.
Less than Local	• All other bird species that are widespread and common and of low conservation concern (e.g. included on the BoCC green list) and which are not present in locally important (or greater) numbers. • Non-avian species typically common and widespread. Features falling below local value are not considered in detail in the assessment process unless they have policy implications for the development, e.g., legal protection.

8.3.6.2 Characterisation of Potential Effects

In line with the CIEEM guidance[8], consideration is given to the following characteristics when identifying potential effects of the Proposed Development on ecological/ornithological features:

- Nature of effect: whether it is positive (beneficial) to features, e.g. by increasing species diversity or extending habitat, or negative (detrimental), e.g. by loss of, or displacement from, suitable habitat;
- Extent: the spatial or geographical area over which the effect may occur;

- Magnitude: the size, amount, intensity, and volume of the effect;
- Duration: the duration of an effect as defined in relation to ornithological characteristics (such as a species' life cycle) as well as human timeframes. It should also be noted that the duration of an activity may differ from the duration of the resulting effect; e.g. if short-term construction activities cause disturbance to breeding birds, there may be long-term implications from failure to reproduce that season;
- Frequency: the number of times an activity occurs may influence the resulting effect; and
- Timing: this may result in an impact on an ecological feature if it coincides with critical life stages or seasons (e.g. the breeding season).

The criteria for assessing the magnitude of a potential effect are defined as follows:

- High: A fundamental change to the baseline condition of the IEF, leading to total loss or major alteration of the relevant population;
- Medium: A material change to the baseline condition of the IEF, leading to partial loss or alteration of the relevant population;
- Low: A slight, detectable, alteration of the baseline condition of the IEF; and
- Negligible: A barely distinguishable change from baseline conditions.

It is considered that a magnitude level of medium or higher could have a likely significant effect on an IEF.

8.3.6.3 Significance of Effects

The prevailing CIEEM guidance avoids and discourages use of the matrix approach to determining significance, and describes only two categories: 'significant' or 'not significant'.

According to the CIEEM guidance, for the purpose of EcIA, a 'significant effect' is an effect that either supports or undermines biodiversity conservation objectives for important ecological features or for biodiversity in general.

Where potential connectivity with an SAC, SPA or Ramsar site has been identified, significant effects on species are assessed in the context of potential effects on the conservation status of that particular SAC, SPA or Ramsar site population, as this is considered to be the most appropriate scale for assessment. In this assessment, any effects on ornithological features that could threaten the integrity of a statutory site, or the favourable conservation status of a bird population, is considered to be significant. Where this is not the case, effects are considered not significant.

8.3.6.4 Mitigation and Residual Effects, Compensation and Enhancement

Mitigation measures are identified with the aim of:

- Avoiding negative ecological effects – especially those that could be significant; and
- Reducing negative effects that cannot be avoided.

The residual effects of the project are then assessed. Any significant effects remaining after mitigation (residual effects), together with an assessment of the likelihood of success in the mitigation, are the factors to be considered against legislation, policy and development control in determining the application.

Compensatory measures are proposed if it is necessary to offset any remaining significant negative ecological effects that cannot be avoided by a mitigation strategy.

Enhancement measures would also be implemented where possible to achieve net ecological gain.

8.3.6.5 Assessment of Cumulative Effects

Cumulative effects can result from individually insignificant but collectively significant actions taking place over a period of time or concentrated in a location. Within Ecological Impact Assessment, cumulative impacts are particularly important as many ecological features are exposed to background levels of threat or pressure and therefore may be close to reaching critical thresholds where further impact could cause irreversible decline.

A list of other developments has been identified in Chapter 2: Environmental Impact Assessment of the ES. The search criteria included a ZoI of approximately 5 km from the Site. These include projects at various stages in the planning system, and include (but are not limited to) submitted applications, permitted developments, those under construction, and those identified in other plans and programmes, such as local plans.

The planning documents for each in-combination project were examined to extract the information regarding the residual effects of the project on birds. The cumulative assessment follows the same method of assessment of effects described above.

8.3.7 Assessment Limitations

The baseline surveys were subject to some limitations, as detailed in **TA 8.1, TA 8.2**, and **TA 8.3**, but overall the dataset is considered robust and suitable for assessment.

The Assessment herein was completed and reviewed by experienced ecologists with a range of technical expertise.

8.4 BASELINE CONDITIONS

8.4.1 Desk study

8.4.1.1 Designated Sites

There are no National Site Network sites within 5 km of the Site boundary, however there are two national statutory designated sites within 2 km of the Site boundary; Sutton and Lound Gravel Pits SSSI, directly south and 0.3 km north east, and Retford Cemetery, 1.4 km southeast.

There are eight non-statutory sites within 2 km of the Site boundary, all LWS. In addition, the Idle Valley nature reserve is adjacent to the Site, which, although not a single designated site, is managed for value to biodiversity.

Table 8.5 summarises the designated sites, however further details can be found in the Ecology Survey Report, **Appendix 8.1**. Locations of designated sites can be found on **Figure 8.2.**

Table 8.5: Designated sites and their proximity to the Site Boundary

Site	Status	Distance/ Direction from Site	Brief Description/Reason for Designation
Statutory Designated Sites			
Sutton and Lound Gravel Pits	SSSI	Split into two areas: 1.47 ha within the Site and adjacent to the south/southeast. 0.2 km northeast	Extensive areas of open water lagoons, supporting variety of breeding, wintering, and passage birds. One of the most important localities for passage and over-wintering wildfowl in East Midlands.
Retford Cemetery	LNR	1.4 km southeast	Victorian era cemetery supporting range of mature trees, assemblage of bats important to county, lichens and other flora, and invertebrates.

Site	Status	Distance/ Direction from Site	Brief Description/Reason for Designation
			Potential to support variety of wildlife.
Non-Statutory Designated Sites			
Sutton and Lound	LWS	Split into two areas: 1.47 ha within the Site and immediately adjacent to the south/south-east Adjacent to the north	Comprises sand and gravel pits, including part of Sutton and Lound Gravel Pits SSSI, with a variety of habitats. Site supports range of breeding and wintering wetland birds.
Idle Valley	Nottingham Wildlife Trust (NWT) Reserve	Adjacent to the south/south-east/east/north-east	Complex of flooded sand and gravel pits, supporting a variety of habitats. Large areas of open water support numbers of wildfowl in winter, many breeding wetland birds and passage migrants, and aquatic plants. Overall, the site supports diverse flora and fauna.
Idle Valley Nature Centre Pond	LWS	0.2 km south-east	Supports notable botanical and invertebrate species.
Tiln Wood Track	LWS	0.6 km south/south-east	Situated on sandy soils through mature pine plantation, with high botanical value.
Tiln North and the Conservation Lake	LWS	0.7 km east	Several gravel pits with ornithological interest.
River Idle Chainbridge Lane Bridge	LWS	0.8 km east	No citation given.
Bolham Wood	LWS	0.9 km east	A small deciduous, ancient woodland situated on a steep south-facing slope above the River Idle.
Folly Dyke, Chain Bridge Lane, NW of Hayton	LWS	1.4 km east	No citation given.
Chesterfield Canal (Shireoaks to Welham)	LWS	1.6 km south-west	Supports variety of notable fauna and aquatic flora.

8.4.1.2 Species records

Nottinghamshire Biological and Geological Records Centre

Table 8.6 briefly summarises the species records within 2 km of the Site boundary, dated 2010 onwards, and that are relevant to the habitats present and the Proposed Development. The species are protected under UK legislation[2,3] and/or are listed under the NERC Act 2006[4] as species of principal importance.

Furthermore, one European Protected Species (EPS) mitigation licence application for bats was identified within 2 km of the Site boundary, allowing the destruction of a resting place, with the licence closed in September 2019.

Further details of the ecology species records can be found in Ecology Survey Report, **TA 8.1**.

Table 8.6: Brief summary of protected and priority species within 2 km of the Site Boundary

Taxonomic Group	Species	Number of Records
Bats	Noctule (*Nyctalus noctula*)	42
	Soprano pipistrelle (*Pipistrellus pygmaeus*)	79
	Common pipistrelle (*Pipistrellus pipistrellus*)	111
	Brown long-eared (*Plecotus auratus*)	8
	Pipistrellus sp.	11
	Myotis sp.	33
	Nyctalus sp.	6
	Brandt's (*Myotis brandti*)	1
	Daubentons' (*Myotis daubentonii*)	15
	Nathusius's pipistrelle (*Pipistrellus nathusii*)	8
	Natterer's (*Myotis nattereri*)	1
	Whiskered bat (*Myotis mystacinus*)	3
	Whiskered/Brandt's (*Myotis mystacinus/ brandti*)	1
	Unidentified bat	2
Terrestrial Mammals	Western European Hedgehog (*Erinaceus europaeus*)	12
	Brown hare (*Lepus europaeus*)	1
	Water vole (*Arvicola amphibius*)	24
	Badger (*Meles meles*)	11
	Otter (*Lutra lutra*)	2
Amphibians	Common toad (*Bufo bufo*)	7
	Great crested newt (*Triturus cristatus*)	3
	Common frog (*Rana temporaria*)	7

Taxonomic Group	Species	Number of Records
	Smooth newt (*Lissotriton vulgaris*)	3
Reptiles	Grass snake (*Natrix natrix/helvetica*)	25
Invertebrates	Dingy Skipper (*Erynnis tages*)	6
	Small Heath (*Coenonympha pamphilus*)	4

Due to the large volume of bird records, these are excluded from the table above but have been considered in forming recommendations. Over 23,500 records of 221 species of birds were returned, many of which are species of conservation concern. Furthermore, 253 records of 29 species have been recorded within the Site boundary during 2016 and 2017. Further details of ornithology records can be found in the Ornithology Survey Report**, TA 8.3**.

Derbyshire and Nottinghamshire Entomology Society

Table 8.7 briefly summarises the nationally scarce[20] and/or notable[21] invertebrate species within 2 km of the Site boundary, dated 2010 onwards, all of which are moths.

Further details of invertebrate records can be found in the Ecology Survey Report, **TA 8.1**.

Table 8.7: Brief summary of nationally scare and notable species within 2.5 km of the Site Boundary

Common Name	Number of Records
Orange-blotch Cosmet (*Chrysoclista lathamella*)	1
Kent Black Arches (*Meganola albula*)	1
Rosy-striped Knot-horn (*Onocera semirubella*)	1
Stathmopoda pedella	1

BTO WeBS data

Table 8.8 briefly summarises recent WeBS data obtained from the BTO, from the adjacent Sutton and Lound Gravel Pits SSSI. Further details can be found in the Ornithology Survey Report, **TA 8.3**.

Table 8.8: Brief Summary of WeBS 5-Year Mean of Peak Counts at Sutton and Lound Gravel Pits SSSI

Species	5-Year Mean of Peak Counts
Canada goose (*Branta canadensis*)	279
Barnacle goose (*Branta leucopsis*)	<1

[20] Nationally Scare B species are uncommon in GB and thought to occur between 31 and 100 10 km squares of the National Grid or, for less-well recorded groups between either and 20 vice-counties.
[21] Species with conservation designations, but no legal protection.

Species	5-Year Mean of Peak Counts
Greylag goose (British/Irish) (*Anser anser*)	1,042
Pink-footed goose (*Anser brachrhynchus*)	2
European white-fronted goose (*Anser albifrons)*	4
Mute swan (*Cygnus olor*)	213
Whooper swan (*Cygnus cygnus*)	75
Egyptian goose (*Alopochen aegyptiaca*)	15
Shelduck (*Tadorna tadorna*)	17
Mandarin duck (*Aix galericulata*)	<1
Garganey (*Spatula querquedula*)	2
Shoveler (*Spatula clypeata*)	237
Gadwall (*Mareca strepera*)	498
Wigeon (*Anas penelope*)	795
Mallard (*Anas platyrhynchos*)	404
Pintail (*Anas acuta*)	6
Teal (*Anas crecca*)	272
Red-crested pochard *(Netta ruffina*)	206
Pochard (*Aythya ferina*)	203
Tufted duck (*Aythya fuligula*)	466
Goldeneye (*Bucephala clangula*)	49
Smew (*Mergellus albellus*)	1
Goosander (*Mergus merganser*)	27
Water rail (*Rallus aquaticus)*	3
Moorhen (*Gallinula chloropus*)	31
Coot (Fu*lica atra*)	1,431
Little grebe (*Tachybaptus ruficollis*)	53
Red-necked grebe (*Podiceps grisegena*)	<1
Great crested grebe (*Podiceps cristatus*)	32
Black-necked grebe (*Podiceops nigricollis*)	<1
Oystercatcher (*Haematopus ostralegus*)	21
Avocet (*Recurvirostra avosetta*)	10
Lapwing (*Vanellus vanellus*)	1,363

Species	5-Year Mean of Peak Counts
Golden plover (*Pluvialis apricaria*)	35
Grey plover (*PLuvialis squatarola*)	<1
Ringed plover (*Charadruis hiaticula*)	4
Little ringed plover (*Charadruis dubius*)	4
Whimbrel (*Numenius phaeopus*)	<1
Curlew (*Numenius arquata*)	<1
Black-tailed godwit (*Limosa limosa*)	2
Turnstone (*Arenaria interpres*)	<1
Ruff (*Calidris pugnax*)	6
Dunlin (*Calidris alpina*)	6
Little stint (*Calidris minuta*)	1
Woodcock (*Scolopax rusticola*)	<1
Jack snipe (*Lymnocryptes minimus*)	<1
Snipe (*Gallinago gallinago*)	26
Common sandpiper (*Actitis hypoleucos*)	2
Green sandpiper (*Tringa ochropus*)	5
Redshank (*Tringa totanus*)	8
Greenshank (*Tringa nebularia*)	2
Cormorant (*Phalacrocorax carbo*)	47
Spoonbill (*Platalea leucorodia*)	<1
Bittern (*Botaurus stellaris*)	<1
Grey heron (*Ardea cinerea*)	10
Great white egret (*Ardea alba*)	5
Little egret (*Egretta garzetta*)	17
Kingfisher (*Alcedo atthis*)	2

8.4.2 Field surveys

Field surveys focussing on a range of features were completed between February 2021 and November 2022. Findings and results of species-specific surveys are briefly summarised below, however further details can be found for ecology and ornithology species in the Ecology Survey Report, **TA 8.1,** and Ornithology Survey Report, **TA 8.3**, respectively.

Habitats

Within the Site

The Site is approximately 113.58 hectares (ha) and predominantly comprised of improved and poor semi-improved grassland fields, separated by fencing, dense scrub and

scattered scrub/trees. Large extents of semi-natural broad-leaved woodland are located at the western, southern, eastern and northwestern boundary, with plantation woodland in the north of the Site. Other habitats include amenity grassland, tall ruderal vegetation, bare ground, an intact species-poor hedge and waterbodies. Several buildings were located in the north of the Site.

To the south, the Site comprises arable fields and poor semi-improved grassland, bordered by defunct hedgerows. An area of mixed woodland, hardstanding and buildings are also located to the south of the Site.

During subsequent ecology surveys at the Site, Himalayan balsam was located in the south-west of the Site, and small numbers of common orchid species were found in grassland habitats within the Site.

Surrounding the Site

Sutton and Lound Gravel Pits SSSI and Sutton and Lound LWS are within close proximity to the Site, and both overlap to a small extent with the Site boundary. Habitats include extensive areas of open water lagoons, areas of open grassland, tall ruderal vegetation, secondary and relict woodland, scrub, marshes, and willow dominated woodland, with the River Idle to the east.

Several priority habitats[4] are located within 2 km of the Site boundary, including deciduous woodland, good quality semi-improved grassland, traditional orchard, and coastal and floodplain grazing marsh.

Furthermore, built up areas associated with the residential town Retford, are located to the south of the Site.

Badgers

Badgers remain one of the most persecuted species in the UK[22], therefore details of badger surveys and any results are included in the **TA 8.2: Confidential Badger Annex**.

Bats

Due to the location and nature of the Site, and the habitats present, the Site is considered of high suitability for bats.

As per Bat Conservation Trust (BCT) guidance[23], surveys include two walked transects per month (April–October) and use of six automated bat detectors, deployed for five or more consecutive nights per month (April–October).

Habitat and Roost Assessments

Potential suitable habitat to support foraging and commuting bats was recorded within the Site boundary, comprising plantation woodland, scattered scrub and trees, and hedgerows. These habitats were connected to extensive areas of suitable habitat within the wider landscape by hedgerows, mature woodland, and nearby waterbodies.

Thirteen trees were assessed as having 'moderate' and 'low' potential to support roosting bats, within the on-site woodland habitats. Tree assessments (ground based visual inspection only) were undertaken during the Extended Phase 1 habitat survey and in updated surveys in November 2022 which included additional areas of woodland on Site.

The desk study returned 321 records of nine species of bat, where two species were recorded within the Site boundary in 2017 and 2018.

[22] Badger Trust (2022) *The Persecution of Badgers: A Guide for Investigators in England and Wales* [Online] Available at: https://www.badgertrust.org.uk/badger-crime-guide [Accessed November 2022]
[23] Collins, J. (ed.) (2016) *Bat Surveys for Professional Ecologists: Good Practice Guidelines. 3rd edition*. Bat Conservation Trust, London

Transect Surveys

Fourteen transect surveys were undertaken April 2021 to October 2021 and recorded eight taxa, where six were identified to species level; common pipistrelle, soprano pipistrelle, noctule, Daubenton's, brown long-eared and Nathusius' pipistrelle, and the remaining two to genus: *Myotis* species and *Nyctalus* species. Common pipistrelle and soprano pipistrelle were the most frequently recorded species, and most overall bat activity was recorded in August.

Most of the activity recorded during the transect surveys was at the edges of the grassland fields, woodland edges and near off-site waterbodies. Relatively limited activity was recorded within open grassland habitats.

Table 8.9: Summary of Bat transect Survey Results

Survey Season and Transect	Common pipistrelle	Soprano pipistrelle	Noctule	Daubleton's	Myotis sp.	Brown-long eared	Nyctalus sp.	Nathusius' pipistrelle	Number of Bat Passes
26.04.2021 N	8	9	2	3	2	0	0	0	24
26.04.2021 S	8	5	3	1	1	0	0	0	18
30.04.2021 N	2	0	0	0	0	0	0	0	2
30.04.2021 S	0	0	0	0	0	0	0	0	0
22.05.2021 N	0	1	1	0	0	0	0	0	2
22.05.2021 S	13	12	0	0	1	0	0	0	25
28.05.2021 N	5	8	0	0	5	1	0	0	19
28.05.2021 S	6	3	1	0	0	0	0	0	10
14.06.2021 N	3	2	4	0	0	0	0	0	9
14.06.2021 S	3	10	2	0	2	0	0	0	17
22.06.2021 N	1	1	8	0	0	0	0	0	10
22.06.2021 S	14	8	4	0	0	0	0	0	26
12.07.2021 N	11	8	2	0	0	0	0	0	21
12.07.2021 S	7	3	3	0	0	0	0	0	13
23.07.2021 N	4	5	3	0	0	0	0	0	12
23.07.2021 S	11	6	0	0	1	0	0	0	18
18.08.2021 N	22	3	4	1	1	0	0	0	31
18.08.2021 S	7	7	3	0	0	0	0	0	17
23.08.2021 N	12	7	2	0	0	0	0	0	21
23.08.2021 S	1	7	8	0	0	0	0	0	16
19.09.2021 N	3	7	2	0	0	0	1	0	13
19.09.2021 S	10	3	0	0	1	0	1	0	15
23.09.2021 N	2	7	1	0	0	0	0	1	11
23.09.2021 S	2	2	3	0	0	0	0	0	7
11.10.2021 N Dawn	0	0	0	0	0	0	0	0	0

Survey Season and Transect	Common pipistrelle	Soprano pipistrelle	Noctule	Daubleton's	Myotis sp.	Brown-long eared	Nyctalus sp.	Nathusius' pipistrelle	Number of Bat Passes
11.10.2021 S Dawn	0	1	0	0	0	0	0	0	1
11.10.2021 N Dusk	0	3	0	0	1	0	0	0	4
11.10.2021 S Dusk	3	1	0	0	0	0	0	0	4
19.10.2021 N	4	0	2	0	0	0	0	1	7
19.10.2021 S	3	4	0	0	0	0	0	0	7
Total	**165**	**133**	**58**	**5**	**15**	**1**	**2**	**2**	**380**

Remote Monitoring

Automated bat detectors were deployed for a minimum of five nights for a minimum of twice a month, April 2021 to October 2021, at six fixed locations across the Site. Ten taxa were identified during the remote monitoring surveys where seven were identified to species level: common pipistrelle, soprano pipistrelle, noctule, brown long-eared, Nathusius' pipistrelle, Leisler's bat and serotine, and the remaining three taxa to genus: *Myotis* species and *Nyctalus* species.

High activity levels and a wide range of bat species were recorded by the automated bat detectors, indicating the Site has favourable habitats for these taxa.

Table 8.10: Remote Monitoring Results Summary

Survey Month	Monitoring Location	*Myotis* sp.	*Nyctalus* sp.	Leisler	Noctule	Nathusius pipistrelle	Common pipistrelle	*Soprano pipistrelle*	*Pipistrellus* sp.	*Brown long-eared bat*	Serotine	Total
April	1	12	100	41	8	1	156	39	4	0	0	361
	2	18	4	6	8	3	2895	141	191	0	0	3266
	3	22	18	1	18	5	2097	1884	112	0	0	4157
	4	6	2	0	6	2	10	33	0	1	0	60
	5	30	7	0	1	1	821	95	0	0	0	955
	6	23	2	1	10	0	108	51	0	0	0	195
May	1	30	60	2	37	5	1232	392	23	4	1	1785
	2	57	27	11	22	6	1257	299	56	1	0	1736

Survey Month	Monitoring Location	*Myotis* sp.	*Nyctalus* sp.	Leisler	Noctule	Nathusius pipistrelle	Common pipistrelle	*Soprano pipistrelle*	*Pipistrellus* sp.	*Brown long-eared bat*	Serotine	Total
	3	212	47	1	45	33	7321	3602	505	0	0	11766
	4	10	0	4	11	0	91	137	0	0	0	253
	5	100	12	0	18	0	6100	2188	0	2	0	8420
	6	31	4	2	21	21	2113	504	0	0	0	2697
June	1	10	17	1	8	3	476	87	12	0	0	614
	2	23	30	5	63	1	2013	129	49	0	0	2313
	3	151	98	1	75	2	1714	756	225	0	0	3022
	4	14	5	0	31	0	53	41	0	0	0	144
	5	43	672	659	1509	8	719	553	0	2	0	4165
	6	22	0	0	0	3	1008	347	0	0	0	1380
July	1	97	140	4	73	12	1467	373	39	1	0	2206
	2	608	155	87	335	37	5229	2767	25	0	0	9243
	3	67	142	92	328	0	810	421	0	3	0	1863
	4	18	1	0	5	0	70	80	0	2	0	176
	5	11	122	136	450	7	1270	532	0	1	0	2529
	6	88	0	0	0	2	5372	4954	0	0	0	10416
August	1	47	92	2	31	0	607	143	6	0	0	928
	2	423	64	204	71	32	5227	5687	3	0	0	11711
	3	617	35	42	8	14	4656	4929	0	5	0	10306
	4	29	5	11	92	0	309	200	0	0	0	646
	5	892	249	91	843	0	2086	1738	0	1	0	5900
	6	89	0	7	51	0	1985	587	31	0	0	1850
September	1	239	8	0	5	6	155	118	4	1	0	536
	2	8	3	1	3	0	83	121	0	0	0	219

Survey Month	Monitoring Location	*Myotis* sp.	*Nyctalus* sp.	Leisler	Noctule	Nathusius pipistrelle	Common pipistrelle	*Soprano pipistrelle*	*Pipistrellus* sp.	*Brown long-eared bat*	Serotine	Total
	3	164	0	0	3	7	1816	1869	251	0	0	4110
	4	11	4	9	7	0	278	104	0	0	0	413
	5	450	145	55	324	4	2190	1486	0	0	0	4654
	6	40	0	6	8	0	214	86	8	0	0	362
October	1	14	2	0	7	5	67	30	1	0	0	126
	2	4	3	0	4	0	3	13	0	0	0	27
	3	60	0	0	0	4	619	210	72	0	0	965
	4*	-	-	-	-	-	-	-	-	-	-	-
	5	9	1	0	5	0	625	149	0	0	0	789
	6	58	0	9	0	0	385	334	10	0	0	796
* No data due to technical fault.												

Swarming Assessment

Limited roosting potential was located within the Site boundary. The majority of the peak bat activity was within sunset hour, rather than 3-4 hours from sunset, indicating that no swarming is taking place on the Site. An anomaly was provided by the data for Location 2 in August; however, activity was high throughout the evening and night therefore it was likely to be related to good foraging conditions rather than swarming.

Birds

A large volume of bird records was returned by the desk study, 23,542 records of 221 species. A high proportion of the records (>95 %) were from the adjacent Sutton and Lound Gravel Pit SSSI and surrounds. The high number of records includes a range of species likely to be found in habitats within and surrounding the Site and highlights the popularity of the wider area as a birdwatching destination.

Non-breeding Bird Surveys (NBBS)

NBBS were completed between October 2020 and mid-March 2021, with two surveys per month (excluding March, which included one WBS) carried out using the "look-see" method. The WBS Area included the Site and 500 m buffer. Opportunistic surveys were completed in January and February 2022 in reaction to periods of heavy rainfall; however, the Site did not flood and bird interest was consistent with dry conditions during the previous winter.

Overall, relatively few birds were recorded within the Site itself, likely due to the high grazing pressure and the short grass habitats present. The wider area supports a large

and varied bird assemblage throughout the year. Results of the NBBS are detailed in **TA 8.3**, but are summarised below:

- Wildfowl were present throughout, although within the Site species were mostly limited to greylag and Canada geese. Small numbers of other species were recorded within the Site when it partially flooded during February 2021 but were otherwise only recorded overflying the Site, transiting between waterbodies in the wider reserve and gravel pit network. Numerous species were recorded on adjacent waterbodies in moderate numbers (typically less than 100 individuals).
- Lapwing was recorded flying over the Site on occasion, but there were no observations of wader species foraging within the Site. Woodcock was recorded within wooded and scrub habitats around the Site boundaries.
- Flocks of widespread gull species were recorded foraging within the Site during some surveys, and small numbers were regularly observed overflying the area.
- Marsh harrier was recorded transiting over the Site during several surveys.
- Passerine species were typical of the area and habitats available, including winter thrushes, meadow pipit, and lesser redpoll.

Surveys for Breeding Birds (SBB)

A six-visit survey of breeding birds (SBB) was completed between mid-March and mid-July 2021. The survey used an adapted version of the Common Bird Census (CBC) method[24], but adhering to new survey guidance released in spring 2021[25]. The SBB Area included the Site and 250 m buffer.

High grazing pressure across much of the Site results in habitat unsuitable for most species, providing negligible foraging and/or nesting opportunities. However, boundary habitats, comprising hedgerows, scrub and woodland, are of higher value and support a broad assemblage of birds, including 14 species of conservation concern breeding or holding territory within the Site.

The adjacent SSSI and NWT nature reserve supported a greater assemblage of birds, including breeding waterbird species associated with the SSSI designation such as mute swan, great created grebe, and greater numbers of reed warbler.

Results of the SBB are detailed in **TA 8.3**, but are summarised below:

- Very few, if any birds bred within the pasture areas of the Site.
- Species of conservation concern holding territory within the scrubby and woodland habitats within the Site include: willow warbler, starling, song thrush, mistle thrush, dunnock, linnet and reed bunting.
- Overall, due to the presence of the reserve and the mosaic of habitats available, the wider area holds a large and diverse assemblage of breeding birds.

<u>Great Crested Newt</u>

Suitable habitat to support breeding, foraging, sheltering and commuting GCN was recorded within the Site boundary, comprising grassland, scrub, woodland, and waterbodies, where 43 waterbodies were identified within the Site and a 500 m buffer of the Site boundary. Furthermore, boundary woodland provided connectivity to the wider landscape.

The desk study returned three records of GCN within 2 km of the Site boundary, the closest being 0.4 km east in 2014. The desk study included a record of great crested newts released in 2007, stating: *"60 newts introduced by a Consultant* [*sic*] *to ponds behind Nottinghamshire Wildlife Trust reserve off Chainbridge Lane"*.

[24] Marchant, J. (1983) *Common Birds Census Instructions*. British Trust for Ornithology, Thetford.
[25] Bird Survey & Assessment Steering Group. (2021). *Bird Survey Guidelines for assessing ecological impacts, v.0.1.0*. https://birdsurveyguidelines.org [Accessed: 09/07/2021]

No further details are available and contacts at NWT are not aware of the event. As such, it is assumed that the release was too far from the Site and did not spread, or the population no longer survives.

Habitat Suitability Index (HSI) Assessment

Three waterbodies (P14 to P16) were subject to a Habitat Suitability Index (HSI) assessment during the Extended Phase 1 Habitat Survey; the remaining 40 were located on private land, where no access was permitted at the time of survey. Waterbodies P14 and P15 were assessed as having 'excellent' potential to support a breeding population of GCN, where waterbody P16 was 'below average'.

Environment DNA (eDNA) Analysis

When access became available, further HSI assessment was completed and eDNA survey was carried out at 18 waterbodies; one on-site and 17 off-site, within 250 m of the Site boundary, that were considered potentially suitable for GCN.

Results of the analysis indicated that eDNA for GCN was absent in all 18 waterbodies.

Invertebrates

An Invertebrate Habitat Potential (IHP) assessment was undertaken in November 2022. Ten parcels were selected during the desk study, approximately 20 m^2, comprising plantation woodland, scrub, and ruderal habitats.

Three parcels require further surveys at the appropriate time of year, with the remainder of the Site providing 'below moderate' potential for invertebrates.

The desk study returned two records of invertebrates within 2 km of the Site boundary, both 0.1 km south, and DaMES data request returned four records of nationally scarce and notable species, the closest being within the Site.

Reptiles

Suitable habitat to support foraging and sheltering reptiles was recorded within the Site boundary, comprising grassland, hedgerows, woodland, scrub, and waterbodies. On-site log and brash piles offered opportunities for sheltering and hibernating reptiles, whereas several south-facing embankments had potential to support basking reptiles.

The desk study returned four records of grass snake within the Site boundary in 2011, 2013 and 2014, and a further 21 records within a 2 km buffer of the Site boundary.

Reptile Surveys

A reptile survey following standard methods[26] was carried out between May and July 2021. A total of 212 refugia were placed in suitable reptile habitat within the Site, primarily located in the grassland strips around the Site boundary.

A low population of grass snake has been identified, with a peak count of four adults. The presence of juvenile grass snake suggests this species breeds within or close to the Site. Observations were concentrated in the north of the Site, with small numbers recorded from grassland/woodland boundary elsewhere within the Site. The grass snakes were predominately recorded within grassland and scrub, adjacent to standing water, and at woodland boundaries.

Water Vole

Potential suitable habitat to support water voles was recorded within the Site boundary during the Extended Phase 1 Habitat Survey: four waterbodies (D2 to D4, and P14).

[26] Froglife (1999) *Reptile survey: an introduction to planning, conducting and interpreting surveys for snake and lizard conservation.* Froglife Advice Sheet 10. Froglife.

Additional suitable waterbodies were also recorded within close proximity to the Site, as well as a good connection to the wider landscape.

The desk study returned 24 records of water vole within 2 km of the Site boundary, the most recent in 2012, 0.6 km east. Consultation with NWT (pers. comms.) suggested American mink (*Neovison vison*) are present in the area and predation likely contributed to hugely reducing or extirpating the local populations.

Water Vole Surveys

Water vole surveys were carried out in June and August 2021, according to standard guidance[27], to identify evidence of water vole. The surveys included potentially suitable ditches and waterbodies within and adjacent to the Site.

Waterbodies D2 to D4, and P14 were surveyed and no evidence of water vole was recorded.

Otter

The Site itself is of low suitability for Otter, lacking any notable wetland habitats with the majority of the Site dominated by open improved grassland, which offers limited opportunities for foraging or sheltering. Suitable habitat to support foraging and sheltering otter was limited at the Site boundary, comprising woodland, scrub, and off-site waterbodies, with the River Idle being approximately 0.1 km south of the Site.

The desk study returned two records of otter within 2 km of the Site boundary, the closest being 0.7 km south in 2014. Anecdotally, NWT suggested otter are present in the area but rarely observed and typically further north in the nature reserve.

Otter Surveys

An otter survey was carried out at the same time as the water vole survey, to determine presence/absence of otters from the ditches within or adjacent to the Site. Suitable riparian habitats within the Site and up to 200 m up and down were not surveyed as the survey effort would be disproportionate to the level of impact predicted by the Proposed Development. Camera traps placed throughout the Site, targeting other key species, included potential otter commuting routes and data from these was reviewed to inform the baseline condition.

No evidence of otter was recorded on the water vole and otter surveys, camera traps, or incidentally during other survey efforts.

8.4.3 Other Species and Incidental Sightings

Amphibians

Suitable habitat for foraging and sheltering amphibians was recorded within the Site boundary, comprising damp areas within woodlands, brash and log piles and on-site waterbody, and waterbodies within close proximity to the Site.

The desk study returned 17 records of amphibians within 2 km of the Site boundary, including common frog, smooth newt and common toad, where common toad was recorded within the Site in 2017.

Polecat

An incidental sighting of a presumed polecat-ferret hybrid (*Mustla furo x putorius*) was recorded within the Site boundary during a bird survey in May 2021.

[27] Dean, M (2021) *Water Vole Field Signs and Habitat Assessments: A Practical Guide to Water Vole Surveys* Pelagic Publishing, Exeter, UK

Suitable habitat to support polecat (*Mustela putorius*) and/or polecat-ferret hybrid was recorded within the Site boundary and the wider landscape, comprising lowland woodland, marshes, and riverbanks.

No records were returned by the desk study within 2 km of the Site boundary, however sightings of both polecat and polecat-ferret hybrid have been verified[28] within 5 km of the Site boundary.

Other Terrestrial Mammals

Brown hare, rabbit (*Oryctolagus cuniculus*), fox (*Vulpes vulpes*), muntjac deer (*Muntiacus reevesi*) and roe deer (*Capreolus capreolus*) were recorded incidentally during survey efforts at the Site.

The desk study returned one record of brown hare, and 12 records of western European hedgehog within 2 km of the Site boundary, with the closest western European hedgehog being within the Site in 2016.

8.4.4 Species Scoped Out

Hazel dormice

Despite the Site being within the geographical range of hazel dormice (*Muscardinus avellanarius*) and suitable habitat recorded within the Site boundary, no records were returned by the desk study and the species is known to be absent from the area. Due to habitat loss and changes to countryside management, existing populations have fallen by a third since 2000, and reintroductions have taken place in Nottinghamshire in 2013, 2014, 2015, and 2019[29]. The nearest reintroduction woodland is approximately 6.3 km south-east of the Site boundary, however monitoring confirms they have not yet dispersed sufficiently far from release sites[30].

Eurasian Beaver

Suitable habitat to support beavers (*Castor fiber*) was recorded within close proximity of the Site and within the wider landscape, comprising woodland, extensive waterbodies and the River Idle. There are known wild and reintroduced[31] populations of beaver in Scotland, Wales, and southern England, however the Site remains outside of their current geographical range.

There is a captive population within the Idle Valley Nature Reserve, released in 2021 into an enclosure located approximately 0.5 km north-northeast of the Site boundary. As these individuals are not "wild-living" they are not protected under the provisions of the Conservation of Habitats and Species Regulations 2017; however, all animals are protected under the Animal Welfare Act 2006[32]which safeguards against cruelty. Given the status of the species locally, distance from the Site, and baseline disturbance pressures, no adverse effects are predicted in the context of EIA and there is negligible potential for offences under any legislation. As such, beaver is not considered further.

[28] Sightings verified by The Mammal Society and records collated by National Biodiversity Network (NBN) Atlas [Online] Available at: https://nbnatlas.org/ [Accessed November 2022]
[29] https://nottsdormousegroup.uk/
[30] Nottinghamshire Dormouse Group (nottsdormousegroup.uk) [Accessed December 2022]
[31] Royal Society for the Protection of Birds (RSPB) *Beaver Reintroduction in the UK* [Online] Available at: https://www.rspb.org.uk/our-work/policy-insight/species/beaver-reintroduction-in-the-uk/ [Accessed November 2022]
[32] Animal Welfare Act 2006. Available from: https://www.legislation.gov.uk/ukpga/2006/45/contents [Accessed November 2022]

8.4.5 Sensitivities by phase

The Proposed Development is phased, with a sequential approach to extraction and restoration. **Table 8.11** provides a summary of baseline condition and ecological sensitivities[33] within each at the time of submission.

Table 8.11: Baseline condition and ecological sensitivities per phase

Phase	Habitats summary	Ecological features present
HR P1	Predominately improved grassland with plantation broad-leaved woodland at the eastern and western boundary, and a bare ground access track. Large brash pile at the south-eastern corner of the improved grassland field.	• Bats (foraging) • Birds (breeding) • Invertebrates (suitable habitat at eastern boundary) • Reptiles (grass snake) • SSSI (adjacent to south)
Infrastructure Including the haul route, conveyor, and processing area in the southwest of the Site.	Access Road – Runs through improved grassland and bare ground. Haul Road – Runs through a mixture of habitats, comprising semi-natural broad-leaved woodland, poor semi-improved grassland, arable land, defunct species-poor hedgerow, recently felled broad-leaved woodland, plantation broad-leaved woodland, tall ruderal vegetation, improved grassland, bare ground, and dense scrub. Processing Area (1-3) – Location moves throughout the phases, impacting a mixture of habitats, comprising improved grassland, plantation broad-leaved woodland, dense scrub, and bare ground.	• Bats (foraging) • Birds (breeding) • Botany (bee and pyramid orchids adjacent to access track, HR P2) • Invertebrates (suitable habitat adjacent to haul road, HR P1) • Reptiles (grass snake) • SSSI (adjacent to south)
LR P1	Improved grassland.	• Bats (foraging) • Birds (breeding) • Botany (bee orchids recorded within woodland adjacent) • SSSI (adjacent to southwest)
LR P2	Predominately improved grassland with limited area of plantation broad-leaved woodland at the southern boundary.	• Birds (breeding) • SSSI (adjacent to south and west)
Soil Store Including an area of land in the north excluded from the other phases. To the east of HR P2.	North – Improved grassland with limited area of bare ground access track. South – Mixture of habitats, comprising recently felled broad-leaved woodland, plantation broad-leaved woodland and arable land.	• Bats (foraging) • SSSI (c.320 m south)
HR P2	Mixture of habitats (although grassland predominant), comprising improved grassland, poor semi-improved grassland, dense scrub, and plantation broad-leaved woodland, with species-poor hedgerow, scattered scrub and scattered coniferous trees towards the north-west boundary.	• Bats (foraging and potential roosting) • Birds (breeding, Schedule 1 species potential) • Botany (bee orchids and pyramid orchids present)

[33] Excluding species where data is confidential.

Phase	Habitats summary	Ecological features present
	Log and brash piles, large soil/manure mound present, along with a bare ground access track.	• Invertebrates (suitable habitat) • SSSI (c.70 m southwest) • Other (brown hare present)
LR P3	Improved grassland.	• Bats (foraging) • Birds (breeding) • Botany (bee orchids recorded within adjacent woodland) • SSSI (c.330 m east)
LR P4	Improved grassland with bare ground access track.	• Bats (foraging) • Birds (breeding, wintering) • Botany (bee orchids recorded within adjacent woodland) • SSSI (c.260 m southeast)
LR P5	Improved grassland with bare ground access track.	• Bats (foraging and) • Birds (breeding, wintering) • Reptiles (grass snake adjacent to but not within phase boundary) • SSSI (c.400 m southeast)
HR P3	Mixture of habitats, comprising improved grassland, poor semi-improved grassland, and plantation broad-leaved woodland, with species-poor hedgerow, scattered scrub and scattered coniferous trees towards the north boundary.	• Bats (foraging) • Birds (breeding) • SSSI (adjacent southeast)
HR P4	Predominately improved grassland with plantation broad-leaved woodland at all boundaries, and a limited area of dense scrub at the west boundary, with a bare ground access track. South facing embankment within area of woodland at the south-east boundary.	• Bats (foraging) • Birds (breeding) • Reptiles (present) • SSSI (adjacent south)
HR P5	Predominately improved grassland with plantation broad-leaved woodland at the north, east and west boundary and a limited area of dense scrub at the north-west boundary, with a bare ground access track.	• Bats (foraging) • Reptiles (present) • SSSI (adjacent east)
HR P6	Predominately improved grassland with plantation broad-leaved woodland at the east and west boundary, with a bare ground access track.	• Birds (breeding) • Reptiles (present) • SSSI (adjacent to east/south, including strip of SSSI within the phase boundary)

8.4.6 Future Baseline

Given the longevity of the proposed extraction, it is likely that ecological interests would change over the lifetime of the Proposed Development. This could include changes to the status of features (presence/absence, or shift in abundance) or legislative updates affecting the protection offered to species.

It is anticipated that the Site would continue to be grazed, as per the current baseline, up to the point of extraction within each phase. As such, the dominant habitat within the Site, and features supported by it, will remain consistent within each phase.

Boundary habitats would continue to mature which may increase their value for some features and/or influence the future assemblages supported by them.

The future of beavers in the area is uncertain. Currently a breeding pair are present in a fenced enclosure within the adjacent reserve; however, given recent changes to legislation and an increasing captive population, it is possible further wild populations will be established in due course. This eventuality is not assessed herein, but the local status would continue to be monitored as part of ongoing reappraisal.

8.5 VALUATION OF IEFS AND SUMMARY OF POTENTIAL EFFECTS

8.5.1 Identification and valuation of IEFs

An evaluation of the importance of ecological and ornithological features is provided in **Table 8.12**, based on the criteria provided in section 8.3.6.1. Species evaluated as being of Local or higher importance are considered to be Important Ecological Features (IEF), while those of *less than local* importance and those considered absent or likely to be absent, are scoped out of further assessment.

Table 8.12: Identification and valuation of IEFs

Feature	Importance	Justification	Legal protection/s
Internationally designated sites	n/a (absent)	There are no internationally designated sites within the ZoI of the Proposed Development.	Conservation of Habitats and Species Regulations (2017) (as amended).
Sutton and Lound Gravel Pits SSSI	National	A nationally designated site located in close proximity to the Site and includes some land within the Site boundary. Effects on the SSSI will be assessed through consideration of the interest features and habitats that support such features: • Gadwall (non-breeding); • Assemblages of breeding birds - Lowland open waters and their margins; and • Variety of passage bird species.	Wildlife and Countryside Act 1981 (as amended)
Retford Cemetery LNR	Regional	The Site qualifies as regional importance through its designation as an LNR. Effects on the LNR will be assessed through consideration of its botanical features and fauna interests.	None
Sutton and Lound LWS	Local	The Site qualifies as of local importance through its designation as a LWS; however, due to the similarity in features and interests with the SSSI, the two are assessed together. Part of the LWS falls within the Site boundary.	None
Tiln Wood Track LWS	Local	The Site qualifies as local importance through its designation as an LWS. Effects on the LWS will be assessed through consideration of its botanical features.	None

Feature	Importance	Justification	Legal protection/s
Idle Valley Nature Centre Pond LWS	Local	The Site qualifies as local importance through its designation as an LWS. Effects on the LWS will be assessed through consideration of its botanical and invertebrate features.	None
Tiln North and the Conservation Lake LWS	Local	The Site qualifies as local importance through its designation as an LWS. Effects on the LWS will be assessed through consideration of its ornithological interests.	None
Chesterfield Canal LWS (Shireoaks to Welham)	Local	The Site qualifies as local importance through its designation as an LWS.	None
River Idle Chainbridge Lane Bridge LWS	Local	The Site qualifies as local importance through its designation as an LWS.	None
Bolham Wood LWS	Local	The Site qualifies as local importance through its designation as an LWS. Effects on the LWS will be assessed through consideration of its botanical features.	None
Folly Dyke, Chain Bridge Lane, NW of Hayton LWS	Local	The Site qualifies as local importance through its designation as an LWS.	None
NWT nature reserve	Local	A land area managed by NWT for the benefit of wildlife, both through habitat creation and management and engagement opportunities with the public. As such, the nature reserve is considered of local importance although assessment is likely to be consistent with that of other designed sites.	None
Habitats (general)	Less than local	Most habitats within the Site are considered of low value due to their nature and condition. The majority of habitats present are common and widespread and are therefore considered of less than local importance.	None
Habitat (Improved Grassland)	Less than local	Listed as a Notts HoCC as it is "a habitat of recognised county rarity/scarcity; one that has experienced significant county decline (as established by local data or adjudged by expert opinion); one for which Nottinghamshire holds a significant proportion of the national coverage; or one that is considered to be otherwise particularly vulnerable". However, given the condition of the grassland at the Site and the low species diversity, it is considered of less than local importance. On the UK BAP list, Improved Grassland is qualified as "Coastal and Floodplain Grazing Marsh", which is not present within the Site.	None

Feature	Importance	Justification	Legal protection/s
Habitat (Ditches)	Regional	Ditches are listed as a Notts HoCC under the same criteria as Improved Grassland. Small lengths are present within Site, with a greater area adjacent, particularly in the northeast. Given local conservation status and potential for adverse effects, ditches are considered of regional importance.	None
Habitat (woodland)	Less than Local	Cumulatively, the woodland at the Site boundaries totals approximately 17.2 ha (existing felled woodland), which is greater than the 0.25 ha threshold stated in section 8.3.6.1. However, the woodland is relatively young (~20 years old), with trees planted in dense, single-species blocks. The nature of the planting has created a habitat considered closer to plantation, rather than semi-natural woodland. As such, it is here assessed as less than local importance and some would be removed as part of the Proposed Development, but areas would be retained offers significant opportunities for enhancement. A small area <0.1 ha of semi-natural woodland is located in the far south-east of the Site. Given the small size and lack of connectivity to comparable habitats, this is also of less than local importance.	None
Badger	Local	Not a national or local conservation priority; however, badger is protected and is considered in the assessment to ensure legal compliance. All details of badger are treated as confidential and the assessment is presented in *TA 8.2: Confidential Badger Annex*.	Protection of Badgers Act 1992
Bats (foraging)	Regional	High levels of activity were recorded during transects and static detector surveys. Ten taxa were recorded, including eight to species level. Due to the high presence and regional conservation status' with four species recorded listed as Notts SoCC, foraging bats are considered as regionally important.	Wildlife and Countryside Act 1981 (as amended)
Bats (roosting)	Local	Given the current age of most woodland, potential roosting opportunities within the Site are limited and there was no evidence of swarming during the surveys; however, better habitats is present adjacent. There are no buildings within the Main Operational Site or Conveyor and Link road areas, and buildings within the Main Processing Site are unsuitable for roosting. The potential for bat roosts outside the Site are considered likely within adjoining woodland habitat included within the assessment.	Wildlife and Countryside Act 1981 (as amended) Conservation of Habitats and Species Regulations (2017) (as amended).

Feature	Importance	Justification	Legal protection/s
		Given the conservation status' of bats and the legal protection afforded, roosting bats are considered of local importance; however, this may increase in future if suitability within the Site changes over lifetime of project.	
Birds (breeding assemblage)	Local	The breeding bird assemblage was typical of the geographic location and habitats present. It included a moderate number of territories but was spatially restricted to the Site boundaries and surrounds. It included Red- and Amber-listed birds of conservation concern and Notts SoCC, although distribution was localised to boundary habitats populations were generally low. As such, the assemblage is considered of local importance.	Wildlife and Countryside Act 1981 (as amended)
Birds (wintering assemblage)	Regional	Numbers were generally low within the Site; however, surrounding land, including the Sutton and Lound Gravel Pit complex, supports the largest waterbird assemblage in the county (6,388 individuals)[34], and is considered one of the best birdwatching sites in the midlands[18]. As such, the wintering assemblage is considered of regional importance.	None
Bittern	Regional	A territorial male was recorded on a single occasion within the adjacent nature reserve. It is not known whether a female was present or if nesting was attempted either close to the Site, or in the wider gravel pits complex. Bittern is a Notts SoCC. Given the Notts SoCC listing, low population within Nottinghamshire and surrounding counties (likely influenced by habitat availability) and the protection afforded by listing as a Schedule 1 species, bittern is considered of regional importance.	Wildlife and Countryside Act 1981 (as amended)
Barn owl	n/a (absent)	Barn owl is listed as a Notts SoCC but was not recorded and is likely absent from the Site. However, a barn owl nest box is present meaning nesting is possible in the future, and therefore this species is included in the assessment to ensure legal compliance.	Wildlife and Countryside Act 1981 (as amended)
Cetti's Warbler	Regional	Recorded holding territory close to the Site. Cetti's warbler is listed as a Notts SoCC. The species has undergone rapid population expansion in the UK since the 1990's and now breeds regularly in suitable habitat, including in Nottinghamshire.	Wildlife and Countryside Act 1981 (as amended)

[34] WeBS five-year mean to 2019/20: Frost, T.M., Calbrade, N.A., Birtles, G.A., Hall, C., Robinson, A.E., Wotton, S.R., Balmer, D.E. and Austin, G.E. (2021) *Waterbirds in the UK 2019/20: The Wetland Bird Survey*. BTO/RSPB/JNCC. Thetford.
[Contains WeBS data from Waterbirds in the UK 2019/20 © copyright and database right 2021. WeBS is a partnership jointly funded by the BTO, RSPB and JNCC, in association with WWT, with fieldwork conducted by volunteers]

Feature	Importance	Justification	Legal protection/s
		The Sutton and Lound Gravel Pit Complex provides good habitat and Cetti's warbler is locally common; however, due to Notts SoCC and Schedule 1 listings, the species is considered of regional importance.	
Hazel Dormouse	n/a (absent)	There are no desk study records and the Site is outside of the current range, as re-introduced populations have yet to spread sufficiently far from release sites. As such, dormouse is considered absent from the Site and surrounds. The Outline Monitoring and Mitigation Plan would provide a framework to ensure any change in status is detected, and appropriate mitigation incorporated to safeguard against potential adverse effects ensure legal compliance. Restoration would increase long-term habitat availability.	Conservation of Habitats and Species Regulations (2017) (as amended)
Invertebrates	Less than local	The majority of the Site is of low suitability for invertebrates and the desk study returned few notable records. Restoration would ensure habitats are improved long-term.	None relevant to species likely to be found within the ZoI
Great crested newt	n/a (absent)	One recent desk study record was returned, of a GCN on the edge of Retford town, >2 km from the Site. A record, from 2007 included the comment "*60 newts introduced by a Consultant to ponds behind Nottinghamshire Wildlife Trust reserve off Chainbridge Lane*"; however, the NWT has no knowledge of this record and are not aware of presence on the reserve (pers. comm.). eDNA was carried out on 17 accessible waterbodies within 500 m of the Site that were considered suitable for GCN. All tests returned a negative result. As such, GCN is considered likely absent from the Site and surrounds. The Outline Monitoring and Mitigation Plan would provide a framework to ensure any change in status is detected, and appropriate mitigation incorporated to safeguard against potential adverse effects ensure legal compliance.	Conservation of Habitats and Species Regulations (2017) (as amended)
Amphibians (general)	Local	Although no surveys were completed to identify assemblage or abundance, suitable habitat does exist and common amphibian species are assumed to be present. Common toad and palmate newt are listed as Notts SoCC[11] and common toad is a species of principal importance. Some amphibian species' populations have been in decline[35]. As such, amphibians are considered of local importance.	None

[35] https://www.bto.org/our-science/projects/gbw/gardens-wildlife/garden-reptiles-amphibians/status-britain

Feature	Importance	Justification	Legal protection/s
Otter	Local	Otter is a Notts SoCC. No evidence or observations from the Site, during surveys of suitable habitat. No incidental records of otter were recorded during the extensive camera trap monitoring undertaken. Otter are known from wider wetland complex surrounding the Site and may transit through the Site on occasion, but use is expected to be very low.	Conservation of Habitats and Species Regulations (2017) (as amended)
Polecat	Less than local	A single incidental observation within the Site is presumed a polecat x ferret hybrid on features observed. A listed Notts SocC; however, presence within the ZoI assumed to be very low or absent.	Wildlife and Countryside Act 1981 (as amended)
Reptiles	Local	A small population of grass snake was recorded from suitable habitat within the Site. Grass snake is a listed Notts SocC.	Wildlife and Countryside Act 1981 (as amended)
Water vole	n/a (absent)	No evidence identified during targeted surveys and the most recent records returned by the Desk Study were from 2012. Anecdotally, the species may be locally extirpated. As such, water vole is considered likely absent from the Site and surrounds. The Outline Monitoring and Mitigation Plan would provide a framework to ensure any change in status is detected, and appropriate mitigation incorporated to safeguard against potential adverse effects ensure legal compliance. In the context of this assessment, water vole is considered less then local importance due to likely absence from the Site.	Wildlife and Countryside Act 1981 (as amended)

Species not listed in **Table 8.12** and not forming important parts of the listed bird communities are considered to be of negligible value, either due to their status as very common species or that their occurrence within the baseline survey areas was sufficiently infrequent that anything more than negligible effects are unlikely to occur. Such species are not considered further in the assessment.

8.5.2 Identification of potential impacts and effects

In the absence of mitigation, the Proposed Development has the potential to affect IEFs in a number of ways, as summarised in **Table 8.13**.

Table 8.13: Potential impacts and effects on IEF in the absence of mitigation

Impact	Nature, location, timing, and effect	IEFs considered
Habitat loss/change	The Proposed Development would result in the near-complete loss of habitats, albeit predominantly lower quality grassland, within each phase during the Site Establishment and Phased Extraction stages, with subsequent reinstatement during a Phased Restoration.	• Birds • Bats • Reptiles • SSSI • LWS • NWT Reserve

Impact	Nature, location, timing, and effect	IEFs considered
	This would include a temporary reduction of resources available due to the time between removal and restoration, with the interval dependant on the size of each phase and period needed for the restored habitat to achieve a favourable condition, itself dependant on the type of habitat targeted. There may be a permanent loss or reduction of some habitats, within each phase and/or overall, if the restoration favours alternatives to the baseline condition. The potential impacts of this would vary between different features, subject to their ecological requirements.	
Direct harm to IEFs	The nature of the extraction works involve habitat stripping and removal of materials from the Site using heavy plant. The process of such works has the potential to harm features, as lethal or sub-lethal effects through direct or indirect contact with individual creatures. Subject to the habitat being created restoration may involve machinery/tool use. Potential effect would be limited to land within the Site and is possible throughout the Site Establishment, Phased Extraction and Phased Restoration stages of the Proposed Development. This effect may constitute a legal offence, if not appropriately managed/mitigated.	• Birds (nesting) • Reptiles
Aural and/or visual disturbance	The Proposed Development would result in a change in potential aural and/or visual stimuli compared to the baseline condition, which may disturb features, resulting in increased energetic cost or risk of predation and/or displace features from favoured habitats, spaces, or routines, with resultant decreases in breeding productivity and/or survival. Effects may occur during all stages of the Proposed Development both within and beyond the Site boundary. Such effects may constitute a legal offence, if not appropriately managed/ mitigated.	• Birds (wintering) • Birds (breeding) • Bittern • SSSI features • NWT Reserve
Fragmentation of habitats	The removal of habitats within the Site has the potential to sever commuting routes, creating a barrier to dispersal for some features. This may isolate populations or reduce resources available for more wide-ranging features. Effects may occur during the Site Establishment and/or Phased Extraction stages and could affect features both within and beyond the Site boundary.	• Bats (foraging) • Reptiles
Hydrological changes	The nature of the extraction works has the potential to harm features indirectly through pollution of watercourses within the site. This could lead to a reduction in flora diversity within the watercourses and could also lead to fatalities of aquatic life, including amphibians and riparian mammals. Effects may occur during all stages of the Proposed Development both within and beyond the Site boundary. Such effects may constitute a legal offence, if not appropriately managed/ mitigated.	• All IEFs

Impact	Nature, location, timing, and effect	IEFs considered
Deposition of dust	The deposition of airborne particles may occur as a result of works activities associated with the Proposed Development, such as traffic movement or the physical extraction process. Direct adverse effects are most likely to enact on plants and habitat features, with subsequent indirect effects on the species that rely on these as a resource. Effects may occur during any/all stages and could affect features both within and beyond the Site boundary.	• All IEFs
Air Quality	Changes to air quality may result from gaseous emissions during works activities associated with the Proposed Development, such as traffic movement or the physical extraction process. Effects may occur during any/all stages and could affect features both within and beyond the Site boundary.	• All IEFs
Artificial Light	Should artificial lights sources be used at any stage of the Proposed Development they may result in adverse effects on features by disrupting natural behaviours, such as attracting or displacing individuals to/from an area which could influence survival or breeding success. Effects may occur during any/all stages, are most likely at night or in low light conditions and could affect features both within and beyond the Site boundary.	• Bats (foraging) • Birds (wintering) • Birds (breeding) • SSSI features
Vibration	Vibration as a result of physical works activities by heavy plant could have an adverse effect on features through disturbance/displacement, or direct damage to immobile features such as trees or habitats. Effects may occur during any/all stages and likely to be of a greater magnitude within the Site boundary and immediate surrounds, in close proximity to active works.	• All IEFs

8.6 EMBEDDED MITIGATION

In accordance with CIEEM guidance, a sequential process has been adopted to avoid, mitigate and compensate adverse effects (often referred to as the 'mitigation hierarchy') on IEFs.

Measures to avoid or reduce potential effects on IEFs have been incorporated into the design of the Proposed Development ('embedded mitigation'). This includes 'mitigation by design' whereby aspects of the Proposed Development have been re-designed to avoid or reduce effects. Embedded mitigation is taken into consideration when undertaking the assessment of significant effects. If significant effects are predicted further mitigation is detailed.

The adjacent SSSI and potential ecological constraints have been considered throughout the design process and development of embedded mitigation, and the following features have been incorporated to minimise potential adverse effects:

- An Outline Monitoring and Mitigation Plan has been drafted and is presented in TA 8.6. The longevity of the Proposed Development raises challenges and it is assumed that the status of some ecological features will shift over the timeframes involved, potentially including changes to presence or abundance within the ZoI, and/or legal protections afforded to features. The Outline Monitoring and Mitigation Plan intends to provide assurance that changes in the baseline condition would be identified and advises reactive mitigation under different scenarios. The plan is

currently prepared based on prevailing legislation, but would be reviewed periodically to ensure it remains relevant throughout the Proposed Development.

- An Outline Restoration Strategy, presented in TA 8.3, has been devised to balance a range of ecological, farming and landscape/visual interests. The restoration scheme is fundamental to the Proposed Development and would provide a mechanism for the Proposed Development to offset habitat losses and provide enhancements, in line with local conservation priorities and policy.
- An Outline Construction Environmental Management Plan (CEMP) has been produced (**Appendix 5.2, Volume 3**) and sets out expected construction methods and controls to minimise the potential for environmental effects during the construction phase. The Outline CEMP is in accordance with the mitigation and control measures set out in the application documents as well as normal construction good practice; however, as is regular practice, some precise details relating to the Proposed Development and/or associated works may not be known at this stage, so the Outline CEMP would be subject to review and revision after submission of the planning application. Any updates would be agreed with stakeholders, as required.
- The Proposed Development avoids some higher value boundary habitats in the northeast and east of the Site, which would be retained and enhanced where possible.
- Potential effects via hydrogeological changes and pollution through seepage, surface run off and/or other potential hydrological pathways would be addressed primarily through best practice mitigation with specific measures where necessary. These are detailed in Chapter 10: Hydrology, Hydrogeology and Flood Risk (**Volume 1**) and **TA 9.3: Drainage Management Plan** (**Volume 3**).
- A Dust Management Plan (DMP) has been produced to support the Environmental Permit application to reduce or avoid the potential effects of dust emissions on environmental and ecological receptors. The DMP, as well as other mitigation to reduce potential effects on air quality from airborne pollutants is detailed in **Chapter 13: Air Quality** (**Volume 1**) and associated appendices (**Volume 3**).

8.7 ASSESSMENT OF POTENTIAL EFFECTS

The assessment in **Table 8.14** considers each IEF in turn (**Table 8.12**) for all potential effects identified previously (**Table 8.13**). Mitigation required to reduce effects on IEFs and residual effects are also considered within **Table 8.14**.

The Site is separated into three distinct areas:

- Area A: Main Operational Site (where PFA extraction is to take place);
- Area B: Conveyor and Link road; and
- Area C: Main Processing Site.

Area A is the largest area (105.84 ha) and is of most value to ecology, and likely to be subject to the greatest magnitude of effects due to the nature of the works taking place within the area. As such, Area A is given priority consideration within the assessment, but effects in Areas B and C are considered separately, where these differ.

Table 8.14: Assessment of Potential Effects

IEF & Importance	Effect	Assessment	Mitigation, Compensation and/or Enhancement
Sutton and Lound Gravel Pits SSSI[36] National importance Including, Sutton and Lound LWS	Habitat loss/change	Main Operational Site A small part of the SSSI falls within the Site boundary and therefore the Proposed Development would result in the direct loss of habitat within the SSSI. This is necessary to facilitate the restoration of the Site, by creating a more naturalistic landform and materials to in-fill excavations. The area totals approximately 1.47 ha in size (<0.5 % of the SSSI land area), and is primarily plantation broadleaved woodland. The area of habitat is a continuation of that elsewhere around the Site boundary and different to that within the adjacent parcel of the SSSI. Features of the SSSI are entirely or primarily associated with wetland habitats and therefore the low value habitats to be removed do not directly support these features, therefore, there would be no adverse effects on SSSI features from direct habitat loss. Wintering gadwall and other waterbirds were recorded using habitats within the Site and therefore would be displaced; however, the resources offered are inconsistent and therefore use is opportunistic. Flooded fields in the northeast of the Site (phases LR P3-P5) were used for foraging during one survey visit, with presence outside this period limited to use by gull species and naturalised geese, all occurring in highly variable numbers (TA 8.3). Given availability of the resource was limited to a <3-week period over in one of the two winters surveyed, it cannot be fundamental to supporting the SSSI habitats and associated waterbird features. As such, loss of the flooded land as a result of the Proposed Development would be temporary, low magnitude, and not a significant adverse effect. The restoration includes creation of wetland habitats, with lakes and wet grassland providing larger and more consistent habitat than the baseline; and therefore habitat loss and subsequent change would result in a long-term positive effect. Conveyor and Link Road, Main Processing Site There would be no direct loss of habitats from within the SSSI boundary. Both areas lie adjacent to the SSSI boundary; however, the closest habitats are woodland and, as such, are less critical to supporting the features of the designated site. No adverse effects on the SSSI are predicted from Habitat loss or change in these areas.	Natural England Consent would be required for works within the SSSI boundary. Mitigation would be required to safeguard ecology features within the area of habitat to be removed. Measures are discussed where relevant under the respective features. The Outline Restoration Strategy would compensate for the direct loss of habitat within the SSSI boundary.
	Aural and/or visual disturbance	Main Operational Site The area would be a source of potential aural and/or visual disturbance to features of the SSSI at all stages of the Proposed Development. Features of the SSSI in relation to the Site are shown in Figure 8.3.	The Outline Restoration Strategy would compensate for any potential disturbance to features of the SSSI,

[36] Potential adverse effects on the SSSI as a designated site are assessed through consideration of the interest features, and the habitats that support their populations.

IEF & Importance	Effect	Assessment	Mitigation, Compensation and/or Enhancement
		Gadwall has non-breeding season disturbance buffer recommendation of 100-200 m as per prevailing guidance[37], which is based on observations by Wallis, *et al.* (2019)[38]. This study quantified numbers of wildfowl species at Abberton Reservoir during a period of major infrastructure works and found numbers increased despite the disturbance, with potential effects offset by habitat changes. The large size of the reservoir may have mitigated effects by providing alternative foraging areas, which is comparable with the Sutton and Lound Gravel pit complex, with >3 km^2 of wetland habitat for dispersal. The closest off-Site wetland routinely used by waterbirds in any numbers (Lake 6, TA 8.3) is located approximately 270 m from the Site boundary and 300 m from the closest phase (LR P4), and therefore exceeds the recommended avoidance distance by an additional 50–100 %. The woodland buffer along the Site boundary would be retained and offer natural screening to potential visual stimuli and help to reduce noise. Based on all best available information, the 20 m width of this is sufficient to provide this effect in all seasons. The recommended distance buffer here also applies to shoveler, wigeon and teal, and is comparable to other non-breeding dabbling duck species[37]. Other features, such as the breeding and migratory bird assemblages, are present in land surrounding the Site. Due to the common and widespread nature of the species involved, including waterbirds, such as great crested grebe and mallard and passerines, such as reed warbler, there is limited information on disturbance distances. Prevailing guidance recommends a buffer of 50–100 m for breeding mallard; however, the species is ubiquitous across wetland habitats throughout the UK and can often be found in highly-disturbed environments, so it is evident that birds can habituate to disturbance stimuli. Species such as mute swan are likely to be similarly adaptable and the retained woodland strip between the Site and nearby waterbodies (Lake/s 7, TA 8.3) would help to reduce potential disturbance stimuli. Some breeding wetland passerine species are located close to the Site; within 10 m, in the case of a reed warbler territory to the south of the Site boundary, but typically further due to distribution of suitable habitat. Disturbance may reduce territory density, as has been found in proximity to roads[39], however, the cause of this is not fully understood and may not be due to noise, but direct mortality[40]. There is little direct research on the relevant species but Shen, *et al.* (2020) found	through provision of large areas of improved habitat long-term. Ecological Clerk of Work (ECoW) provision where necessary throughout the Proposed Development.

[37] Goodship, N.M. and Furness, R.W. (MacArthur Green) (2022) *Disturbance Distances Review: An updated literature review of disturbance distances of selected bird species.* NatureScot Research Report 1283
[38] Wallis, K., Hill, D., Wade, M., Cooper, M., Frost, D. and Thompson, S. (2019) The effect of construction activity on internationally important waterfowl species. *Biological Conservation 232: 208–216*
[39] Reijnen, R., and Foppen, R. (1997) Disturbance by traffic of breeding birds: evaluation of the effect and considerations in planning and managing road corridors. *Biodiversity and Conservation* 6, 567-581
[40] Summers, P. D., Cunnington, G. M., & Fahrig, L. (2011) Are the negative effects of roads on breeding birds caused by traffic noise? *Journal of Applied Ecology* 48, issue 6

IEF & Importance	Effect	Assessment	Mitigation, Compensation and/or Enhancement
		breeding oriental reed warbler likely habituated to human disturbance[41]. The SSSI runs along the southern boundary of the Site and within 100 m includes approximately five reed warbler territories, one sedge warbler, one great created grebe, one mute swan and one mallard. Overall, given the low populations within this area in the context of the SSSI, the adaptable nature of the species involved, and the nature of effects (temporary, limited in duration as only likely during works close to the adjacent Site boundary, and screened by retained trees) potential adverse effects on the bird assemblages within the SSSI are considered not significant. Outside the SSSI boundary some of these species nest within and around other parts of the Site, and these may be part of the wider SSSI metapopulation. Potential effects on these individuals may be greater, if closer to the works or without natural screening; however, such effects would be localised, temporary and reversible, as the Outline Restoration Strategy includes wetland habitats that would support greater populations for a much longer period than any potential disturbance on territories (individually, and collectively), and result in a long-term positive effect. <u>Conveyor and Link Road, Main Processing Site</u> The habitats adjacent to these areas are not critical in supporting features of the SSSI. The woodland present would act as a screen reducing any potential effect on features associated with wetland habitats in the wider area and, as such, no adverse effects are predicted on the SSSI as a result of potential disturbance in this area.	
	Hydrological change	Potential hydrological change is addressed in Chapter 10: Hydrology, Hydrogeology and Flood Risk, including consideration of the SSSI as a receptor. With the mitigation and best practice measures proposed therein and the outline CEMP, no adverse effects on the SSSI or features are predicted. To ensure the mitigation measures remain adequate and proportionate to safeguard features under differing future baseline scenarios, the Outline Monitoring and Mitigation Plan would provide a framework for update surveys and would provide a basis for review of mitigation measures.	No additional mitigation is proposed.
	Dust, Pollution, & AQ	A Dust Impact Assessment (DIA) has informed a Dust Management Plan (DMT) for minimising, controlling and monitoring dust emissions as a result of the Proposed Development. The DIA and DMT are presented as part of Chapter 14: Air Quality, which also assesses potential wider effects of airborne pollutants on ecological receptors. Best Available Techniques (BAT) would be implemented to reduce run-off of any potentially contaminated surface water directly or indirectly into any watercourse or downstream receptor. Pollution through hydrological pathways is considered in Chapter 10: Hydrology, Hydrogeology and	No additional mitigation is proposed.

[41] Shen, *et al.* (2020) Warblers perform less nest defence behaviour and alarm calls to human intruders: A result of habituation. *Global Ecology and Conservation* 23

IEF & Importance	Effect	Assessment	Mitigation, Compensation and/or Enhancement
		Flood Risk and Chapter 11: Ground Conditions and Contamination. This includes measures to implement for the correct and appropriate storage of fuels and chemicals on Site and appropriate buffers from watercourses to avoid pollution and run-off to adhere to best practice guidelines. Mitigation and best practice measures proposed within the outline CEMP to manage dust/ air pollution would ensure no adverse effects on the SSSI or features are predicted.	
All LWS Local importance	Dust, Pollution, & AQ	The remaining LWS have been considered jointly within this assessment. There would not be habitat loss or change to any of the LWS and the main effect to the LWS is considered to be dust, pollution, and AQ. Potential effects are considered in Chapter 10: Hydrology, Hydrogeology and Flood Risk, Chapter 11: Ground Conditions and Contamination, and Chapter 14: Air Quality. Mitigation and best practice measures proposed within the respective chapters and the outline CEMP to manage dust/ air pollution would ensure no adverse effects on LWS.	No additional mitigation is proposed.
NWT nature reserve Local importance	Aural and/or visual disturbance	<u>All Areas (Main Operational Site, Conveyor and Link Road, and Main Processing Site)</u> The adjacent NWT nature reserve supports a range of ecological features across a mosaic of habitats, and is undergoing active management to further benefit biodiversity. This includes improvement of habitats adjacent to the southern boundary of the Site. Many features of the nature reserve are considered important features in their own right and are considered elsewhere in this assessment.	No additional mitigation to that proposed for the SSSI and/or individual features below.
	Hydrological change	Potential hydrological change is addressed in Chapter 10: Hydrology, Hydrogeology and Flood Risk and measures to safeguard the SSSI are considered sufficient for the nature reserve, which includes some of the same land area. As such, no adverse effects are predicted.	No additional mitigation is proposed.
	Dust, Pollution, & AQ	Potential effects are considered in Chapter 10: Hydrology, Hydrogeology and Flood Risk, Chapter 11: Ground Conditions and Contamination, and Chapter 14: Air Quality. Mitigation and best practice measures proposed within the respective chapters and the outline CEMP to manage dust/ air pollution would ensure no adverse effects on the NWT nature reserve are predicted.	No additional mitigation is proposed.
Habitat (Ditch) Local importance	Hydrological change	<u>Main Operational Site and Main Processing Site</u> Small lengths of ditch are present within the Site, with further lengths in close proximity, and could be subject to adverse effects at all stages of the Proposed Development.	No additional mitigation is proposed. Ditches created to aid long-term drainage from the Site would be profiled, vegetated and managed

IEF & Importance	Effect	Assessment	Mitigation, Compensation and/or Enhancement
		Potential hydrological change is addressed in Chapter 10: Hydrology, Hydrogeology and Flood Risk. With the mitigation and best practice measures proposed therein and the outline CEMP, no adverse effects on ditches within or adjacent to the Site are predicted. To ensure the mitigation measures remain adequate and proportionate to safeguard features under differing future baseline scenarios, the Outline Monitoring and Mitigation Plan would provide a framework for update surveys and a basis for review of mitigation measures. The Outline Restoration Strategy includes provision for creation of ditches through the Site and therefore the Proposed Development would provide a long-term increase in this habitat type. There are no ditches close to the Conveyor and Link Road Area and this section is not considered.	to offer benefits to biodiversity.
	Dust, Pollution, & AQ	Potential effects are considered in Chapter 10: Hydrology, Hydrogeology and Flood Risk, Chapter 11: Ground Conditions and Contamination, and Chapter 14: Air Quality. Mitigation and best practice measures proposed within the respective chapters and the outline CEMP to manage dust/ air pollution would ensure no adverse effects on ditches.	No additional mitigation is proposed.
Badger Legal implications	All effects	All details related to badger are presented in TA 8.2: Confidential Badger Annex.	
Bats (foraging) Regional importance	Habitat loss/change	<u>Main Operational Site</u> Suitable bat foraging and commuting habitat is present within the Site boundary and adjoining habitat. Higher quality foraging and commuting habitat, woodland, is largely restricted to the Site boundaries, with some plantation woodland linkages across the Site. Much of the Site is heavily grazed pasture, which represents relatively low-quality foraging habitat for bats. Clearance of vegetation to facilitate the Proposed Development would result in the loss of scrub, low quality plantation woodland and improved grassland habitat, with areas of woodland habitat retained on the Site boundaries. The consistently low sward height limits the value of the habitat for foraging bats, due to the lack of suitable nectaring resources for invertebrates, which bats would prey on. Whilst bat activity levels varied across the Site, the boundary habitats are of greater value to foraging bats, supported by the activity data, with the majority of activity recorded on the edges of grassland fields and woodland. Furthermore, bat activity levels indicate that the Site is not suitable for swarming and therefore the loss of foraging habitat would not have an adverse impact on bats in this way. The phased nature of the Proposed Development, with subsequent restoration, would limit the magnitude of effects by localising the loss of foraging habitat to smaller areas of the Site at any	Ongoing surveying and monitoring to ensure current data are available to inform mitigation needs. The Outline Monitoring and Mitigation Plan would provide a framework on the continued survey requirements and potential mitigation to safeguard bats. The Outline Restoration Strategy would provide a net gain in foraging and commuting habitat,

IEF & Importance	Effect	Assessment	Mitigation, Compensation and/or Enhancement
		one time, allowing bats to forage across other areas of the Site, therefore the temporary loss of these habitats would not be significant. The Outline Monitoring and Mitigation Plan would provide a framework on the continued survey requirements and potential mitigation to safeguard bats. The Outline Restoration Strategy includes habitats beneficial to bats, including increased woodland planting and creation of species-rich grassland, ensuring improved long-term foraging opportunities within the Site. <u>Conveyor and Link Road</u> Some sections (<10) of the hedgerows would be removed along the Conveyor and Link Road to facilitate the construction of the new road. This road would be operational for the lifespan of the Proposed Development. These features offer low bat foraging habitat, as they are heavily managed and defunct. Higher quality foraging habitat such as the woodland to the east, would be retained and would provide opportunities for foraging, reducing the magnitude of effects. Due to small scale clearance that is required to build the road, the loss of this habitat would not be significant to foraging and/ or commuting bats. <u>Main Processing Site</u> No habitat would be lost.	ensuring improved long-term opportunities on the Site.
	Habitat fragmentation	<u>Main Operational Site</u> Bat activity was concentrated along the boundaries of the grassland fields and woodland, although activity levels did vary across the Site, and the scrub & plantation woodland habitat in the centre of the Site does provide a commuting route. This habitat would be lost to facilitate the Proposed Development, but due to the phased nature of the works, this would be spatially limited within the Site, and would only impact a small number of commuting paths at any given time, with the vast majority of community habitat retained and restored across the lifespan of the Proposed Development, therefore the temporary loss of habitats (until restored habitats become of value) would not be significant. The Outline Monitoring and Mitigation Plan would provide a framework on the continued survey requirements and potential mitigation to safeguard bats. The Outline Restoration Strategy includes habitats beneficial to bats, including increased woodland planting and creation of hedgerows, ensuring improved long-term commuting opportunities within the Site. <u>Conveyor and Link Road</u> See above assessment for 'Habitat loss/change' which is applicable to this effect. <u>Main Processing Site</u> No habitat would be lost.	

IEF & Importance	Effect	Assessment	Mitigation, Compensation and/or Enhancement
	Dust, Pollution, & AQ	Potential effects are considered in Chapter 10: Hydrology, Hydrogeology and Flood Risk, Chapter 11: Ground Conditions and Contamination, and Chapter 14: Air Quality. Mitigation and best practice measures proposed within the respective chapters and the outline CEMP to manage dust/ air pollution would ensure no adverse effects on bats.	No additional mitigation is proposed.
	Artificial light	<u>Main Operational Site and Conveyor and Link Road</u> Artificial lighting during the construction of the Proposed Development has the potential to negatively impact and disturb foraging and commuting bats by disrupting behaviours such as displacing individuals from an area, which could influence survival or breeding success. The Proposed Development would largely operate during daytime working hours when there would be no impact to bats within the Site during these operating hours. Natural light levels would fluctuate seasonally and there is the possibility that some works would operate at night during winter which may require artificial lighting. The phased nature of the Proposed Development, with subsequent restoration, would limit the magnitude of effects and artificial light would be spatially limited within the Site at any given time. However, for Phases in the extraction area, where artificial lighting may be required, it would be necessary to avoid retained foraging and commuting habitat, ensuring light spill does not fall onto these habitats and a sufficient dark corridor is maintained. A Lighting Plan would be produced, in consultation with a competent lighting professional and implemented to reduce impacts. This plan would include, but not be limited to, dark buffers, illuminance limits, appropriate luminaries and/or screening. This Plan would be created in line with current best practice guidelines[42] [43]. It is likely that vehicles may need to access the road during low light levels or during the night, however, the majority of vehicle movements would be undertaken during the daytime hours. Considerations for lighting and ensuring a dark corridor is maintained along the woodland edge would be undertaken within the Lighting Plan. It is therefore considered that the use of artificial lighting would be temporary across different areas of the Site and influenced by seasonal changes, therefore any disturbance would not be significant. It would be necessary to undertake updated surveys prior to each phase commencing to make informed decisions on mitigation decisions. The Outline Monitoring and Mitigation Plan would provide a framework for the continued survey requirements and potential mitigation to safeguard bats.	Ongoing surveying and monitoring to ensure current data are available to inform mitigation needs. A Lighting Plan would be produced detailing proposed mitigation, to be implemented before night-time working. The Plan would be revised as required as details of mitigation become known, and would be agreed with consultees as required. The Lighting Plan would feed into the Outline Monitoring and Mitigation Plan. It would also be reference within the Outline CEMP.

[42] Bat Conservation Trust and Institute of Lighting Professionals (2018) *Guidance Note 08/18: Bats and artificial Lighting in the UK.* ILP, Rugby.
[43] Voigt, C.C *et al.* (2018) Guidelines for consideration of bats in lighting projects. EUROBATS Publication Series No. 8. UNEP/EUROBATS Secretariat, Bonn, Germany, 62 pp.

IEF & Importance	Effect	Assessment	Mitigation, Compensation and/or Enhancement
		Main Processing Site The area would operate 24 hours, limited to certain enclosed activities outside of the main operating hours, and would have security lighting for health and safety purposes. However, this is located in an existing industrialised area and it is likely that bats in the local area are habituated to existing light sources from other sites. The Lighting Plan would consider lighting from the Main Processing Site and ensure appropriate mitigation is implemented to minimise any effects on bats. The Lighting Plan would be informed by pre-commencement surveys to ensure best available information is collected on which to base mitigation decisions.	
Bats (roosting) Local importance Legal implications	Habitat loss/ change	Main Operational Site The Proposed Development would result in the loss of 7 trees (two Moderate, 5 Low) identified with roosting potential. To date, no emergence / re-entry surveys have been undertaken to determine if these trees are confirmed bat roosts. Only a small number of trees have been identified with potential on Site, with the majority of trees recorded with negligible bat roosting potential. Roosting features in trees are dynamic and transient and the presence of roosting features or use by bats would change during the duration of Proposed Development. The Site was also assessed as unsuitable for swarming bats due to the lack of suitable roosting opportunities, there are no suitable caves, barns or underground areas known to be present within the surrounding area. The loss of the seven trees identified with potential would be subject to additional surveying to ensure best available information is collected on which to base mitigation decisions. This would include, but not be limited to, presence/ absence and/or roost characterisation surveys. It would be necessary to undertake updated surveys at least 18 months in advance prior to each phase commencing to make informed decisions on licensing requirements and mitigation decisions. The Outline Monitoring and Mitigation Plan would provide a framework for the continued survey requirements and potential mitigation to safeguard bats. Due to the phased nature of the Proposed Development, it would be necessary to undertake updated ground-based tree assessments 18 months prior to each phase to identify if any additional trees have developed features that would be suitable for roosting bats. If further trees are identified, where possible, the Proposed Development should avoid these, however, this may not always be possible. If impacts to trees with roosting potential cannot be avoided then further surveys, as outlined above must be undertaken to determine presence of bats and any subsequent mitigation requirements. Conveyor and Link Road	Ongoing surveying and monitoring to ensure current data are available to inform mitigation needs. The Outline Monitoring and Mitigation Plan would provide a framework on the continued survey requirements and potential mitigation to safeguard bats.

IEF & Importance	Effect	Assessment	Mitigation, Compensation and/or Enhancement
		The construction of the road would result in the loss of arable land and small sections of hedgerow to facilitate the construction of the road. See above assessment criteria for 'Bats (roosting) habitat loss, which is applicable for the loss of these bat roost potential trees. Main Processing Site No habitat loss would be lost.	
	Direct harm	All Areas (Main Operational Site, Conveyor and Link Road, and Main Processing Site) Trees, with potential roosting features, have the potential to be used by roosting bats, which are subject to legal protection under the Conservation of Habitats and Species Regulations (2017) (as amended) and the Wildlife and Countryside Act (1981) (as amended). In the absence of mitigation, removal of trees with a bat roost, has the potential to have a significant adverse effect, and would constitute a legal offence. Therefore, a sequential series of avoidance, survey, licensing and mitigation are required to reduce this risk. The compensation of any confirmed bat roosts would be secured via licensing, prior to the removal of the roost. Mitigation and compensation would likely include bat boxes however this would depend on the species and roost type identified.	To be confirmed upon completion of further survey.
	Artificial Lighting	Further surveys would be required to inform detailed planning and inform mitigation measures within the Lighting Plan (outlined in Foraging Bats above) to minimise effects to confirmed bat roosts, where required. The Outline Monitoring and Mitigation Plan would provide a framework on the continued survey requirements and potential mitigation to safeguard bats.	To be confirmed upon completion of further survey.
	Noise	Further surveys would be required to inform detailed planning and mitigation measures in relation to noise to minimise effects to confirmed bat roosts, where required. The Outline Monitoring and Mitigation Plan would provide a framework on the continued survey requirements and potential mitigation to safeguard bats.	To be confirmed upon completion of further survey.
Birds (breeding assemblage) Local importance Legal implications	Habitat loss/change	All Areas (Main Operational Site, Conveyor and Link Road, and Main Processing Site) The Proposed Development would result in the direct loss of nesting and foraging habitat. Much of the land within the Site is currently sheep-grazed pasture. The consistently low sward height limits the value of the area and it is unsuitable for nesting birds. Some species do forage within the area but these are typically limited to flocks of naturalised geese, which are not considered an important component of the breeding assemblage and may actively damage the Site and wider area, and opportunistic use by other species, such as post-breeding starling flocks. Boundary habitats are of greater value but make up a small proportion of the overall site.	The Outline Restoration Strategy would provide a net gain in nesting, foraging and commuting habitat, ensuring improved long-term opportunities within the Site. This strategy offers a mechanism for regular

IEF & Importance	Effect	Assessment	Mitigation, Compensation and/or Enhancement
		The sequential nature of the works, with subsequent restoration, would limit the magnitude of effects by localising loss of more valuable habitats to a small part of the Site at any one time. Restored habitats would take time to establish which would influence the breeding assemblage within the Site, with different species colonising the area as suitability changes over time. The assemblage in the early stages would be different to the baseline but would still have value by providing resources for alternative species of conservation concern typical of more open, early-successional grassland and woodland habitats. The assemblage would naturally change over time as habitats mature, as would be expected in a more natural ecosystem. As such, although change is expected as a result in habitat loss, potential effects would be short in duration and population reduction in some species would be offset for through increases in others. The Outline Restoration Strategy would provide a strategy for improving habitats across the Site, offering greater areas of more valuable habitats than the current baseline condition, providing a long-term positive effect.	review, to ensure plans remain appropriate. The Outline Monitoring and Mitigation Plan provides a safeguard to identify any changes to baseline condition, and adapt mitigation as required.
	Direct harm	<u>All Areas (Main Operational Site, Conveyor and Link Road, and Main Processing Site)</u> Vegetation, including, but not limited to, trees, scrub, ruderal vegetation, and tall grassland, has the potential to be used by nesting birds, which are subject to legal protection under the Wildlife and Countryside Act 1981 (as amended). Such habitats are primarily found at the boundaries of the Site, around the slopes bounding the higher land, and the two vegetated field boundaries. In the absence of mitigation, removal of such features at a time when birds may be nesting has the potential to have a significant adverse effect, which may constitute a legal offence. Therefore, a sequential series of avoidance, survey/nest searches, and reactive mitigation measures are required to reduce this risk. Would The Outline Restoration Strategy includes a variety of habitats beneficial to nesting birds, ensuring long-term benefits within the Site. The increased diversity of habitats created compared to the baseline would provide opportunities for a greater range of species and complement nearby habitats.	The Outline Monitoring and Mitigation Plan would provide a safeguard to identify any changes to baseline condition, and adapt mitigation as required. Avoidance, nest searches, and reactive mitigation measures as required. Ecological Clerk of Work (EcoW) provision where necessary throughout the Development.
	Aural and/or visual disturbance	<u>All Areas (Main Operational Site, Conveyor and Link Road, and Main Processing Site)</u> Disturbance during all stages of the Proposed Development has the potential to affect bird breeding, by reducing useable habitat (through displacement) or distracting from other breeding activities. Due to the habitat quality and distribution within the Site, the breeding assemblage is comparatively small for the land area. Potential effects from disturbance are likely to be spatially	The Outline Monitoring and Mitigation Plan would provide a safeguard to identify any changes to baseline condition in relation to Schedule 1-listed species.

IEF & Importance	Effect	Assessment	Mitigation, Compensation and/or Enhancement
		and temporally limited to the boundaries of the Site, where they would either be temporary or low magnitude. Should any Schedule 1-listed species be recorded during the updated survey and show evidence of breeding or holding territory, further surveys, avoidance, and/or mitigation may be required. The nature of the measures would be subject to situation- and species-specific guidance and may need to be agreed with consultees.	
	Hydrological change	Potential hydrological change is addressed in Chapter 10: Hydrology, Hydrogeology and Flood Risk and measures to safeguard the SSSI are considered sufficient for other wetlands surrounding the Site. As such, no adverse effects are predicted.	No additional mitigation is proposed.
	Dust, Pollution, & AQ	Potential effects are considered in Chapter 10: Hydrology, Hydrogeology and Flood Risk, Chapter 11: Ground Conditions and Contamination, and Chapter 14: Air Quality. Mitigation and best practice measures proposed within the respective chapters and the outline CEMP to manage dust/ air pollution would ensure no adverse effects on the breeding bird assemblage.	No additional mitigation is proposed.
	Artificial light	<u>All Areas (Main Operational Site, Conveyor and Link Road, and Main Processing Site)</u> Artificial light has the potential to affect breeding birds, for example, by disrupting natural cycles such as sleep[44] and nesting[45]. Details of the lighting at the Proposed Development are not yet fully known, therefore it is assumed that it could have an adverse effect on birds within or near the Site. As such, mitigation would be required, in the form of a detailed lighting strategy, or comparable document that includes measures to avoid or reduce such potential effects. With sensitive design of lighting, following prevailing best practice guidance, potential adverse effects on breeding birds from artificial lighting would be reduced to a level that is not significant.	A detailed Lighting Strategy, or comparable document, would be produced detailing measures to avoid or minimise adverse effects on birds, and other ecological features.
Birds (wintering) Regional importance	Habitat loss/change	<u>Main Operational Site</u> As considered for the SSSI, potential loss of wetland within the Site is negligible. Phases LR P3-P5 have some seasonal flooding; however, during the baseline survey period this was limited to <3-week period in one of the two winters surveyed meaning this cannot be used more than opportunistically and likely only available at a time when other areas in the wider landscape are also flooded. As such, direct loss of wetland habitat within the Site would not be significant. The Outline Restoration Strategy would provide an increase in wetland habitats available, including	The Outline Restoration Strategy would provide a net gain in foraging and commuting habitat, ensuring improved long-term opportunities on the Site.

[44] Sun, J., Raap, T., Pinxten, R., & Eens, M. (2017) Artificial light at night affects sleep behaviour differently in two closely related songbird species. *Environ Pollut, 231 (Pt 1)*.
[45] Wang, J-S., Tuanmu, M-N., & Hung, C-M. (2021) Effects of artificial light at night on the nest-site selection, reproductive success and behavior of a synanthropic bird. *Environ Pollut, 288*

IEF & Importance	Effect	Assessment	Mitigation, Compensation and/or Enhancement
		lakes, reedbeds, and seasonally flooded wet grassland, which would offer a significant positive effect in the long-term. The Site supports a wintering assemblage of passerine species typical of the habitats present and geographic area. Some species, such as finches and winter thrushes, use the Site for foraging; however, distribution and numbers were highly variable across visits. The Site does not offer resources that are not widely available elsewhere in the local landscape and, due to the phased nature of the Proposed Development, loss of habitat would be gradual and localised. As such, adverse effects on the assemblage would not be significant, and the proposed restoration would offer a significant long term net gain. Conveyor and Link Road, Main Processing Site Habitat loss would be negligible, and no adverse effects are predicted.	
	Aural and/or visual disturbance	Main Operational Site Wintering birds with the greatest importance are those associated with the SSSI designation, such as gadwall and migratory wildfowl, which have been assessed previously. This is considered applicable to most waterbirds, which had a similar pattern of distribution and have comparable responses to disturbance. The lake to the west of the Site (Lake 2, TA 8.3) supports moderate numbers of birds, including diving species more typical of deeper water. For much of the Extraction Phase the bund on the western boundary would be retained, offering screening against potential disturbance stimuli. The bund would be removed at which time potential disturbance is likely to be greater if completed during the winter months, but this would be short-term. During the spatially and temporally restricted time when this would occur, birds may be displaced from the lake but due to the large number of comparable habitats in the local landscape, this would not be a significant effect. Birds currently move between different lakes (as demonstrated by fluctuating numbers between surveys and counts) which is likely down to a range of environmental and ecological factors, and therefore nearby lakes would be expected to accommodate the relatively low numbers (in the context of the SSSI population) from Lake 2, or any other nearby waterbody with smaller numbers. As such, potential adverse effects from disturbance would not be significant. Conveyor and Link Road, Main Processing Site The areas are not important for wintering birds and therefore potential effects are negligible and not significant.	No additional mitigation is proposed.
	Hydrological change	Potential hydrological change is addressed in Chapter 10: Hydrology, Hydrogeology and Flood Risk and measures to safeguard the SSSI are considered sufficient for other wetlands surrounding the Site. As such, no adverse effects are predicted.	No additional mitigation is proposed.

IEF & Importance	Effect	Assessment	Mitigation, Compensation and/or Enhancement
	Dust, Pollution, & AQ	Potential effects are considered in Chapter 10: Hydrology, Hydrogeology and Flood Risk, Chapter 11: Ground Conditions and Contamination, and Chapter 14: Air Quality. Mitigation and best practice measures proposed within the respective chapters and the outline CEMP to manage dust/ air pollution would ensure no adverse effects on the winter bird assemblage.	No additional mitigation is proposed.
	Artificial light	<u>All Areas (Main Operational Site, Conveyor and Link Road, and Main Processing Site)</u> Artificial light can influence bird behaviour during migration and non-breeding periods in similar ways to the breeding season as well as others, such as acting as an attractant if the light is sufficiently bright[46]. As with the breeding season, a detailed lighting strategy, or comparable document, would be produced that includes measures to avoid or reduce such potential effects. With sensitive design of lighting, following prevailing best practice guidance, potential adverse effects on breeding birds from artificial lighting would be reduced to a level that is not significant.	A detailed Lighting Strategy, or comparable document, would be produced detailing measures to avoid or minimise adverse effects on birds, and other ecological features.
Bittern Regional importance Legal implications	Habitat loss/change	<u>Main Operational Site</u> The Site lacks suitable wetland and reedbed habitats for bittern and therefore there would be no direct effects from habitat loss or change. Reedbed, including wet reedbed and reed-fringed lakes, is proposed as part of the Outline Restoration Strategy. This would increase available habitat for bittern at all times, especially if inclusive of features beneficial to bittern. 8.5 ha of reedbed is, in isolation, less than the 0.2 km^2 (20 ha) recommended as sufficient to support breeding bittern[47]; however, bittern can nest in areas of 3 ha in size[48] and it is a larger area of habitat than that which held a territorial male in 2021 (approximately 7 ha, estimated from aerial imagery). The habitat would augment comparable habitats in the wider area and aid connectivity between them. Overall, effects of habitat loss/change on bittern are significant long-term positive. <u>Conveyor and Link Road, Main Processing Site</u>	No mitigation or compensation is necessary. Reedbed habitat, as required by the Outline Restoration Strategy (TA 8.5) should include features beneficial to bittern, such as deeper channels or pools within the reeds for foraging.

[46] Adams, C.A., Fernández-Juricic, E., Bayne, E.M. et *al.* (2021) Effects of artificial light on bird movement and distribution: a systematic map. *Environ Evid 10, 37*
[47] RSPB Advice online, Available at: https://www.rspb.org.uk/our-work/conservation/conservation-and-sustainability/advice/conservation-land-management-advice/bitterns/ [Accessed December 2022]
[48] RSPB (2004) Reedbed design and establishment, Advice note, v4. Available at: https://www.rspb.org.uk/globalassets/downloads/documents/conservation--sustainability/lm-advice/reedbed_design_and_establishment.pdf [Accessed December 2022]

IEF & Importance	Effect	Assessment	Mitigation, Compensation and/or Enhancement
		Habitats are unsuitable for bittern therefore there would be no adverse effects.	
	Aural and/or visual disturbance	Main Operational Site Bittern is a scarce breeding species in the UK but has benefitted from widespread wetland habitat creation. The species first started holding territory in Nottinghamshire in 2009 and now breeds in the county, with three "booming" males and at least one nest in 2019[49]. Bittern is an amber-listed bird of conservation concern[9]. A single bittern was recorded holding territory approximately 100 m from the Site in 2021, in habitat that extends to within 20 m of the Site boundary. It is not known if nesting was attempted but it is understood a territorial male was also present in the wider gravel pit complex in 2022[50]. Bittern can be polygamous with more than one female nesting within the territory of a male. Bittern breeding habitat is frequently described as "undisturbed reedbeds"; however, there is apparently little data or research available defining or quantifying disturbance, or advice on tolerance thresholds. Habituation to some disturbance stimuli is expected among many bird species and Alessandria, *et al.* suggested bittern habituated to tractors and their cars during a behavioural study in Italy, although they give no further details[51]. The behaviour of bittern likely makes observation of small-scale disturbance (i.e. events insufficient for the bird to leave the area), but Cramp, *et al.* (1977)[52] notes "*Although more shy of disturbance and observation than most herons, occasionally becomes accustomed to regular and disinterested human activities close by*", again suggesting birds habituate to potential anthropogenic disturbance. In the UK, bittern breed at Old Moor RSPB, with reedbed habitat located within 60 m of the busy A6195. It is assumed that bittern may habituate to potential disturbance; however, given the uncertainties and following the precautionary principal mitigation may be required. Bittern are a secretive species, typically found in dense reedbed where direct observation of behaviour or movements is not possible[53]. As such, it is reasonable to assume potential visual disturbance would need to occur within the habitat, where noise of movement may be a disturbance trigger, or directly overhead. Neither of these scenarios are possible during any stages	Works in LR P2 (i.e. phases within 100 m of potential bittern breeding habitat), would be seasonally constrained to avoid the bittern breeding season. Such measures may be relaxed, subject to updated surveys to establish the status of bittern (and other Schedule 1-listed bird species). Survey results would dictate the requirement for avoidance and/or alternative mitigation which, if required, would be agreed with ecological stakeholders, such as Natural England.

[49] Eaton, M. *et al.* (2021) Rare breeding birds in the UK in 2019. *British Birds 114, 646–704.*
[50] Records from publically available data sources.
[51] Alessandria, G., Carpegna, F. & Toffola, M.D. (2003) Vocalizations and courtship displays of the Bittern *Botaurus stellaris*, *Bird Study, 50:2, 182-184,* doi: 10.1080/00063650309461311
[52] Cramp, S. [Ed] (1977) *Handbook of the Birds of Europe, the Middle East, and North Africa: The Birds of the Western Palearctic. Volume II, Ostrich to Ducks*. Oxford University Press
[53] Gilbert, G., Tyler, G., & Smith, K.W. (2005). Behaviour, home-range size and habitat use by male Great Bittern Botaurus stellaris in Britain. *Ibis, 147(3), 533–543.* doi:10.1111/j.1474-919x.2005.00424.x

IEF & Importance	Effect	Assessment	Mitigation, Compensation and/or Enhancement
		of the Proposed Development, and an area of retained woodland at the Site boundary would offer further natural screening between birds and works. As such, no adverse effects are predicted by disturbance through visual stimuli. Effects from potential aural disturbance are possible, particularly during the Phased Extraction stage when plant and vehicle activity would be greatest. Phase LR P2 is located, at closest point, approximately 45 m from potential bittern breeding habitat. Phases HR P4–P6 at 150 m, and others >200 m, are considered too far for adverse effect from disturbance. LR P2 is among the smallest phases, with an expected timescale for extraction of 0.4 years. It is recommended that any extraction or construction works within LR P2 are completed outside the bittern breeding season (approximately March to May) unless update surveys, completed by a suitably experienced ornithologist using an appropriate survey method[54], find no evidence of a bittern territory in adjacent wetlands (i.e. to the south of the Site, where a territory was likely present previously). With the surveys and subsequent avoidance recommended, no significant adverse effects on nesting bittern from aural disturbance are predicted. <u>Conveyor and Link Road, Main Processing Site</u> Habitats are unsuitable for bittern therefore there would be no adverse effects.	
	Hydrological change	Breeding bittern are dependent on wet reedbeds and therefore potential hydrological changes to wetlands beyond the Site boundary could reduce the area or suitability of habitat available. Such effects are considered in Chapter 10: Hydrology, Hydrogeology and Flood Risk.	No additional mitigation is proposed.
	Dust, Pollution, & AQ	Potential effects are considered in Chapter 10: Hydrology, Hydrogeology and Flood Risk, Chapter 11: Ground Conditions and Contamination, and Chapter 14: Air Quality. Mitigation and best practice measures proposed within the respective chapters and the outline CEMP to manage dust/ air pollution would ensure no adverse effects on bittern.	Mitigation in the Outline CEMP is considered sufficient to avoid potential adverse effects.
Barn owl Legal implications	Habitat loss/change (nest site availability)	<u>Main Operational Site</u> A barn owl nest box is present within the Site; however, there was no evidence of use during the surveys and a check in 2021 found the box occupied by nesting stock dove. Foraging habitat within the Site is limited to intermittent rough grassland at some Site boundaries, which may be insufficient to support a territory. Trees at the Site boundary are too young to have sufficient holes for a natural nest Site. Barn owl is a green-listed bird of conservation concern[9]. Barn owl is a Schedule 1-listed species and therefore legally protected from disturbance when breeding. If the box was to be used by nesting barn owl in the future, disturbance could cause a	Ensure box is not in use and remove box from the Site prior to works starting. Install a replacement box at least 100 m outside the Site boundary, according

[54] For example, surveys between March and May, following method described by Gilbert, Gibbons, and Evans (1998), or agreed alternative.

IEF & Importance	Effect	Assessment	Mitigation, Compensation and/or Enhancement
		significant adverse effect, may constitute a legal offence, and avoidance of the area to avoid these could have consequences for the Proposed Development. It is recommended that the box is removed from the Site prior to works to prevent such eventuality. To compensate for the loss of resource, a box would be placed in the wider area, outside the Site boundary and sufficiently far to avoid disturbance, and therefore offer an overall benefit to the species in the area. Boxes for barn owl to be incorporated into the Outline Restoration Strategy, which with the proposed habitat enhancements would offer a significant long-term benefit. <u>Conveyor and Link Road, Main Processing Site</u> Habitats are unsuitable for barn owl therefore there would be no adverse effects.	to best practice guidance[55]. Include provision for a barn owl box/s within the final restoration design.
Cetti's warbler Regional importance Legal implications	Aural and/or visual disturbance	<u>Main Operational Site</u> Cetti's warbler is a formally scare breeding species in Nottinghamshire; however, colonisation and population growth within the county mirrored wider expansion across southern England to become a regular breeding species in suitable habitat[18]. The species is found throughout the gravel pit complex and was recorded singing (i.e. holding territory) within close proximity of the Site. Cetti's warbler is a green-listed bird of conservation concern[9]. No birds were recorded within the Site and suitable habitat is very limited so there would be no adverse effects caused by direct habitat loss. As a Schedule 1-listed species, Cetti's warbler is afforded legal protection from disturbance when nesting. No literature was found on disturbance drivers and effects on Cetti's warbler. Based on professional experience, Cetti's warbler are reasonably tolerant of disturbed environments, and are known to be recorded close to busy roads, within industrial areas, and adjacent to construction sites. Some reactions to disturbance events have been described, for example, males disturbed while singing drop into vegetation and shortly resume song elsewhere and females are apparently not easily flushed from the nest by humans, only leaving at the last moment and returning to the nest while intruders are still nearby[56]. Both of these observations suggest the species is not easily disturbed from territory-holding or a nesting attempt. There are substantial areas of suitable habitat in the near surrounds which may be able to accommodate any birds that are displaced during construction but, given the species' recent success in the UK, any short-term declines in the local population are considered likely to recover quickly.	The Outline Monitoring and Mitigation Plan would provide a framework to identify changes in the baseline and ensure appropriate mitigation is adopted, if required.

[55] Barn Owl Trust guidance available online at: https://www.barnowltrust.org.uk/barn-owl-nestbox/ [Accessed January 2023]
[56] Cramp, S. [Ed] (1992) *Handbook of the Birds of Europe, the Middle East, and North Africa: The Birds of the Western Palearctic. Vol. VI. Warblers*. Oxford University Press

IEF & Importance	Effect	Assessment	Mitigation, Compensation and/or Enhancement
		Given the distance to territories, intervening screening in the form of retained woodland, and their apparent tolerance of disturbance, potential adverse effects on Cetti's warbler from disturbance would not be significant. Habitat within the Site is suboptimal and the species is not expected to nest within the footprint of the Proposed Development during the lifetime of the Proposed Development, but the Outline Monitoring and Mitigation Plan would provide a safeguard to ensure distribution change is detected and potential effects are mitigated. <u>Conveyor and Link Road, Main Processing Site</u> Habitats are unsuitable for Cetti's warbler therefore there would be no adverse effects.	
Amphibians (general) Local importance	Habitat loss/change	<u>Main Operational Site</u> The Proposed Development would result in the direct loss of foraging and sheltering habitat. Much of the land within the Site is sheep-grazed pasture, which offers limited opportunities for foraging or sheltering amphibians. The removal of the field margins i.e. tall ruderal, scrub or areas of plantation woodland are of greater value but make up a small proportion of the overall Site. The phased nature of the Proposed Development, with subsequent restoration, would limit the magnitude of effects by localising the loss of suitable habitat to smaller areas of the Site at any one time, allowing amphibians opportunities to forage/ shelter across other areas and within retained habitat within the Site. Whilst restored habitats would take time to establish, early successional grassland and woodland habitats would be of value to amphibians providing resources for foraging and sheltering. Although a change is expected from the habitat loss, effects would be spatially limited and temporary, and would still benefit amphibians. The Outline Monitoring and Mitigation Plan would provide a framework on the potential mitigation to safeguard amphibians. The Outline Restoration Strategy includes habitats beneficial to amphibians, including increased woodland planting and creation of species-rich grassland, ensuring improved long-term foraging opportunities within the Site. <u>Conveyor and Link Road, Main Processing Site</u> The habitats lost for the conveyor and Link Road would be predominately arable land. Whilst small sections of hedgerow would be lost to facilitate the Proposed Development, the quality of the hedgerows are poor as they are heavily managed and defunct. Higher quality habitat such as the woodland to the east would be retained and provide opportunities for amphibians, reducing the magnitude of effects. The loss of this habitat would not be significant. There would be no habitat loss for the Main Processing Site.	The Outline Monitoring and Mitigation Plan would provide a framework on the continued survey requirements and potential mitigation to safeguard amphibians. Ecological Clerk of Work (ECoW) provision where necessary throughout the Proposed Development.

IEF & Importance	Effect	Assessment	Mitigation, Compensation and/or Enhancement
	Hydrological change	Potential hydrological change is addressed in Chapter 10: Hydrology, Hydrogeology and Flood Risk and measures to safeguard the SSSI are considered sufficient for the nature reserve, which includes some of the same land area. As such, no adverse effects are predicted.	No additional mitigation is proposed.
	Dust, Pollution, & AQ	Potential effects are considered in Chapter 10: Hydrology, Hydrogeology and Flood Risk, Chapter 11: Ground Conditions and Contamination, and Chapter 14: Air Quality. Mitigation and best practice measures proposed within the respective chapters and the outline CEMP to manage dust/ air pollution would ensure no adverse effects on the NWT nature reserve are predicted.	No additional mitigation is proposed.
Otter Local importance	Habitat loss/ change	<u>Main Operational Site</u> No evidence or observations of otter were recorded during surveys of suitable habitat. However, otter are a highly mobile species and there is potential for individuals to transit through the Site, however, this use is expected to be low due to the lack of suitable riparian habitat present on Site. The Proposed Development would not result in the loss of any ditches present on Site. Habitat loss in proximity to the ditches on site, have potential to effect otters causing temporary disturbance or potential changes which may affect food sources. The phased nature of the Proposed Development, with subsequent restoration, would limit the magnitude of effects by localising the loss of habitat to smaller areas of the Site at any one time, allowing otters to commute through undisturbed areas of the Site and the temporary loss of habitats (until restored habitats become of value) would not be significant. The Outline Monitoring and Mitigation Plan would provide a framework on the further survey requirements, licensing, and potential mitigation, where required, to reduce harm to otter. Mitigation and best practice measures to minimise pollution would be included within the outline CEMP. <u>Conveyor and Link Road, Main Processing Site</u> Habitats are unsuitable for otter and therefore there would be no adverse effects.	The Outline Monitoring and Mitigation Plan would provide a framework on the continued survey requirements and potential mitigation to safeguard otter.
	Hydrological change	Potential hydrological change is addressed in Chapter 10: Hydrology, Hydrogeology and Flood Risk and measures to safeguard the SSSI are considered sufficient for the nature reserve, which includes some of the same land area. As such, no adverse effects are predicted.	No additional mitigation is proposed.
	Dust, Pollution, & AQ	Potential effects are considered in Chapter 10: Hydrology, Hydrogeology and Flood Risk, Chapter 11: Ground Conditions and Contamination, and Chapter 14: Air Quality.	No additional mitigation is proposed.

IEF & Importance	Effect	Assessment	Mitigation, Compensation and/or Enhancement
		Mitigation and best practice measures proposed within the respective chapters and the outline CEMP to manage dust/ air pollution would ensure no adverse effects on the NWT nature reserve are predicted.	
Reptiles Local importance	Habitat Loss	Main Operational Site The grassland, hedgerows, scrub and woodland provide suitable opportunities for foraging, basking and sheltering reptiles. A low population of grass snake was recorded. The Proposed Development would result in the loss of these habitats and in the absence of mitigation, removal of these features has the potential to have an adverse effect on the grass snakes present on Site. While there would be the loss of suitable habitat, this would be spatially limited to areas of the Site at any one time and would reduce the magnitude of effects. The restored habitats, from early successional grassland and habitat, would provide foraging and basking opportunities for grass snake. Therefore, the effects are considered to be temporary and not significant. The Outline Restoration Strategy includes habitats beneficial to reptiles, including increased woodland planting and creation of species-rich grassland, ensuring improved long-term foraging & sheltering opportunities within the Site. Conveyor and Link Road, Main Processing Site The habitats lost for the conveyor and Link Road would be predominately arable land. Whilst small sections of hedgerow would be lost to facilitate the Proposed Development, the quality of the hedgerows are poor as they are heavily managed and defunct. Higher quality habitat such as the woodland to the east would be retained and provide opportunities for reptiles, reducing the magnitude of effects. The loss of this habitat would not be significant. There would be no habitat loss for the Main Processing Site.	The Outline Monitoring and Mitigation Plan would provide a framework on the continued survey requirements and potential mitigation to safeguard reptiles. Ecological Clerk of Work (ECoW) provision where necessary throughout the Proposed Development.
	Direct harm	All Areas (Main Operational Site, Conveyor and Link Road, and Main Processing Site) Vegetation, including, but not limited to the scrub, ruderal vegetation and tall grassland, has the potential to be used by reptiles, which are subject to legal protection under the Wildlife and Countryside Act 1981 (as amended). Such features are found at the boundaries of the Site, around the slopes bounding the higher land, and the two vegetated field boundaries. In the absence of mitigation, removal of such features, has the potential to have a significant adverse effect, which may constitute a legal offence. Updated surveys would be required to help inform the mitigation required for each phase's working plan. It is likely that each phase would have different mitigation requirements or require a combination of avoidance, habitat manipulation and translocation to reduce the risk to reptiles.	The Outline Monitoring and Mitigation Plan would provide a framework on the continued survey requirements and potential mitigation to safeguard reptiles.

IEF & Importance	Effect	Assessment	Mitigation, Compensation and/or Enhancement
		The Outline Monitoring and Mitigation Plan would provide a framework on the potential mitigation to safeguard reptiles.	
	Dust, Pollution, & AQ	Potential effects are considered in Chapter 10: Hydrology, Hydrogeology and Flood Risk, Chapter 11: Ground Conditions and Contamination, and Chapter 14: Air Quality. Mitigation and best practice measures proposed within the respective chapters and the outline CEMP to manage dust/ air pollution would ensure no adverse effects on the NWT nature reserve are predicted.	No additional mitigation is proposed.

8.8 CUMULATIVE EFFECTS ASSESSMENT

The appropriate scale for considering cumulative developments depends on the nature of the potential effect. There are considered in turn, for each category of potential effect.

There are a number of development sites, either consented or in the planning process, as set out in **Table 8.15**.

Table 8.15: Cumulative Assessment – Planning Applications

Development	Status	Approximate Distance and direction from the Site	Assessment
17/01509/FUL Retain Engineering Operations to Sub-Divide Lake into Four Smaller Lakes, Including Dredging of Lake to Achieve Original Depth of 1.5 metres	Approved - April 2020	1.09 km north of the Site	Sufficient distance from the Site and occurring within different habitats to the Proposed Development to avoid cumulative effects in respect to ecology features. Additionally, works are likely to be complete before Proposed Development starts and large areas of comparable habitats are available and able to accommodate displaced birds.
21/01666/RES Reserved Matters Application for the Approval of Appearance, Landscaping, Layout and Scale to Erect 27 Dwellings Following Outline Application 20/00424/VOC (Original Outline Application 17/01300/OUT)	Approved - June 2022	5.28 km northwest of the Site	The development is too far from the Site for potential effects to enact on the same populations. Therefore, there would be no cumulative effects in respect to ecology features. Potential environmental effects, such as AQ, dust and/or hydrogeology, are considered where relevant elsewhere in this ES.
20/01405/FUL Installation and Operation of a Solar Farm with all Associated Works, Equipment and Necessary Infrastructure	Approved - February 2021	1.20 km east of the Site	Overall low impacts from proposal in respect to ecology features present within Site and therefore no significant cumulative effects are predicted. Potential environmental effects, such as AQ, dust and/or hydrogeology, are considered where relevant elsewhere in this ES.
21/00508/VOC Variation of Conditions 2, 3, 4, 12, 13 and 14 of P.A. 20/01405/FUL to Amend the Location, Design and Elevations and Retention of the 132kV Substation and	Approved - July 2021		

Associated Access Beyond the Temporary 40 Years to a Permanent Basis			
19/00157/SCR Screening Opinion - Erect 171 Dwellings	Not EIA - February 2019	3.04 km southeast of the Site	The development is large, but will have localised effects on ecology and is sufficiently far that these will not enact on the same populations/features. No cumulative effects are predicted in respect to ecology features. Potential environmental effects, such as AQ, dust and/or hydrogeology, are considered where relevant elsewhere in this ES.
22/01698/FUL Erection of 4 Holiday Lodges, Fish Welfare/Reception/Equipment Store, Driveway and Car Parking Area	Planning application submitted 20th December 2022 (resubmission of a 2018 planning permission)	0.10 km west of the Site	Proposed Development is small in scale and will have localised effects on ecology. No cumulative effects are predicted in respect to ecology features. Potential environmental effects, such as AQ, dust and/or hydrogeology, are considered where relevant elsewhere in this ES.

Table 8.16: Cumulative Assessment – Local Plan allocations

Development	Status	Approximate Distance and direction from the Site	Assessment
SITE HS7 Planning permission has been granted for Phase 1 (in blue in Figure 19) comprising 196 dwellings and 11.11 ha of employment/employment generating uses (2.7ha allocated for employment uses by Policy ST7), and supporting infrastructure. A further 305 dwellings on 11.15 ha is proposed		0.38 km southwest of the Site	Located close to the access road of the Proposed Development but a greater distance to the Main Operation Site. The habitats are different to those within the Site and unlikely to be used by many of the same features or populations. The A638 represents a dispersal barrier for some smaller features. As such, no cumulative effects are predicted in respect to ecology features.

			Potential environmental effects, such as AQ, dust and/or hydrogeology, are considered where relevant elsewhere in this ES.
SITE HS13 The site (106.5ha) provides an opportunity to create a sustainable and well-integrated extension – for 1250 dwellings		4.06 km south of the Site	Development is a sufficient distance from the Site for any cumulative effects in respect to ecology features, as habitats are different and potential effects are not enacting on the same populations or features. Potential environmental effects, such as AQ, dust and/or hydrogeology, are considered where relevant elsewhere in this ES.

8.9 SUMMARY OF EFFECTS

Table 8.15 provides a summary of effects detailed within this chapter, including mitigation requirements and residual effects.

Table 8.15: Summary of Effects

IEF	Potential Effect	Significance of Effect	Mitigation Proposed	Residual Effect
Sutton and Lound Gravel Pits SSSI	Habitat loss/change	Adverse, significant	Mitigation to safeguard features. Compensation for loss habitat.	Negligible, not significant
	Aural and/or visual disturbance	Adverse, not significant	ECoW to monitor potential effects. Habitat creation as enhancement	Beneficial, significant
	Hydrological change	Negligible, not significant	No additional mitigation proposed.	n/a
	Dust, Pollution, AQ	Adverse, significant	As per respective chapters. No additional mitigation proposed.	Negligible, not significant
All LWS	Dust, Pollution, AQ	Adverse, significant	As per respective chapters. No additional mitigation proposed.	Negligible, not significant
NWT nature reserve	Aural and/or visual disturbance	Adverse, not significant	ECoW to monitor potential effects. Habitat creation as enhancement	Beneficial, significant
	Hydrological change	Negligible, not significant	No additional mitigation proposed.	n/a
	Dust, Pollution, AQ	Adverse, significant	As per respective chapters. No additional mitigation proposed.	Negligible, not significant
Ditch habitat	Hydrological change	Negligible, not significant	No additional mitigation proposed. Habitat Creation as enhancement	Beneficial, significant
	Dust, Pollution, AQ	Adverse, significant	As per respective chapters. No additional mitigation proposed.	Negligible, not significant
Badger	All details related to badger are presented in TA 8.2: Confidential Badger Annex.			
Bats (foraging)	Habitat loss/change	Adverse, significant	Continued surveys and monitoring. Habitat creation as enhancement	Beneficial, significant
	Habitat fragmentation	Negligible, not significant	Habitat creation as enhancement	Beneficial, significant
	Dust, Pollution, AQ	Adverse, significant	As per respective chapters. No additional mitigation proposed.	Negligible, not significant
	Artificial light	Adverse, significant	Continued surveys and monitoring. Creation of suitable Lighting Plan.	Negligible, not significant

IEF	Potential Effect	Significance of Effect	Mitigation Proposed	Residual Effect
Bats (roosting)	Habitat loss/change	Adverse, significant	Continued surveys and monitoring. Reactive mitigation or licencing as required. Habitat creation as enhancement	Beneficial, significant
	Artificial light	Adverse, significant	Continued surveys and monitoring. Creation of suitable Lighting Plan.	Negligible, not significant
	Noise	Unknown. Potentially adverse, significant	Continued surveys and monitoring. Reactive mitigation or licencing as required.	Negligible, not significant
Birds (breeding assemblage)	Habitat loss/change	Adverse, significant	Continued surveys and monitoring. Habitat creation as enhancement	Beneficial, significant
	Direct harm	Adverse, significant	Continued surveys and monitoring. Avoidance, nest searches, and reactive mitigation measures as required. ECoW supervision	Negligible, not significant
	Aural and/or visual disturbance	Negligible, not significant	Continued surveys and monitoring. Reactive mitigation measures as required.	Negligible, not significant
	Hydrological change	Negligible, not significant	No additional mitigation proposed. Habitat Creation as enhancement	Beneficial, significant
	Dust, Pollution, AQ	Adverse, significant	As per respective chapters. No additional mitigation proposed.	Negligible, not significant
	Artificial light	Adverse, significant	Continued surveys and monitoring. Creation of suitable Lighting Plan.	Negligible, not significant
Birds (wintering)	Habitat loss/change	Negligible, not significant	Habitat creation as enhancement	Beneficial, significant
	Aural and/or visual disturbance	Negligible, not significant	ECoW to monitor potential effects. Habitat creation as enhancement	Beneficial, significant
	Hydrological change	Negligible, not significant	No additional mitigation proposed. Habitat Creation as enhancement	Beneficial, significant
	Dust, Pollution, AQ	Adverse, significant	As per respective chapters. No additional mitigation proposed.	Negligible, not significant

IEF	Potential Effect	Significance of Effect	Mitigation Proposed	Residual Effect
	Artificial light	Adverse, significant	Continued surveys and monitoring. Creation of suitable Lighting Plan.	Negligible, not significant
Bittern	Habitat loss/change	Negligible, not significant	Habitat creation as enhancement	Beneficial, significant
	Aural and/or visual disturbance	Unknown. Potentially adverse, significant	Continued surveys and monitoring. Reactive mitigation as required.	Negligible, not significant
	Hydrological change	Negligible, not significant	No additional mitigation proposed. Habitat Creation as enhancement	Beneficial, significant
	Dust, Pollution, AQ	Adverse, significant	As per respective chapters. No additional mitigation proposed.	Negligible, not significant
Barn owl	Habitat loss/change	Negligible, not significant	Nest site removal as avoidance. Nest site provision as enhancement.	Beneficial, significant
Cetti's warbler	Aural and/or visual disturbance	Unknown. Potentially adverse, significant	Continued surveys and monitoring. Reactive mitigation as required.	Negligible, not significant
Amphibians (general)	Habitat loss/change	Adverse, significant	Continued surveys and monitoring. Habitat creation as enhancement	Beneficial, significant
	Hydrological change	Negligible, not significant	No additional mitigation proposed. Habitat Creation as enhancement	Beneficial, significant
	Dust, Pollution, AQ	Adverse, significant	As per respective chapters. No additional mitigation proposed.	Negligible, not significant
Otter	Habitat loss/change	Negligible, not significant	Continued surveys and monitoring. Reactive mitigation as required. Habitat creation as enhancement	Beneficial, significant
	Hydrological change	Negligible, not significant	No additional mitigation proposed. Habitat Creation as enhancement	Beneficial, significant
	Dust, Pollution, AQ	Adverse, significant	As per respective chapters. No additional mitigation proposed.	Negligible, not significant
Reptiles	Habitat loss/change	Negligible, not significant	Continued surveys and monitoring. Reactive mitigation as required. ECoW supervision	Beneficial, significant

IEF	Potential Effect	Significance of Effect	Mitigation Proposed	Residual Effect
			Habitat creation as enhancement	
	Dust, Pollution, AQ	Adverse, significant	As per respective chapters. No additional mitigation proposed.	Negligible, not significant

8.10 STATEMENT OF SIGNIFICANCE

Any IEF described as less than local importance in **Table 8.4** are seen as widespread and common and were scoped out of detailed assessment. In addition, IEFs were also scoped out from further assessment where their occurrences was sufficiently infrequent that anything more than negligible effects are unlikely to occur.

Through the implementation of mitigation measures discussed in 1.6 potential residual effects of the Proposed Development are assessed as being of low to negligible magnitude and thus not significant in terms of the EIA regulations. Furthermore, positive effects at the Local level are likely in respect of habitats, birds, bats, amphibians and reptiles, though the compensatory habitat that would be provided at detail design through the implementation of the Outline Restoration Strategy and associated BNG assessment.

Through individual assessment of the of the qualifying/designated features, consideration has been given to impacts on the Sutton and Lound Gravel Pits SSSI and LWS. Potential effects on the statutory designation, both alone and in combination, are assessed as being of low magnitude, and therefore not significant in terms of the EIA Regulations.