Tritax Symmetry (Hinckley) Limited

HINCKLEY NATIONAL RAIL FREIGHT INTERCHANGE

The Hinckley National Rail Freight Interchange Development Consent Order

Project reference TR050007

Environmental Statement
Volume 2: Appendices

Appendix 12.1: Ecology Baseline

Document reference: 6.2.12.1A

Revision: 05

9 January 2024

Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 Regulation 5(2)(a)

The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 Regulation 14

This document forms a part of the Environmental Statement for the Hinckley National Rail Freight Interchange project.

Tritax Symmetry (Hinckley) Limited (TSH) has applied to the Secretary of State for Transport for a Development Consent Order (DCO) for the Hinckley National Rail Freight Interchange (HNRFI).

To help inform the determination of the DCO application, TSH has undertaken an environmental impact assessment (EIA) of its proposals. EIA is a process that aims to improve the environmental design of a development proposal, and to provide the decision maker with sufficient information about the environmental effects of the project to make a decision.

The findings of an EIA are described in a written report known as an Environmental Statement (ES). An ES provides environmental information about the scheme, including a description of the development, its predicted environmental effects and the measures proposed to ameliorate any adverse effects.

Further details about the proposed Hinckley National Rail Freight Interchange are available on the project website:

http://www.hinckleynrfi.co.uk/

The DCO application and documents relating to the examination of the proposed development can be viewed on the Planning Inspectorate's National Infrastructure Planning website:

https://infrastructure.planninginspectorate.gov.uk/projects/east-midlands/hinckley-national-rail-freight-interchange/

Appendix 12.1 ◆ Ecology Baseline

EXECUTIVE SUMMARY

1.1. This Ecology Baseline has been prepared by The Environmental Dimension Partnership Ltd (EDP) on behalf of Tritax Symmetry (Hinckley) Limited (hereafter referred to as 'the Applicant'). It sets out the results of ecological investigations regarding a proposed National Rail Freight Interchange on land north-east of Hinckley, which is to be the subject of a Development Consent Order (DCO) application.

1.2. The Main Order Limits lie 3km north-east of Hinckley in an area of mixed farmland to the north-west of M69 Junction 2 and is centred on National Grid Reference (NGR) SP 46314 94858.

1.3. The baseline ecological investigations included a desk study, Extended Phase 1 survey and detailed (Phase 2) surveys relating to wintering and breeding birds, foraging and roosting bats, great crested newt, otter and water vole, badger, invertebrates and reptiles. All surveys were undertaken with reference to best practice guidance.

1.4. EDP's desk- and field-based baseline investigations have identified that there are no international designation that are regarded as Important Ecological Features (IEFs). Burbage Common and Woods Site of Special Scientific Interest (SSSI) is located adjacent to the Main Order Limits and is regarded as an IEF at the National Level. Within 3km of the central grid reference of the Main Order Limits are thirteen Local Wildlife Sites (LWS), three of which lie partly within the Main Order Limits (Burbage Common and Woods, Field Rose Hedgerow, Elmesthorpe Plantation Hedgerow).

1.5. Also, within 3km of the Main Order Limits are 13 candidate Local Wildlife Sites (cLWS), and 60 potential Local Wildlife Sites (pLWS), of which seven are within the Main Order Limits (Freeholt Meadow, Woodland adjacent to Aston Firs, Burbage Common Road Hedgerows, Burbage Common Road Railway Bridge, junction 2 Grassland, B4669 Road Verge and Elmsthorpe Boundary Hedgerows).

1.6. The majority of the Main Order Limits is of only limited (Negligible or Site-level) intrinsic nature conservation importance, comprising mainly arable grassland, arable land, improved grassland, species-poor semi-improved grassland and built areas. In addition to these habitats, several features of Local or higher-level intrinsic nature conservation importance are present including the network of ponds, a stream, mature standard trees, boundary hedgerows and woodland.

1.7. The habitats present support and are likely/have the potential to support a limited number of protected/notable species (wintering/breeding birds, foraging and roosting bats, badger, otter and water vole, amphibians and reptiles) given the habitat's limited quality and extent. Further surveys have been undertaken to determine the presence, diversity, population sizes and levels of activity associated with populations of each of these

protected species. These surveys have recorded:

- 50 species of wintering bird were recorded. Of these, 13 were on the Red List of birds of conservation concern (BoCC) and 9 were on the Amber List;
- Out of 59 species recorded during the breeding bird survey, 23 were species of conservation concern: 12 Red Listed and 11 Amber Listed. 14 were considered to probably be breeding on site, three to possibly be breeding, and it was considered that six were non-breeders;
- Minor bat roosts have been confirmed within four buildings - other buildings and trees are assessed as having roosting potential, although no further roosts have been detected;
- Low to moderate levels of commuting and foraging bat activity, principally associated with hedgerows and waterbodies. Mostly from common pipistrelle, but including Myotis species and Barbastelle bat;
- Active badger setts;
- A small population of grass snakes and slow worms in the wider landscape; and
- Positive eDNA results were returned from four ponds in 2018 and one pond in 2019 within or in close proximity to the Main Order Limits, however, no breeding great crested newts were recorded during aquatic surveys, indicating that a low population may still be present.

1.8. The IEF identified within the Main Order Limits that are pertinent to an Ecological Impact Assessment (EcIA) in respect of the Proposed Development are listed within Table 1.1.

Table 1.1: Important Ecological Features.

Importance Ecological Feature	**Key Attributes**	**Nature Conservation Importance**
Statutory Designated Sites		
Burbage Woods and Aston Firs SSSI	Ash-Oak-Maple woodland adjacent to the west of the Main Order Limits.	National
Burbage Common and Woods Local Nature Reserve (LNR)	Semi-natural woodland and mesotrophic grassland, overlapping with the SSSI.	County/National

Importance Ecological Feature	Key Attributes	Nature Conservation Importance
Non-statutory Designated Sites		
Burbage Common and Woods LWS	Semi-natural woodland and mesotrophic grassland, overlapping with the SSSI.	County/National
Other LWS, cLWS and pLWS	Various woodland, hedgerow, wetland and grassland sites	District to County
Habitats		
Semi-improved Neutral Grassland	Grassland with poor to moderate species-diversity, value limited by extent and isolation.	Local
Hedgerow and Tree Network (not including pLWS or LWS)	Network of predominantly species-rich hedgerows and mature tress associated with the field boundaries that form dispersal corridors for wildlife.	District
Woodland (not including Woodland adjacent to Aston Firs pLWS)	Small areas of plantation and semi-natural broadleaved woodland.	Local
Ponds	Network of permanent water bodies supporting a few aquatic species and forming part of the local ecological network.	Local
Stream	Stream supporting very few aquatic species but forming a wildlife corridor through landscape.	District
Ditches	Mostly dry, but a small number of wet ditches present supporting aquatic flora.	Local

Importance Ecological Feature	Key Attributes	Nature Conservation Importance
Fauna		
Winter Birds	Assemblage including reasonable flocks of farmland specialists, with a range of other species of conservation concern in smaller numbers. Value limited by management regime and levels of disturbance.	Local to District
Breeding Birds	Breeding assemblage including reasonable numbers of farmland specialists, including a population of up to 42 pairs of skylark and other ground nesting species such as lapwing.	District
Bats	Common and widespread assemblage of foraging/commuting/roosting bats primarily associated with higher value boundary hedgerow and tree habitats.	Local
Badger	An active subsidiary sett within hedgerow in west of the Main Order Limits, main sett just off-site to the west, outlier sett towards south-east and in the south-west of the Main Order Limits. The habitats present on-site provide opportunities for foraging and commuting badgers.	Site
Otter	One old spraint on wet ditch in north-western corner of the Main Order Limits	Local
European hare	Hare present over most arable land within the Main Order Limits.	Local
Reptiles	Records of grass snake in local area, low population recorded on-site.	Site

Importance Ecological Feature	Key Attributes	Nature Conservation Importance
Common toad	Records of amphibians present nearby, including common toad. Medium population recorded during reptile and great crested newt surveys.	Local

INTRODUCTION, PURPOSE AND CONTEXT

1.9. This Ecology Baseline has been prepared by The Environmental Dimension Partnership LTD(EDP) on behalf of Tritax Symmetry (Hinckley) Limited (hereafter referred to as 'the Applicant'). It sets out the results of ecological investigations regarding a proposed National Rail Freight Interchange on land north-east of Hinckley, which is to be the subject of a Development Consent Order (DCO) application. The full extent of the DCO Order Limits are hereafter referred to as the 'DCO Site'.

1.10. The land between the M69 motorway and the Leicester to Hinckley railway on which the proposed Hinckley National Rail Freight Interchange (HNRFI) would be developed is identified as the 'Main HNRFI Site', as shown in Figure 2.1 of ES Chapter 2 (document reference 6.3.2.1).

1.11. The DCO Site contains the Main HNRFI Site and also include contiguous areas to the north-west, south and east, respectively to contain the corridor of a proposed link road that would cross the Leicester to Hinckley railway and connect to the B4668/A47 Leicester Road (the 'A47 Link Road'), the proposed works to M69 Junction 2 and a section of the B4669 Hinckley Road towards the village of Sapcote. These are hereafter referred to as the 'Main Order Limits'.

1.12. The DCO Site also includes additional non-contiguous areas of land at roads and junctions for which highway enhancements and traffic management measures are proposed; in addition to pedestrian level crossings on the Leicester to Hinckley railway that are subject to proposed works and restrictions.

1.13. EDP is an independent environmental planning consultancy with offices in Cirencester, Cheltenham and Cardiff. The practice provides advice to private and public-sector clients throughout the UK in the fields of landscape, ecology, archaeology, cultural heritage, arboriculture, rights of way and master planning. Details of the practice can be obtained at our website (www.edp-uk.co.uk).

1.14. This report has been informed and prepared in accordance with the following industry standard guidelines and best practice guidance in relation to survey techniques:

- BSI (2013) Biodiversity. Code of Practice for Planning and Development. BS Standard.

BS 42020:2013. British Standards Institute;

- CIEEM (2017). Guidelines for Preliminary Ecological Appraisal. Chartered Institute of Ecology and Environmental Management (CIEEM), Winchester;
- CIEEM (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. CIEEM, Winchester;
- British Standards Institute (2013) BS 42020 - Biodiversity - Code of Practice for Planning and Development;
- Joint Nature Conservation Committee (2010) Handbook for Phase 1 Habitat Survey: A Technique for Environmental Audit;
- Marchant, J.H. (1983) Common Birds Census instructions, British Trust for Ornithology, Tring;
- Bat Conservation Trust (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edition). Bat Conservation Trust, London;
- Bat Conservation Trust (2023) Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th edition). Bat Conservation Trust, London;
- Stone, E.L. (2013) Bats and lighting: Overview of current evidence and mitigation;
- Bat Conservation Trust and Institute of Lighting Professionals (2023) Bats and Artificial Lighting at Night, Guidance Note 08/23;
- Harris, S., Cresswell, P., and Jeffries, D.J. (1989) Surveying Badgers, Mammal Society, London;
- Joint Nature Conservation Committee (1999) Bat Workers Manual;
- Froglife (1999) Reptile survey: an introduction to planning, conducting, and interpreting surveys for snake and lizard conservation. Froglife Advice Sheet 10, Froglife, Halesworth;
- Oldham, R.S., Keeble, J., Swan M.J.S. & Jeffcote M. (2000) Evaluating the suitability of habitat for the Great Crested Newt (Triturus cristatus). Herpetological Journal 10 (4), 143- 155;
- Williams, P. (2013) GCN eDNA protocol, Freshwater Habitats Trust;
- Chanin P (2003). Monitoring the Otter (Lutra lutra). Conserving Natura 2000 Rivers Monitoring Series No. 10, English Nature, Peterborough;
- Strachan R., Moorhouse T and Gelling M. (2011) Water Vole Conservation Handbook (Third Edition). Wildlife conservation unit, Oxford; and

- Dean, M., Strachan, R., Gow, D. and Andrews, R. (2016) The Water Vole Mitigation Handbook (Mammal Society Mitigation Guidance Series) Mammal Society, London.

Site Context

1.15. The Main Order Limits lie 3km north-east of Hinkley in an area of mixed farmland to the north-west of M69 Junction 2 and is centred on National Grid Reference (NGR) SP 46314 94858.

1.16. The Main Order Limits encompasses 48 fields and 3 farms, which are bounded to the north-west by the Nuneaton to Felixstowe railway, with the M69 motorway defining the south-eastern boundary. The south-western boundary is defined by field boundaries, beyond which are blocks of deciduous woodland, including Burbage Wood, Aston Firs and Freeholt Wood. The north-eastern boundary is also bounded by field boundaries beyond which lies the village of Elmesthorpe, a linear settlement on the B581 (Station Road). An unnamed stream flows north-eastward through the southern portion of the Main Order Limits. Additional land extending to the north-west, connecting the Main Order Limits to the B4668 road was added in 2019 and included in subsequent baseline surveys.

1.17. The highest aspect of the Main Order Limits is along the middle of the southern edge of the Main Order Limits, which sits at c.108m above Ordnance Datum (aOD), with the landform falling to c.80m aOD at the far northern and eastern boundaries.

1.18. The DCO Site also includes additional non-contiguous areas of land at roads and junctions for which highway enhancements and traffic management measures are proposed. The DCO Site also includes some pedestrian level crossings on the Leicester to Hinckley railway that are subject to proposed works and restrictions. These additional works are considered to be ecologically insignificant.

Scope of Baseline Report

1.19. This Ecology Baseline report describes the current ecological interest within and around the Main Order Limits, which has been identified through standard desk and field-based investigations. The remainder of this report is structured as follows:

- Section 2 summarises the methodology employed in determining the baseline ecological conditions within and around the Main Order Limits (with further details provided within Annexes and on Plans where appropriate);
- Section 3 summarises the baseline ecological conditions (with further details also provided within Annexes and on Plans where appropriate) and identifies and evaluates any pertinent ecological features/receptors; and
- Section 4 summarises the Important Ecological Features (IEF) that are relevant to the Main Order Limits.

METHODOLOGY (BASELINE INVESTIGATIONS)

1.20. This section of the Ecology Baseline summarises the methodologies employed in determining the baseline ecological conditions within and around the Main Order Limits. The appraisal has been undertaken by appropriately qualified ecologists using relevant best practice methodologies wherever possible.

Desk Study and Consultation

1.21. The extent of the study area has been defined as the ecological Zone of Influence (ZOI) of the EIA Project. This has been determined through a review of the baseline ecological conditions relative to the Proposed Development in the context of the proposed activities. It has also been informed by liaison with consultees and other specialists involved in assessing the effects in other disciplines of the Proposed Development.

1.22. The scope of the desk study reflects the sensitivity and value of potential ecological receptors while providing contextual information to assist with determining and evaluating the baseline. The following desk study search radii around the Main Order Limits were employed and are considered to be sufficient to cover the ecological ZOI of the project:

- International statutory designations (15km radius);
- National statutory designations (5km);
- Non-statutory local sites (3km);
- Annex II bat species records (6km); and
- All other protected/notable species records (3km).

1.23. The field surveys undertaken to inform the assessment cover the Main Order Limits and, where access was permitted/available, the surrounding habitats to provide contextual information to further inform the assessment.

1.24. In addition to the above, freely available web-based Ordnance Survey (OS) plans and aerial photographs were reviewed to identify key habitat features including ponds within 250m[1] that could offer potential breeding habitat for great crested newt (*Triturus cristatus*) and strong linear 'green' (terrestrial) or 'blue' (aquatic) connecting features in the landscape.

1.25. A consultation letter was sent to Leicestershire County Council (LCC) Ecology Planning Services in December 2017 setting out the proposed scope of survey work and to agree the survey requirements for the DCO Site.

Extended Phase 1 Survey

[1] 250m is the upper distance over which most great crested newts typically disperse from breeding ponds (English Nature (2001). *The Great Crested Newt Mitigation Guidelines.* English Nature, Peterborough.

1.26. The survey technique adopted for the initial habitat assessment was at a level intermediate between a standard Phase 1 Habitat survey technique[2], based on habitat mapping and description, and a Phase 2 survey, based on detailed habitat and species surveys as recommended by CIEEM[3]. This level of survey does not aim to compile a complete floral and faunal inventory for the defined survey area.

1.27. The level of survey involves identifying and mapping the principal habitat types and identifying the dominant plant species present in each principal habitat type. In addition, any actual or potential protected species or species of principal importance are identified and scoped.

1.28. The Extended Phase 1 survey of the Main Order Limits Site was undertaken by suitably experienced surveyors on 19 June 2017 and 26 June 2018. An update Extended Phase 1 survey was carried out on 14 and 15 May 2019 and again on 01 July 2021. A further Extended Phase 1 survey was undertaken on the 14 April 2022 of the additional areas included for the highways works. These surveys occurred within the optimal period for undertaking an Extended Phase 1 survey. The results are therefore not considered to be climatically or seasonally constrained.

Detailed (Phase 2) Surveys

1.29. The scope of Phase 2 surveys undertaken at the Main Order Limits was defined following the initial studies described above (desk study and Extended Phase 1 survey) and in consultation with the local planning authority. The surveys 'scoped in' are summarised in turn below and a brief explanation of the potential surveys 'scoped out' is provided thereafter.

Botanical Surveys

1.30. Targeted botanical surveys were undertaken of the pLWS within the Main Order Limits, to inform an assessment of their value against the current Local Wildlife Site selection guidelines for Leicestershire and Rutland. A survey of Burbage Common Road Railway Bridge pLWS was undertaken on 19 March 2021, and a survey of junction 2 Grassland pLWS, Freeholt Meadow pLWS and Woodland Adjacent to Aston Firs pLWS was undertaken 09 June 2021.

Winter Bird Survey

1.31. The paucity of suitable, extensive wetland habitat within the Main Order Limits, limits the potential for a diverse assemblage of over-wintering bird species to be present, particularly with regard to waders and waterfowl. However, large areas of arable farmland are present within the Main Order Limits. British farmland is an essential habitat for many resident bird species and also for many northern and eastern winter immigrants (Gillings

[2] Joint Nature Conservation Council (2004) *Handbook for Phase 1 Habitat Survey – A Technique for Environmental Audit* (reprinted with minor corrections for original Nature Conservancy Council publication).

[3] CIEEM (2013) *Guidelines for Preliminary Ecological Appraisal*. CIEEM, Winchester.

et al., 2008)[4]. As such, it was considered by EDP that the Main Order Limits has potential to support notable assemblages of specific farmland species of conservation concern. Therefore, as a precaution, wintering bird surveys (WBS) were undertaken to identify whether any notable species populations occur during the winter months.

1.32. The initial WBS comprised three survey visits undertaken between January and March 2018. An update WBS was undertaken over three visits between December 2020 and February 2021. Survey visits were completed on calm days with good visibility and avoiding periods of heavy rain. The results therefore provide a representative overview of wintering bird interest and have not been limited by seasonal or climatic factors.

Breeding Bird Survey

1.33. The Main Order Limits contains large areas of mixed farmland and therefore has the potential to support a significant assemblage of breeding birds including declining farmland species. A full breeding bird survey (BBS) was therefore undertaken with reference to standard methodology, entailing a modified Common Bird Census (CBC) 'territory mapping' approach. The initial BBS comprised three visits, undertaken monthly between April and June 2018, i.e. at the height of the breeding bird season for lowland Britain. An update BBS was undertaken over three visits between April and early June 2021.

Bat Surveys

1.34. Based upon the Extended Phase 1 survey, a number of habitats and features within the Main Order Limits were identified as being potentially suitable for roosting, foraging and commuting bats.

1.35. All buildings and trees were subject to ground-level visual assessments to assess their bat roosting potential. The visual assessment of trees was undertaken in May 2018 and was updated in May 2019 and again in May 2021. The building assessment first took place in April 2018 and was updated in May 2019. An update assessment of a railway bridge with bat roost potential (Burbage Common Road Railway Bridge pLWS) was undertaken in March 2021. Emergence and re-entry surveys of all buildings within the Main Order Limits that were determined to have potential to support roosting bats were initially carried out between May and August 2018, with update surveys undertaken between May and September 2019 and again between May and August 2021.

1.36. Bat activity was investigated through a combination of manual transect surveys and automated detector surveys between April to September in 2018, 2019 and again over this same period in 2021.

Badger Survey

1.37. The Main Order Limits were considered to offer suitable foraging and sett building opportunities for badgers (*Meles meles*), therefore detailed walkover surveys were

[4] Gillings, S., Wilson, A.M., Conway, G.J., Vickery, J.A. & Fuller, R.J. (2008). Distribution and abundance of birds and their habitats within the lowland farmland of Britain in winter. *Bird Study*, 55:1, 8-22.

undertaken to determine the presence/absence and distribution of badgers within the Main Order Limits and to examine the level of current use of any setts present.

1.38. Badger activity within the Main Order Limits was initially assessed by EDP in 2017 and 2018 during the course of the Extended Phase 1 survey, however an updated badger survey was also undertaken on 16 July 2018 by a suitably experienced ecologist and updated further during subsequent visits thought 2018. A further update survey was undertaken on 15 September 2021.

1.39. During the surveys, any signs of badger activity such as holes, latrines, trails, snuffle holes and hairs on fencing or vegetation were recorded. Where holes of a size and shape consistent with badgers were identified, the following signs of badger activity were searched for in order to determine whether they were currently in active use:

- Fresh spoil outside entrances;
- Old bedding material (typically dried grass) outside entrances;
- Holes being cleared of leaf litter;
- Badger guard hairs; and
- Fresh tracks leading to/from the holes.

Limitations

1.40. Given that badgers are highly mobile animals and that suitable foraging and sett building opportunities exist across the Main Order Limits, it is possible that additional badger setts may be excavated in the future.

1.41. During the 2021 survey the field on the southern boundary of the Main Order Limits (just north of Freehold Wood), where setts were recorded in 2018 (including one main sett and one subsidiary sett) could not be safely accessed due to shooting activities taking place. The current status of these setts could not be confirmed, and therefore it should be assumed that these remain active unless proven otherwise.

Water Vole and Otter Survey

1.42. Aquatic habitats present within the Main Order Limits were considered suitable for otter (*Lutra lutra*) and water vole (*Arvicola amphibius*) during the Extended Phase 1 survey included the stream running from the freehold woodland past the north of Hobbs Hayes farm.

1.43. Detailed walkover surveys and habitat assessment were therefore undertaken by an experienced surveyor on 28 June 2018 and 29 August 2018, with all signs of otter and water vole activity along these watercourses recorded. For robustness, the survey also extended to the mosaic of occasionally wet ditches throughout the Main Order Limits. This survey was updated on 29 July 2021.

1.44. The surveys, undertaken in accordance with standard guidance[5], involved a visual inspection of the watercourses for characteristic signs of otters, such as prints, tracks, spraints, feeding remains and resting sites/holts. Features considered to have the potential to be used as holts were also documented during the survey. A visual search for use of the Main Order Limits by water voles, which included evidence of latrines, footprints, feeding caches, runs, holes and lawns, was also undertaken.

Limitations

1.45. Many of the ditches were dry during the surveys, in part owing to the hot dry weather at the time but also indicative of annual drying, however the main stream running through the Main Order Limits (which is potentially suitable for water voles and otters) still held water. These conditions are not considered to have been a constraint to the survey particularly as watercourses which dry out regularly are suboptimal for otter and water vole.

Great Crested Newt Survey

1.46. Several waterbodies are present within the Main Order Limits, together with numerous further waterbodies, which are located within 500m of the Main Order Limits boundary, and which are not separated by any significant barriers to amphibian dispersal. Therefore, surveys were undertaken to establish the current presence or likely absence of great crested newts (*Triturus cristatus*).

1.47. Surveys were completed in 2018, 2019 and 2021. The 2018 surveys comprised a Habitat Suitability Index (HSI) assessment of ponds, environmental DNA (eDNA) surveys and conventional pond surveys using torching and bottle trapping techniques. The update surveys in 2019 and 2021 were eDNA surveys only.

1.48. The ponds surveyed varied between surveys due to changes to the Proposed Development boundary and the extent to which access was permitted to survey off-site ponds.

Reptile Survey

1.49. The Main Order Limits contain grassland, scrub, field margins and woodland edge habitats which are suitable for reptile species. Refugia-based surveys were therefore undertaken of the suitable habitats to determine the presence and distribution or likely absence of reptiles. The initial survey was undertaken between May and September 2018 and was updated during surveys between July and September 2019 and between April and October 2021.

Invertebrate Surveys

1.50. An invertebrate habitat scoping study, to evaluate the potential conservation value of the Main Order Limits for invertebrates, was undertaken in May 2018.

1.51. In addition, owing to the presence of local records of white-letter hairstreak butterfly

[5] Strachan, R. et al. (2011) *Water Vole Conservation Handbook Third Edition*. Abingdon, UK.

(Satyrium w-album), which is a Priority Species, a winter egg search of elm trees (the larval foodplant of this species) was carried out in March 2019 to determine the presence or likely absence of this species. This survey was updated in February 2021.

1.52. An Aquatic Invertebrate survey was undertaken of those ponds within the site that were deemed to have potential to support an invertebrate assemblage in July 2022. Samples were taken from three ponds and analyses undertaken. Three other ponds were found to be dry and samples could not be taken.

Surveys Scoped Out

1.53. Whilst commonly required as part of an ecological appraisal for development sites, it was not considered necessary/appropriate to undertake a survey for dormouse (*Muscardinus avellanarius*) in this instance. This is based upon the absence of recent records of this species during the desk study and the lack of known populations of dormouse within Leicestershire or Warwickshire.

RESULTS (BASELINE CONDITIONS)

1.54. This section of the Ecology Baseline summarises the baseline ecological conditions within and around the Main Order Limits, determined through the course of desk- and field-based investigations described in Section 2. In particular, this section identifies and evaluates those IEFs situated within the Main Order Limits, or the potential ZoI, which are pertinent in the context of the Proposed Development.

1.55. The evaluation of potential IEFs has been undertaken in accordance with the latest Chartered Institute of Ecology and Environmental Management (CIEEM) guidance[6], with professional judgement and available guidance used to assign a level of importance to IEFs at a geographical scale from International/European (highest importance) > National > County > District > Local > Site-level > Negligible (lowest importance).

1.56. Except where indicated otherwise, within this Ecology Baseline report 'Priority Species' and 'Priority Habitats' refers to the list of species and habitats of principle importance for nature conservation; a list that is required to be in operation under Section 41 of the Natural Environment and Rural Communities Act 2006, and to which, under Section 40, Local Planning Authorities have a statutory duty to consider when decision making.

1.57. Further technical details of the results are, where appropriate, provided within Annexes 1 – 7 and to the rear of this report. Much of the baseline information and survey findings are illustrated on Figures (i.e. Figure 12.1, Figure 12.2 etc.) which are provided separately to accompany both this report and the formal assessment chapters.

1.58. The baseline information presented within this report relates to Main Order Limits, rather than the full extent of the DCO Site, which include a number of junctions and rail and highway works. These junctions and rail and highway works affect areas of land at some

[6] Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland, CIEEM 2018

distance from the Main Order Limits, and are of typically negligible ecological importance. However, such works are necessarily assessed below where appropriate.

Designated Sites

1.59. Information regarding designated sites was obtained during the Desk Study from the MAGIC website and WBRC. Statutory designations (those receiving legal protection) and non-statutory designations (those receiving planning policy protection only) are discussed in turn below.

Statutory Designations

1.60. Statutory designations represent the most significant ecological receptors, being of recognised importance at an international and/or national level. Statutory designations of International/European importance include Special Protection Areas (SPA), Special Areas of Conservation (SAC) and Ramsar Sites. Statutory designations of National importance include Sites of Special Scientific Interest (SSSI) and National Nature Reserves (NNR). Although Local Nature Reserves (LNR) are statutory, their level of importance is typically County level or less, consistent with non-statutory designations, and are therefore considered alongside non-statutory sites.

1.61. No part of the DCO Site is covered by any international statutory designations, and there are none immediately adjacent to the Main Order Limits. Such designations which fall within a 15km radius are specifically dealt with at Appendix 12.3 Shadow Habitats Regulation Assessment (document reference 6.2.12.3).

1.62. In terms of national designations, Burbage Wood and Aston Firs SSSI is adjacent to the Main Order Limits western boundary. This SSSI is designated for its ash-oak-maple woodland, one of the best remaining examples in Leicestershire. This SSSI overlaps with the larger Burbage Common and Woods LNR which extends further to the west of the Main Order Limits (see Figure 12.1 , document reference 6.3.12.1 and 12.2, document reference 6.3.12.2), which in turn overlaps with Burbage Common and Woods LWS (discussed below).

1.63. Three additional SSSIs are located within the 5km search radius, to the north-east of the Main Order Limits, namely:

- Croft Pasture (3.8km), an area of acidic mixed grassland;
- Croft and Huncote Quarry (4.0km), designated for geological reasons; and
- Croft Hill (4.1km), an area of tussocky acid grassland, the largest of its kind in Leicestershire.

1.64. These three SSSIs are considered to sufficiently distant from the Main Order Limits (or any roads where traffic may increase) not to be at risk of any adverse effects from the proposed development, including air pollution, and are therefore not considered to be IEFs.

Non-statutory Designations

1.65. Non-statutory designations are also commonly referred to in planning policies as 'local sites', although in fact these designations are typically considered to be of importance at a county level. In Leicestershire, such designations are named LWS. Leicestershire also uses a system of cLWS and pLWS. Additionally, Ancient Semi-Natural Woodland (ASNW) should be considered at this level where it is not covered by other designations, such as LNR.

1.66. Within 3km of the central grid reference of the Main Order Limits are 13 LWS (see Figure 12., document reference 6.3.12.2), of which two lie within the Main Order Limits (Field Rose Hedgerow and Elmesthorpe Plantation Hedgerow), one lies immediately adjacent to the Main Order Limits western boundary (Burbage Common and Woods, which is also part of the LNR and SSSI), and one lies immediately adjacent to the Main Order Limits southern boundary (The Borrow Pit Grassland). Additionally, two LWSs (Billington Rough and Hay Meadow) lie 100m and 250m to the north of the railway respectively.

1.67. Also, within 3km of the Main Order Limits are 13 cLWS, and 60 pLWS, of which seven are within the Main Order Limits (Freeholt Meadow, Woodland adjacent to Aston Firs, Burbage Common Road Hedgerows, Burbage Common Road Railway Bridge, junction 2 Grassland, B4669 Road Verge and Elmsthorpe Boundary Hedgerows). Burbage Wood and Aston Firs SSSI and Freeholt Wood pLWS are also listed as ASNW. Table 1.2 shows those within or immediately adjacent to the Main Order Limits (see Figure 12.2, document reference 6.3.12.2) to be considered pertinent in relation to any future development.

Table 1.2: Non-statutory Site Designations within the Main Order Limits Zone of Influence.

Site Name (and Reference)	Designation	Distance from Main Order Limits	Reasons for Designations
Burbage Common and Woods	LWS	Immediately west	Transitional mesotrophic/acid grassland, ancient semi-natural woodland, significant bird and amphibian assemblages and Red Data Book species, with scrub and ponds. Community value.
Field Rose Hedgerow	LWS	Within	Species-rich hedgerow
Elmesthorpe Plantation	LWS	Within	Species-rich hedgerow

Site Name (and Reference)	Designation	Distance from Main Order Limits	Reasons for Designations
Hedgerow			
The Borrow Pit	LWS	Immediately south	Mesotrophic grassland
Billington Rough	LWS	Immediately north-east	Wet grassland with pond
Hay Meadow	LWS	250m to north of railway in north-east	Mesotrophic grassland
Freeholt Woods	pLWS	Immediately south	Broad-leaved woodland
Freeholt Meadow	pLWS	Within	Mesotrophic grassland
Woodland Adjacent to Aston Firs	pLWS	Within	Broad-leaved woodland
Castlewood Grassland	pLWS	Immediately south-west	Mesotrophic grassland
Stanton Road Verge 2	pLWS	Immediately north-east	Mesotrophic grassland
Home Farm Grassland	pLWS	Immediately north-east	Mesotrophic grassland
Trackside Meadow	cLWS	Immediately north	Mesotrophic grassland
Burbage Common Road Hedgerows	pLWS	Within	Species-rich hedgerow with trees
Burbage Common Road Railway Bridge	pLWS	Within	Brick railway bridge with ferns

Site Name (and Reference)	Designation	Distance from Main Order Limits	Reasons for Designations
Junction 2 Grassland	pLWS	Within	Mesotrophic grassland
B4669 Road Verge	pLWS	Within	Mesotrophic grassland
Elmesthorpe Boundary Hedgerows	pLWS	Within	Species-rich hedgerow

1.68. LRERC also provided a list of parish, district and county sites, which were designated as a result of a large-scale habitat assessment in the late 1980s and early 1990s. This system has since been superseded by LWS, but many of the sites still hold biodiversity value. Six of these were found within the Main Order Limits; two parish level ponds, three parish level hedgerows (two of which also form one of the pLWS) and one district level hedgerow.

1.69. The reasons for designation, results from the Extended Phase 1 survey and a further botanical survey suggest that the LWSs and some of the pLWSs located within the Main Order Limits hold some ecological value, namely the species-rich hedgerows, B4669 road verge Junction 2 grassland and Woodland Adjacent to Aston Firs. The Freeholt Meadow grassland, however, although richer in species than much of the rest of the Main Order Limits, it is unremarkable in its species composition. Burbage Common Road Railway Bridge, Freeholt Wood pLWS and Castlewood Grassland pLWS were not surveyed due to access limitations. With the exception of Burbage Common and Woods LWS, all LWS should be considered at the County level. Almost all of the pLWS should be considered at the District level, apart from Freeholt Meadow pLWS and Burbage Common Road Railway Bridge pLWS, which, due to their limited diversity should be considered at the Local level. Burbage Common and Woods LWS, which is also partially a SSSI and LNR should be considered at the County to National level as part of those designations.

1.70. The remainder of the non-statutory designations within 3km of the Main Order Limits are not considered to be at risk of significant negative impacts as a result of the Development Proposals. This is due to their degree of separation and lack of connectivity with the Main Order Limits, coupled with their reasons for designation. They have therefore been scoped out of the Ecological Impact Assessment (EcIA) as IEFs.

Policy Areas and Priority Habitats

1.71. Priority Habitats[7] and biodiversity policy areas do not receive direct statutory protection nor automatic planning policy protection, but nonetheless if present are useful context for designing biodiversity gain into any development scheme.

1.72. The Main Order Limits are not situated within or near to any national Nature Improvement Areas (NIAs). These are extensive landscape-scale areas comprising many land uses within which multi-stakeholder action can be prioritised and focused for enhancing biodiversity.

1.73. The Main Order Limits contain two areas of Priority Habitat, blocks of 'Deciduous Woodland[8]', including Woodland Adjacent to Aston Firs pLWS. In addition, some of the ponds and old hedgerows within or bounding the Main Order Limits are potential Priority Habitats and their importance and sensitivity to development impacts are covered in the Habitats section below.

Habitats

1.74. The Extended Phase 1 survey recorded a range of habitats present within and adjacent to the Main Order Limits, the nature and distribution of which is illustrated on Figure 12.3 (document reference 6.3.12.3). In addition, detailed descriptions of these habitat types, together with illustrative photographs, are provided in Annex 1 (encl.).

1.75. A summary, and qualitative assessment of these habitats is provided in Table 1.3.

[7] The 56 habitats occurring on the national list of habitats and species of principal importance for nature conservation; a list that is required to be in operation by Section 41 of the Natural Environment and Rural Communities Act 2006.

[8] Lowland Mixed Deciduous Woodland Priority Habitat is not referenced directly on the magic website but is instead broken down into other woodland types, including 'Deciduous Woodland' which is believed by EDP to relate to Lowland Mixed Deciduous Woodland.

Table 1.3: Summary of Habitats within the Main Order Limits

Habitat or Feature	Distribution within Main Order Limits	Intrinsic Ecological Importance
Semi-Improved Neutral Grassland	Small areas of grassland along the M69 corridor	**Local**, as confirmed by botanical survey information, limited by extent and isolation
Ponds	Ponds scattered across the Main Order Limits	**Local**, owing to number present
Stream	Steam corridor runs through the centre	**District**, owing to connective feature within the wider landscape
Hedgerows and Standard Trees	Forming external and internal boundaries. Trees found along many field boundaries	**District**, owing to age, species diversity, connectivity and established position in the local landscape
Woodland	Small areas of broad-leaved woodland, including the Woodland adjacent to Aston Firs pLWS	**Local/District**, owing to extent, age, structural and botanical diversity
Tall Ruderal Vegetation and Scattered Scrub	Patches scattered, including around ponds and field margins	**Site**, owing to limited species diversity or value
Improved Grassland	Large areas, particularly in the south and some smaller areas within the new link road boundary to the north	**Site**, owing to management regime and low-distinctiveness
Poor Semi-Improved Grassland	Individual fields and field boundaries	**Site**, owing to management regime and low-distinctiveness
Marshy Grassland	Small area of wet ground in the north-east	**Site**, owing to isolation and lack of botanical diversity

Habitat or Feature	Distribution within Main Order Limits	Intrinsic Ecological Importance
Amenity Grassland	Small area of gardens around buildings	**Negligible**, owing to management regime and low-distinctiveness
Arable	Covering roughly 2/3 of the Main Order Limits, particularly in the north and west	**Negligible**, owing to lack of botanical interest and structure
Built Environment	Buildings and hard-standing	**Negligible**
Ditches	Network of dry and wet ditches	**Local**, owing to lack of botanical interest

1.76. As noted within Table 1.3, the majority of habitat area within the Main Order Limits is of Negligible or Site level intrinsic importance. However, there are several habitats within the Main Order Limits that are considered to be of up to District level importance.

1.77. A number of the habitats or other features also require consideration in relation to their importance in maintaining populations of protected and/or notable species

Protected and/or Notable Species

1.78. The likelihood of presence, or confirmed presence, of protected/and or notable wildlife species within the Main Order Limits is summarised below with reference to desk study records, habitat suitability and detailed surveys where relevant. Further details are made available within Annexes and Plans where referenced.

1.79. Where a particular species or taxonomic group is having been confirmed to be present, or presence is inferred based on habitat suitability, the ecological importance or significance of the population or assemblage is assessed on a geographical scale.

Birds

1.80. The desk study returned a number of bird records from within 3km of the Main Order Limits. A record for the nationally protected barn owl (*Tyto alba*) was returned, in addition to records for the red listed skylark (*Alauda arvensis*), yellow wagtail (*Motacilla flava*), house sparrow (*Passer domesticus*), tree sparrow (*P. montanus*), linnet (*Linaria cannabina*), yellowhammer (*Emberiza citrinella*), cuckoo (*Cuculus canorus*) and song thrush (*Turdus philomelos*). Although many of the species records returned were associated with Burbage Woods, the assemblage of birds returned within the data search

was otherwise typical of an urban edge farmland site in central England.

1.81. Full details of winter bird and breeding bird surveys can be found in Annex 2 and 3 respectively (encl.).

Wintering Birds

1.82. The arable fields and hedgerows around the Main Order Limits have the potential to support wintering farmland birds. The species targeted during the survey were those of conservation concern (Red and Amber Listed), including the species whose main habitat is farmland, but also those species that use farmland in large numbers in winter, but for which it is not necessarily their main habitat.

1.83. A total of 50 species were recorded throughout the survey visits, of which 22 (i.e. 44%) are considered to be of conservation concern (13 are listed on the Red list; 9 are on the Amber list of Birds of Conservation Concern (BoCC). The remaining 28 species are either on the Green list or have no status (i.e. are not native to the UK). The distribution of birds recorded during the surveys is shown on Figures 12.5 to 12.7 (document reference 6.3.12.5 - 6.3.12.7).

1.84. The diversity and abundance of species recorded is considered to be fairly typical for a site of this size and type, although the surveys did record several large flocks of red listed lapwing utilising the Site, and large flocks of the over-wintering migrant species redwing and fieldfare. Smaller flocks of other Red list species including skylark, yellowhammer and starling were also observed. The large flocks of lapwing were recorded in arable fields in the northern part of the Site, north of Burbage Common Road.

1.85. Skylark, along with the other farmland specialist species mentioned, were also recorded using the arable fields, hedgerow and woodland edge habitats across the Site. Low numbers of other Red listed species were also recorded during the surveys including song thrush, house sparrow and grey partridge.

1.86. The Amber list species found to be utilising the Site were mostly recorded in low numbers, although larger numbers of black-headed gull were recorded associated with fields in the north of the Site. Also recorded within an arable field in the north of the Site was a flock of snipe, although this species was recorded on one occasion only. Mallard were recorded on every survey, generally associated with the on-site waterbodies.

1.87. The assemblage is therefore considered to be of value at a Local-District level.

Breeding Birds

1.88. The grassland habitats which comprise a large proportion of the Main Order Limits are generally grazed or managed intensively, therefore they are not considered to afford breeding opportunities for large numbers of ground nesting species. However, a limited number of ground nesting species are considered likely to utilise the arable fields which form the majority of land cover across the north and west of the Main Order Limits.

1.89. The hedgerows, including mature trees, and scrub, have suitability to support nesting birds. However, owing to the limited extent of habitats, the Main Order Limits are not considered to have potential to support a significant bird assemblage.

1.90. Out of 59 species recorded during the three survey visits in 2021, 23 were species of conservation concern: 12 Red Listed and 11 Amber Listed. Of these species, 14 were considered to probably be breeding 'on-site', three to possibly be breeding and it was considered that six were non-breeders. The distribution of birds recorded on-site during the BBS is shown on Figures 12.8 to 12.10 (document reference 6.3.12.8 - 6.3.12.10)

1.91. Abundance and diversity of bird species is considered to be consistent with the extent and diversity of habitats within the Main Order Limits. The majority of species recorded on-site were associated with the arable fields and boundary hedgerows. The limited size of other habitats, such as wetland and woodland habitats, is considered to have limited the potential for large populations of habitat specialists. Despite this, a number of ground nesting species are present within the Main Order Limits, including a breeding skylark population, and small numbers of lapwing, yellowhammer, linnet, yellow wagtail and grey partridge. For this reason, the assemblage is considered to be of value at a District level.

Bats

1.92. The data search returned a negative result for any records of Annex II bat species within 6km of the Main Order Limits.

1.93. A number of bat records were however returned from within a 3km radius, namely pipistrelle species (*Pipistrellus* sp.), brown long-eared (*Plecotus auritus*), and noctule (*Nyctalus noctula*). None of the records were located within the Main Order Limits, however a number of unspecified bat roosts were recorded within 1km of the Main Order Limits, particularly to the south.

Bat Roosting

1.94. The Main Order Limits contain 33 buildings/built structures (see Figure 12.12, document reference 6.3.12.12), all of which were assessed for their potential to support roosting bats. Four of these buildings [redacted]) were found to support bat roosts in 2021. [redacted] were found to support only single common pipistrelle bats in 2021 and no roosts had been recorded in these buildings previously. [redacted] was found to support a roost of two common pipistrelle bats 2021 and supported three bats of this species during the previous surveys. [redacted] was found to support eight common pipistrelle bats in 2021 and in previous surveys was found to support three common pipistrelle and six long-eared bats.

1.95. A total of 83 trees were found to have bat roost potential (8 with high, 22 with moderate and 53 with low potential) within the Main Order Limits (see Figure 12.13, document reference 6.3.12.13). No trees were confirmed as roosts during the ground level visual assessment or subsequent general activity surveys.

1.96. Further details of bat roosting within buildings and trees are provided within Annex 4

(encl.).

Bat Activity

1.97. Detailed results from the dusk and dawn activity surveys and automated detector recordings in 2021 are provided in Annex 4. The distribution of bat activity recorded around the Main Order Limits during the transect surveys is illustrated on Figures 12.14 to 12.20 (document reference 6.3.12.14 - 6.3.12.20).

1.98. The activity survey recorded low to moderate levels of commuting and foraging bat activity, principally associated with hedgerows and waterbodies. The highest levels of activity recorded during transect surveys was along the stream corridor and adjacent species-rich hedgerows. The automated detectors recorded similar levels, with no particular hotspots of activity.

1.99. The vast majority of activity recorded on both the transect and automated detector surveys was by common and widespread species with common pipistrelle bats (*Pipistrellus pipistrellus)* accounting for 79.9% of the automated detector recordings in 2021. Noctule (*Nyctalus noctula*) accounted for a further 11.0% of total calls in 2021, and the remainder were made up of small numbers of soprano pipistrelle (*P. pygmaeus*), Myotis species (Myotis sp.), serotine (Eptesicus serotinus), long-eared bat (*Plecotus auritus*), barbastelle (*Barbastella barbastellus*), Nathusius' pipistrelle (*Pipistrellus nathusii*) and Leisler's bat (*Nyctalus leisleri*).

1.100. Most of the species recorded are considered to be widespread in central England and their presence in such numbers is not considered to be significant beyond a local context. However, there were low numbers of recordings of barbastelle, which is one of the four Annex II species[9] found within the UK. The Main Order Limits are located within the range for the species and as such it is expected that low numbers would be present in the area, particularly with the presence of large areas of ancient woodland nearby. Therefore, the presence of barbastelles in low numbers implies no more than a local level of importance.

1.101. The bat assemblage recorded is considered to be relatively typical for an urban edge farmland site in central England with common and widespread generalist species accounting for the vast majority of foraging and commuting activity. The assemblage of foraging/commuting bats is therefore considered to be of Local value.

Badgers

1.102. A reasonably large number of recent records of badger were returned by the desk study. The majority of these were for setts along the railway line to the north and the along the M69 embankment.

1.103. During 2018 surveys one outlier badger sett was recorded north of the bridge bank located on the eastern boundary of the Main Order Limits and one subsidiary sett was recorded

[9] Annex II of the Habitats Directive lists species to which a strict protection regime, greater than that provided within UK law, must be applied across their entire natural range within the EU, both within and outside of sites designated primarily for the presence of such species.

in the stream bank and hedge to the west of Hobbs Hayes Farm. A possible main sett was also recorded just outside the Main Order Limits, approximately 250m south-west of the subsidiary sett (see Figure 12.21 (Confidential) document reference 6.3.12.20).

1.104. The outlier sett had 3 entrances and appeared to be partially active in 2018, with evidence of cleared debris from the entrances present. This sett was found to be partially active in 2021.

1.105. The subsidiary sett in the stream bank had 3–4 entrances, whereas the possible main sett located 250m south-west of it had 8 entrances (dense blackthorn scrub contributed to lack of visibility/accessibility). These setts appeared to be partially active in 2018, but could not be resurveyed in 2021 for health and safety reasons, and it should be assumed that these remain active unless proven otherwise.

1.106. Badger push-throughs, latrines, snuffle holes and footprints were recorded throughout the south and west of the Main Order Limits during the 2018 and 2021 surveys, suggesting that much of the area is used by badger clans for at least occasional foraging.

1.107. Badgers are relatively common and widespread nationally and within Leicestershire, the presence of setts on a site of this size is consequently not unexpected. The relatively small population present is therefore considered to be of only Site-level importance; however, badger should be included as an IEF by virtue of its legal protection.

Otter and Water Vole

1.108. The data search returned one otter record from 2002 in Elmesthorpe and seven water vole records from 1998 to 2003 in Burbage Common and Elmesthorpe. These locations are within 3km of the Main Order Limits.

1.109. No evidence of otter/water vole was recorded during the detailed walkover survey in June 2018. Potential evidence of water vole foraging (possible feeding remains), and a potential otter spraint were found in August 2018 adjacent to Burbage Wood. No evidence of these species was recorded during the update survey in July 2021.

1.110. The stream section that runs from the freehold woodland, north of Hobbs Hayes farm towards the M69 is heavily vegetated and is largely shaded. The bankside vegetation is sparse and dominated by rosebay willowherb (*Chamaenerion angustifolium*), meadow sweet (*Filipendula ulmaria*), nettles (*Urtica dioica*) and hogweed (*Heracleum sphondylium*). The lack of suitable submerged vegetation makes the stream poorly suited to water voles, which prefer sites with wide swathes of riparian vegetation, and provides little cover for potential dispersing otters. The banks of the stream comprise steep earth banks and silt substrate, which is considered suitable for burrowing mammals. The stream supports a sediment base with small stone/gravel in places. At the time of survey, the stream had little to no flow with a water depth of <5cm, which is less than the preferred 1m depth for water voles. The stream banks are 2m deep and considered to support a suitable water depth dependant on weather conditions however due to the proximity of a more suitable watercourse to the north of the Main Order Limits and a lack of connectivity due to the railway line running along the northern border, water vole

presence is unlikely. The stream is considered unlikely to support a significant abundance of fish and is not considered to provide an important foraging resource for otters.

1.111. Overall, the watercourses present within the Main Order Limits are considered to offer sub-optimal habitat for otters/water voles, and owing to the evidence recorded during the surveys it is considered that otters and water voles are using the stream to the north-west of the Main Order Limits for foraging and dispersal, however in very small numbers owing to limited connectivity to a more suitable watercourse to the north of Main Order Limits.

1.112. The evidence found is not considered to be indicative of a permanent population of either species on-site and, in the case of otter, is more likely to indicate the overspill of populations from the adjacent Burbage Common and Woods LNR. Otter is judged to be of up to Site-level importance and, owing to the lack of suitable habitat and definitive field signs, water vole is judged to be absent.

Other Mammals

1.113. There are five records of hedgehog (*Erinaceus europaeus*) within 3km of the Main Order Limits, focussed around Sapcote.

1.114. Suitable hedgehog habitat is present, although given the prevalence of large areas of unsuitable habitat (improved pasture and arable land), any population present is likely to be small.

1.115. European/brown hares (Lepus europaeus) were recorded occasionally during survey visits, including during bird and badger surveys. All arable land in the north and west of the Main Order Limits represents suitable habitat for this S.41 priority species and the population is therefore judged to be of up to Site-level importance.

Amphibians

1.116. Great crested newt, common frog (*Rana temporaria*), smooth newt (*Lissotriton vulgaris*) and common toad (*Bufo bufo*) records from as recently as 2012 were all returned as part of the desk study. The majority of great crested newt records were from Hinckley Golf Course to the north-west, Sapcote to the south-east and around the Earl Shilton bypass, which is situated to the north-east of the Main Order Limits.

1.117. There are nine ponds within the Main Order Limits. There are also 37 off-site ponds within 500m (see Figure 12.22, document reference 6.3.12.22). Along with aquatic habitat, the Main Order Limits support hedgerows, woodland and scrub which provide suitable terrestrial habitat for great crested newts. Detailed results of the HSI assessment, eDNA sampling and conventional pond surveys can be found within Annex 5 (encl.).

1.118. Although the on-site ponds have potential to support great crested newts, the habitat is low quality, all surveyed ponds having scored ‘poor’ or ‘below average’ in the HSI assessment, owing to a lack of aquatic botanical diversity, the presence of fish stock, shading and other factors.

1.119. In 2018, the eDNA survey returned a positive result for the presence of great crested newt eDNA in ponds P2, P7 and P62 (onsite) and P35 (off-site) but was negative for all other surveyed ponds within the Main Order Limits. Access was not granted to the majority of off-site ponds. No great crested newts (or eggs or larvae) were recorded during the course of the six conventional pond surveys undertaken of P2, P7, P35 and P62 in 2018. A second eDNA test was carried out on these four ponds following this result, resulting in a positive result for just one pond, P2. In 2019, only P63 (off-site) returned a positive eDNA result and in 2021 all sampled ponds tested negative.

1.120. Based on these findings it is concluded that a small, non-breeding population of great crested newt was once present, but this has since declined to undetectable levels. At the current time, therefore, great crested newts are not considered to warrant inclusion as an IEF in the EcIA.

1.121. Common toads are a priority species and were recorded within the Main Order Limits during reptile surveys. The ponds present within the Main Order Limits are small and unlikely to support significant numbers of common toad, given the extent of unsuitable habitat between possible breeding ponds. The population is judged to be of no more than Local level importance.

Reptiles

1.122. The desk study returned records of grass snake (*Natrix helvetica*) on the edge of Burbage and in arable field margins to the north of the Main Order Limits. A record of adder (*Vipera berus*) was also returned from Hinckley Golf Club in 2005. The Main Order Limits support habitats suitable for reptiles, namely rough grassland, field margins, woodland, scrub and hedgerows.

1.123. The results of the reptile surveys carried out in 2018, 2019 and 2021 are set out in full within Annex 6 (encl.). The aggregated sightings of reptiles from the three surveys are illustrated on Figure 12.23 (document reference 6.3.12.23).

1.124. During the surveys a small number of grass snakes, and a single slow worm, have been recorded at the Main Order Limits. The maximum count of grass snake was 4 in 2018, and 1 in both 2019 and 2021, although the survey in 2021 was significantly disrupted by the removal of large numbers of the artificial refugia. The single slow worm was recorded during the 2019 survey only. Accordingly, low populations of both species are present within the Main Order Limits.

1.125. The reptile population is therefore considered to be of Site level importance.

Invertebrates

1.126. A number of invertebrate records were returned as part of the desk study, with notable species including a number of S.41 (NERC) listed moth species and white-letter hairstreak butterfly (Satyrium w-album).

1.127. The invertebrate scoping exercise completed on 23 and 24 May 2018 (see Annex 7 [encl.])

identified habitats within the Main Order Limits which may support locally notable invertebrate species, including ponds, hedgerows, herb-rich grassland, (along the M69 corridor) woodland edge and scrub.

1.128. The only terrestrial invertebrate survey recommended as a result of the scoping exercise was for white-letter hairstreak butterfly. Winter eggs searches for this species, undertaken in 2019 and again in 2021, did not record any eggs of this species. Details of this survey are also found within Annex 7.

1.129. An Aquatic Invertebrate survey was undertaken of those ponds within the site that were deemed to have potential to support an invertebrate assemblage identified by the scoping survey. Of the six ponds assessed three were dry and three were sampled. The survey found that pond 5 had three Notable Invertebrate species and three local species present. Details of this survey are also found within Annex 8.

1.130. Based on these survey findings the invertebrate populations likely to be present, based on the habitats present and the surveys undertaken, are judged to be of no greater than Site level importance.

SUMMARY OF FINDINGS

1.131. Based on the baseline investigations described above, the IEFs pertinent to an Ecological Impact Assessment of the Proposed Development (those of Local level importance or greater or those subject to specific legal protection), are listed in Table 1.4.

Table 1.4: Important Ecological Features Warranting Consideration by the EcIA.

Importance Ecological Feature	Key Attributes	Nature Conservation Importance
Statutory Designated Sites		
Burbage Woods and Aston Firs SSSI	Ash-Oak-Maple woodland adjacent to the west of the Main Order Limits.	National
Burbage Common and Woods LNR	Semi-natural woodland and mesotrophic grassland, overlapping with the SSSI.	County/National
Non-statutory Designated Sites		

Importance Ecological Feature	Key Attributes	Nature Conservation Importance
Burbage Common and Woods LWS	Semi-natural woodland and mesotrophic grassland, overlapping with the SSSI.	County/National
Field Rose Hedgerow LWS	Species-rich hedgerow with 14 woody species.	County
Elmesthorpe Plantation Hedgerow LWS	Species-rich hedgerow with 8 species	County
The Borrow Pit LWS	Mesotrophic grassland.	County
Billington Rough LWS	Wet grassland with pond	County
Hay Meadow LWS	Mesotrophic grassland.	County
Freeholt Meadow pLWS	Species-poor, semi-improved grassland	Local
Woodland adjacent to Aston Firs pLWS	On-site broad-leaved woodland with moderate structural and botanical diversity.	District
Castlewood Grassland pLWS	Mesotrophic grassland (not surveyed).	District
Burbage Common Road Hedgerow pLWS	Species-rich hedgerow with 7 woody species.	District
Burbage Common Road Railway Bridge pLWS	Railway bridge with ferns. Potential for roosting bats but none recorded.	Local
Junction 2 Grassland pLWS	Semi-improved neutral grassland surrounded by woodland.	District

Importance Ecological Feature	Key Attributes	Nature Conservation Importance
B4669 Road Verge pLWS	Mesotrophic grassland (not surveyed).	District
Elmesthorpe Boundary Hedgerows pLWS	Species-rich hedgerow with 9 woody species.	District
Stanton Road Verge 2 pLWS	Mesotrophic grassland.	District
Home Farm Grassland pLWS	Mesotrophic grassland.	District
Trackside Meadow cLWS	Mesotrophic grassland.	District
Habitats		
Semi-improved Neutral Grassland	Grassland with poor to moderate species-diversity, value limited by extent and isolation.	Local
Hedgerow and Tree Network (not including pLWS or LWS)	Network of predominantly species-rich hedgerows and mature tress associated with the field boundaries that form dispersal corridors for wildlife.	District
Woodland (not including Woodland adjacent to Aston Firs pLWS)	Small areas of plantation and semi-natural broadleaved woodland.	Local
Ponds	Network of permanent water bodies supporting a few aquatic species and forming part of the local ecological network.	Local

Importance Ecological Feature	Key Attributes	Nature Conservation Importance
Stream	Stream supporting very few aquatic species but forming a wildlife corridor through landscape.	District
Ditches	Mostly dry, but a small number of wet ditches present supporting aquatic flora.	Local
Fauna		
Winter Birds	Assemblage including reasonable flocks of farmland specialists, with a range of other species of conservation concern in smaller numbers. Value limited by management regime and levels of disturbance.	Local to District
Breeding Birds	Breeding assemblage including reasonable numbers of farmland specialists, including a population of up to 42 pairs of skylark and other ground nesting species.	District
Bats	Common and widespread assemblage of foraging/commuting/roosting bats primarily associated with higher value boundary hedgerow and tree habitats.	Local
Badger	An active subsidiary sett, off-site main sett and outlier sett. The habitats present on-site provide opportunities for foraging and commuting badgers.	Site
Otter	One old spraint on wet ditch in north-western corner of the Main Order Limits.	Local
European hare	Hare present over most arable land within the Main Order Limits.	Local

Importance Ecological Feature	Key Attributes	Nature Conservation Importance
Reptiles	Records of grass snake in local area, low population recorded on-site. Low population of slow worm also recorded on-site.	Site
Common toad	Records of amphibians present nearby, including common toad. Medium population recorded during reptile and great crested newt surveys.	Local

Annex 1 ◆ Habitat Descriptions and Illustrative Site Photographs

SURVEY METHODS

Extended Phase 1 Survey

A1.1 The principal habitats within the Site together with their dominant/characteristic plant species were identified during the Extended Phase 1 survey. The Extended Phase 1 survey was undertaken by suitably experienced surveyors on 19 June 2017 and 26 June 2018. An update Extended Phase 1 survey was carried out on 14 and 15 May 2019 and again on 01 July 2021.

A1.2 The survey technique adopted for the initial habitat assessment was at a level intermediate between a standard Phase 1 Habitat survey technique[10], based on habitat mapping and description, and a Phase 2 survey, based on detailed habitat and species surveys. The survey technique is commonly known as an Extended Phase 1 survey. This level of survey does not aim to compile a complete floral and faunal inventory for the Site.

A1.3 The level of survey involves identifying and mapping the principal habitat types and identifying the dominant plant species present in each principal habitat type. In addition, any actual or potential protected species or species of principal importance are identified and scoped.

A1.4 Habitats identified during Extended Phase 1 survey are discussed in turn below and should be read in conjunction with Figures 12.3 and 12.4 and the illustrative photographs provided within the text.

Limitations

A1.5 The Extended Phase 1 survey area was not fully accessible at the time of the initial Site visits due to red line changes and was therefore completed the following years along with updates to previous areas. Surveys were undertaken during between May and August which is within the optimal survey period of April-September for this type of survey. The survey was therefore not considered to be seasonally constrained.

Botanical Surveys

A1.6 Targeted botanical surveys were undertaken of the pLWS within the Site boundary, to inform an assessment of their value against the current LWS selection guidelines for

[10] Joint Nature Conservation Council (2004) *Handbook for Phase 1 Habitat Survey – A Technique for Environmental Audit* (reprinted with minor corrections for original Nature Conservancy Council publication).

Leicestershire and Rutland[11].

A1.7 A survey of Burbage Common Road Railway Bridge pLWS, specifically to record the fern species present, was undertaken by an experienced surveyor on 19 March 2021.

A1.8 In addition to the above, a botanical survey of Junction 2 Grassland pLWS, Freeholt Meadow pLWS and Woodland Adjacent to Aston Firs pLWS was undertaken by an experienced surveyor on 09 June 2021. During the survey, plant species abundance was recorded using the DAFOR scale (Dominant, Abundant, Frequent, Occasional, and Rare) to aid in the identification of plant communities/habitat types. Within the two grassland pLWSs, quadrat sampling (with three quadrats in each site) was also undertaken.

Limitations

A1.9 Both surveys were undertaken in suitable weather conditions and at an appropriate time of year for the species being targeted. These are therefore not considered to be limited by seasonal or climatic factors.

RESULTS

Hedgerows

A1.10 Numerous hedgerows are present across the Site, the majority of which are species-rich see Figure 12.4). The majority of these are box-cut, many with standard trees (ordinarily ash Fraxinus excelsior and oak Quercus robur) along their length, forming the internal and external boundaries of the Site. A small number are tall and bushy, particularly along the edges of woodland and waterways. Full details of hedgerows within or near the Site boundary can be found in Table A1.1, species codes are explained in Table A1.2.

Field Rose Hedgerow LWS and Elmesthorpe Plantation Hedgerows LWS

A1.11 Two sections of hedgerow within the Site are designated as LWS, namely hedgerows H52 and H56, which form the Field Rose Hedgerow LWS, and hedgerows H3 and H5, which form the Elmesthorpe Plantation Hedgerows LWS. Each of these hedgerows is species-rich, with 14, 11, 9 and 8 woody species recorded respectively.

Elmesthorpe Boundary Hedgerows pLWS and Burbage Common Road Hedgerows pLWS

A1.12 Two further sections of hedgerow within the Site are designated as pLWS, namely hedgerows H30, H32 and H35, which form the Elmesthorpe Boundary Hedgerows pLWS, and hedgerows H57 and H58, which form the Burbage Common Road Hedgerows pLWS. Each of these hedgerows is species-rich, with 6 or more woody species recorded.

[11] Guidelines for the selection of Local Wildlife Sites in Leicester, Leicestershire and Rutland (Leicestershire County Council, 2011).

Table A1.1: Full Details of Hedgerows.

Hedgerow No.	Schedule 3 Woody Species noted across Hedgerow Length	Total No. Schedule 3 Species	Total Gaps <10%	Standard Tree (1 or more per 50m)	Ditch/Bank
H1	Cm, Ps, Ca, Ac, Rosa, Sc, Qr, Fe, Up	7	Y	N	N
H3	Rosa, Fe, Ac, Ps, Qr, Ca, Cm, Ia, Sn	9	Y	Y	Y
H4	Ps, Rosa, Fe, Ac, Ca, Cm, Ia, Qr, Sn	9	Y	N	N
H5	Ps, Ca, Cm, Fe, Cs, Ac, Rosa, Qr	8	Y	Y	N
H6	Rc, Ps, Qr, Cm, Cs, Lv, Fe	7	Y	Y	N
H7	Sn, Fe, Cs, Lv, Qr, Ps, Ac	7	Y	N	N
H8	Ue, Ps, Qr, Cm, Lv, Rosa, Fe, Sn, Up, Ac	10	Y	Y	Y
H9	Cm, Fe, Rosa, Ac, Ps	5	Y	N	N
H10	Ps, Ac, Rosa, Cm, Sn, Qr, Fe	7	Y	N	N
H11	Cm, Ps, Rosa, Qr, Ia, Ac, Rc, Fe	8	Y	N	N
H12	Cm, Sn, Fe, Rosa, Lv, Qr, Ps, Ac	8	Y	N	N

Hedgerow No.	Schedule 3 Woody Species noted across Hedgerow Length	Total No. Schedule 3 Species	Total Gaps <10%	Standard Tree (1 or more per 50m)	Ditch/Bank
H13	Up, Ps, Sn, Cm, Rosa, Fe, Lv, Ee, Qr, Ca, Cs	11	N	N	N
H14	Ps, Ac, Fe, Cm, Ee	5	Y	N	N
H15	Fe, Qr, Cm, Rosa, Sn	4	Y	N	N
H16	Ps, Cm, Rosa, Fe	4	Y	N	N
H17	Cm, Qr, Ps, Rosa, Fe, Ac, Sn	7	Y	N	Y
H18	Cm, Ia, Qr, Ps, Fe, Rosa	6	Y	Y	N
H19	Ps, Qr, Cm, Sn, Ca, Fe, Rosa, Cs, Ee, Ag	10	Y	N	N
H20	Cm, Ps, Rosa, Fe, Lv, Up, Qr, Sn, Ee, Ag	10	Y	N	N
H21	Fe, Cm, Rosa, Ps	4	Y	N	N
H22	Rosa, Cm, Fe, Sn	4	Y	N	Y
H23	Fe, Cm, Rosa, Ps, Sn, Ms	6	Y	N	Y
H24	Cm	1	Y	N	Y
H25	Cm, Up, Ia, Rosa, Sn, Ps	6	N	N	N

Hedgerow No.	Schedule 3 Woody Species noted across Hedgerow Length	Total No. Schedule 3 Species	Total Gaps <10%	Standard Tree (1 or more per 50m)	Ditch/Bank
H26	Cm, Ps, Fe, Rosa	4	Y	N	N
H27	Cm, Ps, Sn, Fe, Rosa	5	Y	N	N
H28	Ps, Fe, Cm, Ac, Ms, Sn, Rosa, Qr	8	Y	N	N
H29	Cm, Sn, Rosa, Ps, Fe	5	Y	N	N
H30	Fe, Up, Rosa, Ps, Ac, Cm, Ca	7	Y	Y	Y
H31	Ps, Cm, Up, Rosa, Sn, Sc, Ag	7	Y	N	N
H32	Up, Ca, Ps, Ac, Sn, Cm, Fe, Qr	8	N	Y	Y
H33	Ps, Cm, Qr, Sn, Ca, Ac, Rosa, Fe	8	Y	Y	N
H34	Qr, Ca, Fe, Ac, Rosa, Ca, Up	7	Y	Y	Y
H35	Up, Ca, Ps, Ac, Sn, Cm, Fe, Qr	8	Y	Y	Y
H36	Qr, Rosa, Ac, Ca, Cm, Fe, Sn, Ps	8	Y	Y	Y
H37	Ps, Rosa, Fe, Ca, Cm, Sc, Qr, Sn, Ag	8	Y	N	Y

Hedgerow No.	Schedule 3 Woody Species noted across Hedgerow Length	Total No. Schedule 3 Species	Total Gaps <10%	Standard Tree (1 or more per 50m)	Ditch/Bank
H38	Rosa, Cm, Fe, Sn, Ee, Ps,Up	7	N	Y	N
H39	Sn, Cm, Ps, Ag	4	Y	N	Y
H40	Cm, Rosa, Lv, Ps, Rc, Sn, Fe	7	Y	N	N
H41	Sn, Cm, Rosa, Cs, Qr, Ps	6	N	N	N
H42	Qr, Ac, Cm, Rosa, Ps, Fe, Lv, Sn	8	N	N	Y
H43	Ps, Sn, Rosa, Cm	4	Y	N	N
H44	Cm, Fe, Qr, Rosa, Ps, Sn	6	N	N	N
H45	Ms, Cm, Sn, Rosa, Up, Ps, Sc, Vl, Ca, Ee	10	N	N	Y
H46	Fe, Cm, Up, Ps, Rosa	5	N	Y	Y
H47	Ps, Up, Rosa, Cm, Fe, Ms, Sn, Ac	8	N	N	Y
H48	Up, Ps, Fe, Ac, Sn, Rosa, Qr, Cm, Lv, Ia	10	Y	N	Y
H49	Fe, Cm, Ps, Sn, Rosa, Ac, Rc, Ca, Qr, Up, Ee	11	Y	N	N

Hedgerow No.	Schedule 3 Woody Species noted across Hedgerow Length	Total No. Schedule 3 Species	Total Gaps <10%	Standard Tree (1 or more per 50m)	Ditch/Bank
H50	Ps, Cs, Rosa, Cm, Ac, Sn, Ms, Up, Fe	9	Y	N	Y
H51	Fe, Up, Ps, Rosa, Cm	5	Y	N	N
H52	Ia, Ee, Rc, Fe, Ps, Cm, Ac, Cs, Rosa, Lv, Sn, Qr, Vo, Vl	14	Y	N	Y
H53	Sc, Qr, Fe, Ag, Sf, Cm, Bp	7	Y	N	Y
H54	Ps, Qr, Cm, Sn, Cs, Up, Fe, Rosa, Ac, Ca, Ms	11	Y	N	Y
H55	Ps, Qr, Cm, Sn, Cs, Up, Fe, Rosa, Ac, Ca, Ms	11	Y	N	Y
H56	Fe, Ps, Cm, Ca, Ac, Rosa, Lv, Cs, Qr, Ia, Sn	11	Y	Y	Y
H57	Sn, Up, Qr, Fe, Ps, Rosa	6	Y	Y	Y
H58	Up, Ps, Fe, Qr, Cm, Ac	6	Y	N	Y
H59	Cm, Qr, Ps, Fe, Sn, Up, Ug	7	Y	N	Y
H60	Ps, Fe, Cm, Rosa, Ac, Ia, Lv, Sn, Qr, Ag	10	Y	Y	Y
H61	Ac, Cm, Ca, Ps, Fe, Qr,	10	Y	N	N

Hedgerow No.	Schedule 3 Woody Species noted across Hedgerow Length	Total No. Schedule 3 Species	Total Gaps <10%	Standard Tree (1 or more per 50m)	Ditch/Bank
	Lv, Ag, Ca, Rosa				
H62	Fe, Ps, Cm, Ca, Ac, Rosa, Cs, Qr, Up	9	Y	Y	N
H63	Ps, Ms, Ac, Cm, Fe, Rosa, Qr, Cs, Sf, Ca	10	Y	N	N
H64	Cm, Sn, Rosa, Fe, Ps, Ac, Up, Qr	8	Y	N	N
H65	Pa, Ue, Fe, Ac, Vl, Cm, Ps, Up, Sc, Sn, Rosa, Qr	12	Y	N	Y
H66	Ps, Cm, Fe, Qr, Rosa, Ms, Sn, Ac	8	Y	Y	Y
H67	Sn, Ms, Sf, Ps, Cs, Up, Lv, Qr, Ac, Ia, Ee, Fe, Rosa	13	Y	Y	N
H68	Cm, Ps, Fe, Ac, Ms, Rosa, Sn, Rc, Lv	9	Y	N	Y
H69	Fe, Up, Cm, Ps, Rosa, Sn, Sc	7	Y	N	N
H70	Ac, Ps, Cm, Sn, Fe, Lv	6	Y	N	N
H71	Cm, Ps, Rosa, Fe, Up, Qr	6	Y	N	N
H72	Ps, Cm, Sn, Rosa, Up	5	Y	N	N

Hedgerow No.	Schedule 3 Woody Species noted across Hedgerow Length	Total No. Schedule 3 Species	Total Gaps <10%	Standard Tree (1 or more per 50m)	Ditch/Bank
H73	Ps, Qr, Fe, Ac, Rosa, Sn, Ca	7	Y	Y	Y
H74	Cm, Fe, Rosa, Ps, Sn, Up, Ac, Qr	8	N	N	N
H75	Qr, Sn, Cm, Ps, Fe, Rosa, Up	7	Y	Y	N
H76	Ps, Sn, Up, Ac, Sar, Ca	6	Y	N	N
H77	Qr, Sn, Cm, Ps, Fe, Rosa, Up	7	Y	Y	N
H78	Cm, Ps, Fe	3	Y	N	N
H79	Cm, Sn, Ps, Rosa, Qr, Fe	6	Y	N	Y
H80	Sn, Rosa, Cm, Ps, Fe, Ug, Ag	7	Y	N	N
H81	Sn, Cm, Fe, Rosa, Ps	5	Y	N	N
H82	Ps, Cm, Ac, Rosa, Up, Fe, Sc, Sn, Ag	9	Y	N	N
H83	Cm, Ps, Fe, Rosa, Cs, Ac, Up, Sn	8	Y	N	N
H84	Rosa, Cm, Sn, Ac, Ps, Ca	6	Y	N	N

Hedgerow No.	Schedule 3 Woody Species noted across Hedgerow Length	Total No. Schedule 3 Species	Total Gaps <10%	Standard Tree (1 or more per 50m)	Ditch/Bank
H85	Ps, Cm	2	Y	N	N
H86	Cm, Ps, Fe, Sn	4	Y	N	N
H87	Cm, Sn, Fe, Ps, Rosa	5	Y	N	N
H88	Cm, Fe, Lv, Sn, Rosa	5	Y	N	Y
H89	Cm, Ps, Ca, Ac, Sn, Qr	6	Y	Y	N
H90	Ps, Cm, Sn, Cs, Rosa, Up, Ac	7	Y	Y	N
H91	Ps, Cs, Up, Qr	4	Y	N	Y
H98	Fe, Qr, Cm, Rosa, Ca, Ia	6	Y	Y	Y
H99	Ms, Rosa, Fe, Cm, Sn	5	Y	Y	N
H100	Cm, Sn, Rosa, Fe	4	Y	Y	N
H101	Cm, Rosa, Fe, Sn	4	Y	Y	N
H104	Cm, Rosa, Fe, Ee, Ps, Ms, Ca	7	Y	Y	Y
H106	Fe, Sc, Ps, Cm, Ca, Ac, Qr	7	Y	Y	Y
H109	Cm, Rosa, Fe, Ac, Ee,	8	Y	Y	N

Hedgerow No.	Schedule 3 Woody Species noted across Hedgerow Length	Total No. Schedule 3 Species	Total Gaps <10%	Standard Tree (1 or more per 50m)	Ditch/Bank
	Sn, Ca, Ps				
H110	Ps, Cm, Ca	3	Y	Y	N
H111	Ps, Cm, Rosa, Fe, Ee, Qr	6	Y	Y	Y
H118	Ps, Ac, Cm, Qr, Rosa, Fe	6	Y	Y	Y
H119	Cm, Elm, Fe, Rosa, Ee, Ca	6	Y	Y	Y
H120	Ps, Fe, Cm, Rosa, Ee, Sc, Qr, Ag	7	N	Y	N
H122	Cm, Rosa, Fe, Ac, Ee	5	Y	N	N
H124	Cm, Fe, Ac, Ee	4	Y	Y	N
H125	Rosa, Cm, Ps, Fe, Ac, Ee, Sn	7	Y	N	Y
H127	Cm, Fe, Ac, Ee	4	Y	N	Y

Table A1.2: Species Codes.

Code	Common name	Scientific name
Ac	Field maple	*Acer campestre*

Code	Common name	Scientific name
Ag	Alder	*Alnus glutinosa*
Bp	Silver birch	*Betula pendula*
Ca	Hazel	*Corylus avellane*
Cm	Hawthorn	*Crataegus monogyna*
Cs	Dogwood	*Cornus sanguinea*
Ee	Spindle	*Euonymus europaeus*
Fe	Ash	*Fraxinus excelsior*
Ia	Holly	*Ilex aquifolia*
Lv	Wild privet	*Ligustrum vulgare*
Ms	Crab-apple	*Malus sylvestris*
Pa	Wild cherry	*Prunus avium*
Ps	Blackthorn	*Prunus spinose*
Qr	Pedunculate oak	*Quercus robur*
Rc	Buckthorn	*Rhamnus cathartica*
Rosa	Dog or field rose	*Rosa canina/R. arvensis*
Sar	Whitebeam	*Sorbus aria*

Code	Common name	Scientific name
Sc	Goat or grey willow	*Salix caprea/S. cinerea*
Sf	Crack willow	*Salix fragilis*
Sn	Elder	*Sambucus nigra*
Ue	Gorse	*Ulex europaeus*
Ug	Wych elm	*Ulmus glabra*
Up	Elm	*Ulmus procera*
Vl	Wayfaring tree	*Viburnum lantana*
Vo	Guelder rose	*Viburnum opulus*

Ditch Network

A1.13 A number of ditches exist across the Site, most of which are dry most of the year. These were generally vegetated with nettles (*Urtica dioica*), rosebay willowherb (*Chaemaenerion angustifolium*), other willowherb species (*Epilobium* spp.), cleavers (*Galium aparine*), hogweed (*Heracleum sphondylium*) and other species indicative of waste or disturbed ground (see Image A1.1).

Image A1.1: Dry vegetated ditch.

A1.14 A small number of the ditches remained wet throughout the year, primarily in the north-east corner of the Site and along the south-western boundary. The north-eastern ditch contained some aquatic and marginal plants, such as rushes (*Juncus* sp.) and watercress (*Nasturtium officinale*), as well as species such as meadowsweet (*Filipendula ulmaria*), pendulous sedge (*Carex pendula*) and woody nightshade (*Solanum dulcamara*). The south-western ditch, bordering Burbage Common, was wetter and contained willowherb and yellow flag iris (*Iris pseudacorus*).

Stream

A1.15 A small stream runs through the south of the Site, splitting Woodhouse Farm from Hobbs Hayes Farm. The stream is shaded by a tall, wide hedgerow, meaning that the stream has little to no established vegetation (see Image A1.2).

Image A1.2: Heavily shaded stream.

Ponds

A1.16 There are seven ponds within the Site boundary and a further 36 within 500m. One of the ponds within the Site was dry. The remainder were field ponds, mostly shaded and surrounded by scrub and trees (see Image A1.3), although two were open, with bulrushes (*Typha latifolia*) and water crowfoot (*Ranunculus aquitilis*) present (see Image A1.4). One pond was heavily stocked with carp (*Cyprinus carpio*), was turbid, contained lots of algae and was surrounded by scattered scrub and semi-improved grassland. More information about on- and off-site ponds can be found in Annex 5.

Image A1.3: Scrubbed over pond.

Image A1.4: Open pond with bulrushes (*Typha latifolia*).

Arable

A1.17 Much of the north and west of the Site is managed as arable farmland, taking up roughly two thirds of the total Site area. No notable arable weeds were recorded, and the habitat is considered to be of negligible intrinsic ecological value. Most of the arable field margins are also considered to be of improved grassland quality, with very few species present, with areas of tall ruderal vegetation (see Image A1.5).

Image A1.5: Arable land comprising the majority of the Site.

Improved Grassland

A1.18 Almost all of the remainder of the Site area is improved grassland. Improved grassland on the Site is dominated by coarse grass species, including perennial rye (*Lolium perenne*), cock's foot (*Dactylis glomerata*) and Yorkshire fog (*Holcus lanatus*). Very few forb species are present, limited mainly to species such as white clover (*Trifolium repens*), creeping buttercup (*Ranunculus repens*) and common mouse-ear (*Cerastium fontanum*).

A1.19 Improved grassland within the Site is managed intensively as grazing for cattle and sheep as well as the production of silage (see Image A1.6).

Image A1.6: Improved grassland in the north of Site.

Poor Semi-improved Grassland

A1.20 Some areas of grassland within the Site are more species-diverse. Although diversity is greater, these areas are still dominated by grasses, such as Yorkshire fog, perennial rye, cock's foot, creeping bent (*Agrostis stolonifera*), rough meadow-grass (*Poa trivialis*), meadow foxtail (*Alopecurus pratensis*) and crested dog's tail (*Cynosurus cristatus*). Forb species are more prevalent, although still fairly limited. Species recorded include: dandelion (*Taraxacum officinale*), creeping buttercup, curled dock (*Rumex crispus*), spear thistle (*Cirsium vulgare*), broad-leaved dock (*Rumex obtusifolius*), creeping thistle (*Cirsium arvense*), white clover, common vetch (*Vicia sativa*), common mouse-ear, nipplewort (*Lapsana communis*) and meadow buttercup (*Ranunculus acris*)

Marshy Grassland

A1.21 A small area of marshy grassland exists in the Site's far north-eastern corner. The area was wet until late Summer 2018. Species recorded include: soft brome (*Bromus hordeaceus*), Yorkshire fog, false oat-grass (*Arrhenatherum elatius*), great willowherb (*Epilobium hirsutum*), hard and soft rush (*Juncus inflexus, J. effusus*), pendulous sedge and false fox sedge (*Carex otrubae*). The area also contains scattered wild roses, hawthorn, oak, alder and willow scrub.

Semi-improved Neutral Grassland

A1.22 Some of the land backing onto the motorway embankment is of slightly higher ecological value again, with a greater diversity and abundance of forb species. Species recorded include: Yorkshire fog, crested dog's-tail, cock's foot, rough meadow-grass, timothy

(*Phleum pratense*), meadowsweet, sow thistle (*Sonchus* sp.), creeping thistle, ox-eye daisy (*Leucanthemum vulgare*), common knapweed (*Centaurea nigra*), cut-leaved cranesbill (*Geranium dissectum*), meadow vetchling (*Lathyrus pratensis*), bird's foot trefoil (*Lotus corniculatus*), hairy tare (*Vicia hirsuta*), tufted vetch (*V. cracca*), common vetch, red clover (*Trifolium pratense*), lesser trefoil (*T. dubium*), white clover, ragwort (*Senecio jacobaea*), common mouse-ear, hawkweed (*Hieracium lachenalii*), forget-me-not (*Myosotis arvensis*) and self-heal (*Prunella vulgaris*) (see Image A1.7).

Image A1.7: Semi-improved grassland on the eastern border of Site near the foot bridge over motorway.

Junction 2 Grassland pLWS

A1.23 The Junction 2 grassland pLWS is situated within the Site Boundary within the central area of the roundabout over the motorway junction. The grassland is described as mesotrophic grassland in the LRERC records. The results of the botanical survey of this grassland in 2021, including a total species list and abundance scores for each quadrat, are set out in Table A1.3.

Table A1.3: Junction 2 Grassland pLWS - Botanical Survey Results.

Common Name	Scientific Name	Abundance		
		Q1-	Q2	Q3
Yarrow	*Achillea millefolium*	O	A	-

Common Name	Scientific Name	Abundance		
		Q1-	Q2	Q3
Common bent	*Agrostis capillaris*	-	-	-
Marsh foxtail	*Alopecurus geniculatus*	-	-	-
Sweet vernal-grass	*Anthoxanthum odoratum*	-	A	-
False oat grass	*Arrhenatherum elatius*	A	-	O
Daisy	*Bellis perennis*	-	-	-
Soft brome	*Bromus hordeaceus*	-	A	-
Common mouse-ear	*Cerastium fontanum*	O	-	-
Creeping thistle	*Cirsium arvense*	-	-	F
Spear thistle	*Cirsium vulgare*	-	-	O
Crested dog's-tail	*Cynosurus cristatus*	-	F	-
Cocksfoot	*Dactylis glomerata*	-	-	-
Marsh orchid species	*Dactylorhiza spp.* **	-	-	R
Tufted hairgrass	*Deschampsia cespitosa*	-	-	-
Teasel	*Dipsacus fullonum*	-	-	-
Great willowherb	*Epilobium hirsutum*	F	-	-
Field horsetail	*Equisetum arvense*	O	F	-

Common Name	Scientific Name	Abundance		
		Q1-	Q2	Q3
Red fescue	*Festuca rubra*	A	F	F
Bristly ox-tongue	*Helminthotheca echioides*	O	-	-
Hogweed	*Heracleum sphondylium*	O	-	-
Yorkshire fog	*Holcus lanatus*	F	-	F
Hard rush	*Juncus inflexus*	-	-	-
Meadow vetchling*	*Lathyrus pratensis*		O	O
Oxeye daisy*	*Leucanthemum vulgare*	F	F	-
Heath woodrush	*Luzula multiflora*	-	-	-
Field forget-me-not	*Myosotis arvensis*	O	F	F
Orange hawkweed	*Pilosella aurantiaca*	-	-	-
Ribwort plantain	*Plantago lanceolata*	-	F	-
Smooth Meadow-grass	*Poa pratensis*	-	F	-
Rough meadow-grass	*Poa trivialis*	A	-	F
Meadow buttercup*	*Ranunculus acris*	-	-	-
Creeping buttercup	*Ranunculus repens*	-	F	-

Common Name	Scientific Name	Abundance		
		Q1-	Q2	Q3
Sorrel*	*Rumex acetosa*	-	O	-
Curled dock	*Rumex crispus*	-	-	O
Marsh ragwort	*Senecio aquaticus*	-	F	-
Common ragwort	*Senecio jacobaea*	O	F	F
Bittersweet	*Solanum dulcamara*	-	-	F
Prickly sow-thistle	*Sonchus asper*	O	-	
Goat's-beard	*Tragopogon pratensis*	-	-	-
Red clover*	*Trifolium pratense*	-	A	-
White clover	*Trifolium repens*	-	-	-
Common vetch	*Vicia sativa*	F	-	-

***Species listed as indicators of neutral grassland within LWS selection guidelines**
****Southern or Early marsh orchid**

A1.24 With reference to national[12] and local[13] guidance with respect to neutral (mesotrophic) grassland and lowland meadow, the semi-improved neutral grassland within the pLWS does not meet the definition of 'priority habitat' at a national or local level. Furthermore, with reference to the LWS selection guidelines the grassland contains five plant species contained within List F (Mesotrophic grassland species), and thus falls short of the minimum of seven required to be considered for LWS selection. This grassland is therefore judged to be of District level ecological importance.

[12] *UK Biodiversity Action Plan Priority Habitat Descriptions - Lowland Meadows* (http://jncc.defra.gov.uk/page-5706)

[13] *Space for Wildlife.* Leicester, Leicestershire and Rutland Biodiversity Action Plan. 2016 – 2026

Freeholt Meadow pLWS

A1.25 Freeholt Meadow pLWS is situated within the Site Boundary, south of Freeholt Lodge and north of the roundabout over the motorway junction. The grassland is described as mesotrophic grassland in the LRERC records. The results of the botanical survey of this grassland in 2021, including a total species list and abundance scores for each quadrat, are set out in Table A1.4.

Table A1.4: Freeholt Meadow Grassland pLWS - Botanical Survey Results.

Common name	**Scientific name**	**Abundance**		
		Q1-	**Q2**	**Q3**
Meadow foxtail	*Alopecurus pratensis*	F	O	-
Sweet vernal-grass	*Anthoxanthum odoratum*	A	A	F
Silverweed	*Argentina anserina*	-	-	-
Soft brome	*Bromus hordeaceus*	-	-	O
Common mouse-ear	*Cerastium fontanum*	O	O	-
Creeping thistle	*Cirsium arvense*	-	-	-
Meadow thistle	*Cirsium vulgare*	-	-	-
Crested dog's-tail	*Cynosurus cristatus*	F	O	O
Cocksfoot	*Dactylis glomerata*	-	O	-
Red fescue	*Festuca rubra*	A	F	F
Hogweed	*Heracleum sphondylium*	-	-	-
Yorkshire fog	*Holcus lanatus*	F	A	O

Common name	Scientific name	Abundance		
		Q1-	Q2	Q3
Common cat's-ear	*Hypochaeris radicata*	-	F	O
Perennial rye-grass	*Lolium perenne*	-	O	-
Field woodrush*	*Luzula campestris*	F	O	-
Ribwort plantain	*Plantago lanceolata*	F	O	-
Smooth Meadow-grass	*Poa pratensis*	-	O	-
Rough meadow-grass	*Poa trivialis*	O	-	-
Creeping cinquefoil	*Potentilla reptans*	F	-	-
Meadow buttercup*	*Ranunculus acris*	A	A	F
Creeping buttercup	*Ranunculus repens*	O	A	F
Sorrel*	*Rumex acetosa*	-	F	-
Broad-leaved dock	*Rumex obtusifolius*	-	-	-
Common ragwort	*Senecio jacobaea*	-	-	O
Dandelion	*Taraxacum officinale agg.*	R	-	-
Goat's-beard	*Tragopogon pratensis*	-	-	-
Red clover*	*Trifolium pratense*	A	-	O
White clover	*Trifolium repens*	-	-	-

Common name	Scientific name	Abundance		
		Q1-	Q2	Q3
Nettle	*Urtica dioica*	-	-	-
Common vetch	*Vicia sativa*	O	-	-

***Species listed as indicators of neutral grassland within LWS selection guidelines**

A1.26 With reference to national and local guidance with respect to neutral (mesotrophic) grassland and lowland meadow, the semi-improved neutral grassland within the pLWS does not meet the definition of 'priority habitat' at a national or local level. Furthermore, with reference to the LWS selection guidelines the grassland contains four plant species contained within List F (Mesotrophic grassland species), and thus falls short of the minimum of seven required to be considered for LWS selection. This grassland is therefore judged to be of no greater than Local ecological importance.

Tall Ruderal Vegetation and Scrub

A1.27 Small areas of scattered and dense scrub and tall ruderal vegetation exist across the Site. These are mainly concentrated around field boundaries and ponds. Species recorded include willowherb (*Epilobium* sp.), nettle, hogweed and cow parsley.

Woodland

A1.28 Some small areas of woodland are present within the Site, including a small area of plantation woodland at Woodhouse Farm, a small area along the motorway embankment in the south-east of the Site, and a block to the north of the B4669 Hinckley Road (Woodland Adjacent to Aston Firs pLWS).

A1.29 The woodland adjacent to the motorway is dominated by ash and oak, with a hawthorn, elm, crab-apple, blackthorn and rose understorey. Ground flora is limited, including ivy (*Hedera helix*), cleavers, hogweed, bramble (*Rubus fruticosa* agg.) and nettles.

A1.30 Woodland Adjacent to Aston Firs pLWS is described as broad-leaved woodland in the LRERC records. The results of the botanical survey of this woodland in 2021, including abundance scores for species occurring in the canopy, understorey and in the ground flora, are set out in Table A1.5.

Table A1.5: Woodland Adjacent to Aston Firs pLWS - Botanical Survey Results.

Common Name	Scientific Name	Abundance		
		Canopy	Understorey	Ground
Horse chestnut	*Aesculus hippocastanum*	O	-	-
Garlic mustard	*Alliaria petiolata*	-	-	LF
Cow parsley	*Anthriscus sylvestris*	-	-	O
Lords and ladies	*Arum maculatum*	-	-	O
Silver birch	*Betula pendula*	R	-	-
Remote sedge	*Carex remota*	-	-	O
Common hawthorn	*Crataegus monogyna*	-	A	-
Ash	*Fraxinus excelsior*	A	O	-
Cleavers	*Gallium aparine*	-	-	F
Herb robert	*Geranium robertianum*	-	-	F
Wood avens	*Geum urbanum*	-	-	O
Ivy	*Hedera helix*	-	-	A
Creeping soft-grass	*Holcus mollis*	-	-	O
Bluebell	*Hyacinthoides non-scripta*	-	-	O

Common Name	Scientific Name	Abundance		
		Canopy	Understorey	Ground
Holly	*Ilex aquilifolium*	-	O	-
Soft rush	*Juncus effusus*	-	-	O
Wild privet	*Ligustrum vulgare*	-	O	-
Honeysuckle	*Lonicera periclymenum*	-	-	O
Rough meadow-grass	*Poa trivialis*	-	-	O
Pedunculate oak	*Quercus robur*	O	-	-
Creeping buttercup	*Ranunculus repens*	-	-	O
Rose species	*Rosa spp.*	-	O	-
Bramble	*Rubus fruticosus agg.*	-	-	A
Wood dock	*Rumex sanguineus*	-	-	O
Elder	*Sambucus nigra*	-	R	-
Red campion	*Silene dioica*	-	-	O
Hedge woundwort	*Stachys sylvatica*	-	-	O
Dandelion	*Taraxacum officinale* agg.	-	-	O

Common Name	Scientific Name	Abundance		
		Canopy	Understorey	Ground
Wood sage	*Teucrium scorodonia*	-	-	O
Nettle	*Urtica dioica*	-	-	LA

A1.31 An assessment of the pLWS against the primary criteria for woodland habitat set out within the LWS selection guidelines (see Table A1.6) confirms that it does not meet any of these. Nonetheless, this woodland has moderate species and structural diversity and is therefore judged to be of District level ecological importance.

Table A1.6: Woodland Adjacent to Aston Firs pLWS - Botanical Survey Results.

Description	Size Threshold	Met? Yes/No	Notes
included in Leicestershire Inventory of Ancient Woodland	None	Unlikely (unconfirmed)	Not in National Inventory, despite other ASNW being mapped nearby
with at least 4 species from Ancient Woodland Indicator List Z1 which are O, F, A or D	≥2ha	No	No ancient woodland indicator species recorded and less than 2ha
naturally regenerated	≥ 5 ha	No	Naturally regenerated but less than 5ha
dominated by willow and/or alder with the water table seasonally near or above the surface	≥ 0.25 ha	No	Not wet woodland dominated by willow/alder

Description	Size Threshold	Met? Yes/No	Notes
contains colonies of Hyacinthoides non-scripta (native bluebells) ≥ 500m^2	≥2ha	No	Bluebell only occasionally present

Image A1.8: Woodland within the Site.

Burbage Common Railway Bridge pLWS

A1.32 Burbage Common Railway Bridge pLWS is described as a 'brick railway bridge with ferns' in the LRERC records. During the targeted survey in 2021, only two ferns were recorded growing within the brickwork of the bridge, namely maidenhair spleenwort (*Asplenium trichomanes*) and wall rue (*Asplenium ruta-muraria*). Both ferns were found occasionally along both sides of the bridge though were more abundant to the east.

A1.33 The primary criteria for rocks and built structures set out within the LWS selection guidelines relate to the presence of certain lichen species and other vascular plants which were not covered by the survey. The secondary criterion relates to the presence of fern species set out in List E, which contains six fern species, and requires good populations (at least 50 individual plants) of at least one of these species, or populations of at least three species. Both maidenhair spleenwort and wall rue are included in List E but neither species were sufficiently abundant to meet this criterion.

A1.34 Based on the survey findings, it is unlikely that the pLWS would meet the LWS selection criteria. In addition, bat emergence surveys of the bridge undertaken in 2021 did not record any evidence of roosting bats. It is therefore judged to be of no greater than Local ecological importance.

Annex 2 ◆ Wintering Bird Surveys

METHODOLOGY

A2.1 The paucity of suitable marshy and wetland habitat within the Site is considered to limit the potential of a diverse assemblage of over-wintering bird species, particularly with regard to waders and waterfowl. However, British farmland is an essential habitat for many resident bird species and also for many northern and eastern winter immigrants[14]. As such, it is considered that the Site has potential to support significant assemblages of specific farmland and wetland species of conservation concern. Therefore, a wintering farmland bird survey (WBS) was undertaken in early 2018 to identify whether any notable species populations are supported during the winter months. A single update pilot survey was undertaken in December 2019 to identify any changes to bird assemblage and an update WBS was undertaken in winter 2020/2021.

A2.2 Bird survey methods are tailored to the bird community present in the locality, the species whose impacts are to be investigated, and the nature of the potential impacts. Hence, the surveys were undertaken with reference to Gillings et al. (2008).

A2.3 The species targeted were those of conservation concern[15] (Red and Amber Listed), including the species whose main habitat is farmland, but also those species that use farmland in large numbers in winter but for which it is not necessarily their main habitat.

A2.4 The Site was surveyed by suitably experienced ornithologists on three occasions over the winter of 2018; once a month during January, February and early March. A single update survey was undertaken in December 2019 and further update surveys were undertaken monthly between December 2020 and February 2021. Each survey visit was carried out by two surveyors using binoculars to allow full coverage of the Site. Each surveyor recorded species Amber and Red, or birds listed on Schedule 1 of the Wildlife and Countryside Act (WCA) (as amended) species encountered, along with any notable behaviour.

A2.5 It is considered that this level of repetition provides an adequate estimate for the total count of the core winter population. It is also considered that such repetition is important as some fields will potentially change habitat type during the survey period, for example when tilled and sown fields develop a covering of germinated winter cereal. This potentially could have an impact on the suitability of such a field to support specific over-wintering bird species.

[14] Gillings, S., Wilson, A.M., Conway, G.J., Vickery, J.A. & Fuller, R.J. (2008). Distribution and abundance of birds and their habitats within the lowland farmland of Britain in winter. *Bird Study*, 55:1, 8-22.

[15] Eaton, M.A., Aebischer, N.J., Brown, A.F., Hearn, R.D., Lock, L., Musgrove, A.J., Noble, D.G., Stroud, D.A. and Gregory, R.D. (2015). *Birds of Conservation Concern 4: the population status of birds in the UK, Channel Islands and Isle of Man*. British Birds, Vol. 108, 708-746.

A2.6 Survey visits were completed on calm days with good visibility and avoiding periods of heavy rain. It is therefore considered that the results provide a representative overview of the wintering bird interest at the Site and have not been limited by seasonal or climatic factors. The dates and timings of the survey visits in winter 2020/2021 (each of which took one day to complete), and the weather conditions encountered, are summarised at Table A2.1.

Table A2.1: Date, Timing and Weather Conditions during the WBS Visits in winter 2020/2021

Survey	Date	Weather Conditions	Wind (Beaufort Scale)	Visibility
1	07/12/20	Overcast with drizzle at start	2-3	Moderate - Good
2	29/01/21	Overcast with sunny spells, dry	2-4	Good
3	05/02/21	Overcast and dry	2	Good

A2.7 The first and last hours of daylight were not surveyed to avoid counting when birds are moving between foraging and roosting habitats. Registrations of target bird species were recorded and assigned to the location where they were first detected (if flushed). Flying birds were only recorded if they were clearly associated with the Site (e.g. just flushed or about to land).

A2.8 Following completion of the WBS, an average (mean) count and maximum count of each species of conservation concern (Red and Amber listed) was calculated for the survey area. Means are only provided where a species was recorded on more than one survey. The assemblage of birds recorded on-site were also compared against national conservation priorities, Birds of Conservation Concern Report and Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) and their local conservation statuses, through consultation with published reports for birds of Leicestershire[16]. Based on these comparisons, an assessment can be made of the importance of the wintering bird species within the study area, both with regard to each species, and the overall assemblage.

[16] Baker, R., Graham, J., Croxtall, B., Dovis, R., Lister, S., Skevington, M. (2017) *The Leicestershire & Rutland Bird Report 2015.* The Leicestershire & Rutland Ornithological Society, 19-131

Limitations

A2.9 A limitation with surveying birds on arable land in winter is that birds vary in detectability. This is typically a function of the species size, species behaviour (including 'flushing' distance, flocking behaviour, crypticity), foraging ecology and field characteristics[17] (including vegetation density and height, area of the field). As such, a simple 'field perimeter' based count can miss significant numbers of birds, particularly where the field vegetation is tall or dense. This is particularly true for certain bird species, including the Red List skylark, and the Amber List meadow pipit.

A2.10 It should be noted that for a large number of species, including thrushes, sparrows, finches and buntings in most field types, the overall majority (i.e. >90%) can be recorded using a 'perimeter count'. However, where detectability may be an issue (e.g. varying crop heights), comparisons of bird densities or total numbers between fields will not be possible purely from using perimeter counts as the field characteristics, and hence detectability, vary between field parcels.

A2.11 The survey methodology therefore involved walking to within a maximum distance of 75m of all suitable habitats for the target wintering bird species[18]. However, with regard to the effect of vegetation density and height on the ability to record birds within each field, the survey method relies on the judgement of an experienced surveyor to assess when a count is complete. As such, in fields with more ground cover, a greater frequency of transects across open areas (and hence reduced maximum distance) is required.

A2.12 It is considered that 'double counting' could affect results, particularly with the whole-area search approach where birds could be flushed from one field to another. With reference to Wilson et al. (1996)[19], although this source of error cannot be eliminated, it can be minimised by taking account (namely through the detailed recording of bird movements on site plans) of birds flushed to fields yet to be counted.

A2.13 The surveys were not limited by seasonal nor climatic factors and were undertaken during optimal months. While the surveys did not cover all of the migratory periods, breeding bird surveys within the Site were completed in 2018 and repeated in 2021. There was therefore a continued surveyor presence through the spring.

A2.14 An equipment fault resulted in the data from the winter bird survey in December 2020 being lost prior to analysis. However, as the 2020/2021 surveys were update surveys and the site covered on multiple other occasions, and as half of the site was still covered on this occasion it is thought that the data from this suite of surveys still provides an accurate reflection of the on-site winter bird assemblage.

[17] Atkinson, P.W., Fuller, R.A., Gillings, S. & Vickery, J.A. (2006). Counting birds on farmland habitats in winter. Bird Study, 53:3, 303-309

[18] Vickery, J.A., P.W. Atkinson, Marshall, J.M., West, T., Norris, K., Robinson, L.J., Gillings, S., Wilson, A. & Kirby, W. 005) The Effects of Different Crop Stubbles and Straw Disposal Methods on Wintering Birds and Arable Plants. BTO Research Report 402. British Trust for Ornithology

[19] Wilson, J.D., Taylor, R. & Muirhead, L.B. (1996) Field use by farmland birds in winter: an analysis of field type preferences using re-sampling methods. Bird Study, 43, 320–332

A2.15 The surveys are therefore considered a robust and reliable basis for decision making.

RESULTS

A2.16 The results of the WBS are shown in Table A2.2, providing a summary of all species of bird of conservation concern recorded across the Site. The results for the Red and Amber Listed species recorded during the 2020/2021 update surveys are illustrated on Figures 12.5 to 12.7 (document reference 6.3.12.5 – 6.3.12.7).

A2.17 A species list of for those species recorded which are not on either the Amber or Red List is included in Table A2.3.

A2.18 A total of 50 species were recorded throughout the survey visits, of which 22 (i.e. 44%) are considered to be of conservation concern (13 are listed on the Red list; 9 are on the Amber list of Birds of Conservation Concern). The remaining 28 species are either on the Green list or have no status (i.e. are not native to the UK).

A2.19 The diversity and abundance of species recorded is considered to be fairly typical for a site of this size and type, although the surveys did record several large flocks of red listed lapwing utilising the Site, and large flocks of the over-wintering migrant species redwing and fieldfare. Smaller flocks of other Red-list species including skylark, yellowhammer and starling were also observed. The large flocks of lapwing were recorded in arable fields in the northern part of the Site, north of Burbage Common Road.

A2.20 Skylark, along with the other farmland specialist species mentioned, were also recorded using the arable fields, hedgerow and woodland edge habitats across the Site. Low numbers of other Red listed species were also recorded during the surveys including song thrush, house sparrow and grey partridge.

A2.21 The Amber list species found to be utilising the Site were mostly recorded in low numbers, although larger numbers of black-headed gull were recorded associated with fields in the north of the Site. Also recorded within an arable field in the north of the Site was a flock of snipe, although this species was recorded on one occasion only. Mallard were recorded on every survey, generally associated with the on-site waterbodies, although were also recorded flying over the Site.

A2.22 In addition to the species listed within Table A2.2, three other notable species were recorded during the 2018 WBS that were not recorded during the update surveys, namely teal, common gull, and grey wagtail. None of these species were recorded in large numbers with only several individuals of each species being recorded throughout the surveys.

A2.23 It is considered that that the diversity and abundance of over-wintering birds within the Site reflects the diversity of habitats present but is not exceptional beyond a local context. Therefore, in EDP's opinion, the wintering bird assemblage present within the Site is considered to be Local-District level nature conservation value.

Table A2.2: A Summary of the Bird Species Recorded during the 2020/2021 WBS.

Species	Protection/ UK Status/- Country Status	Regional Status[20]	On-site Distribution	Population in the Site	
				Mean WBS Count	Maximum WBS Count
Mallard (*Anas platyrhynchos*)	Amber List	Common autumn and winter visitor, fairly common breeder	Limited to ponds at Woodhouse Farm and on the western site boundary, and birds flying over the Site.	9	16
Grey partridge (*Perdix perdix*)	Red List	Uncommon resident breeder	Recorded in small flocks during both surveys in 2021, located in fields south and west of Woodhouse Farm	9	17
Lapwing (*Vanellus vanellus*)	Red List	Abundant winter visitor, fairly common migrant breeder	Recorded in small flocks foraging across the northern part of the Site with a large flock (107) noted in the north-east on the Dec. 2020 survey.	124	232
Snipe (*Gallinago gallinago*)	Amber List	Fairly common passage and winter visitor, rare breeder	Flushed from winter crops/stubble and grass in the eastern part of the Site, in the fields north and south of Burbage Common Road.	4	12

[20] Baker, R., Graham, J., Croxtall, B., Dovis, R., Lister, S., Skevington, M. (2017) *The Leicestershire & Rutland Bird Report 2015.* The Leicestershire & Rutland Ornithological Society, 19-131

Species	Protection/ UK Status/- Country Status	Regional Status[20]	On-site Distribution	Population in the Site	
				Mean WBS Count	Maximum WBS Count
Black-headed gull (*Chroicocephalus ridibundus*)	Amber List	Present all year, abundant in winter, fairly common breeder	Most records were individual or small groups of birds within arable fields. Several large flocks were noted during the 2018 surveys and a flock of 250 were noted foraging in the east of the site in Jan. 2021	109	250
Herring gull (*Larus argentatus*)	Red List	Common winter visitor, uncommon in summer, new colonist	A moderate number were recorded within the large flocks of black-headed gulls in 2018 and small numbers recorded on-site during the update surveys.	2	6
Lesser black-backed gull (*Larus fuscus*)	Amber List	Common passage and winter visitor, recent colonist	A small number were recorded within the large flocks of black-headed gulls.	16	43
Stock dove (*Columba oenas*)	Amber List	Fairly common to common resident breeder	Small numbers were recorded scattered around the Site.	1	4

Species	Protection/ UK Status/- Country Status	Regional Status[20]	On-site Distribution	Population in the Site	
				Mean WBS Count	Maximum WBS Count
Kestrel (*Falco tinnunculus*)	Amber List	Fairly common resident breeder	A small number of individuals were recorded hunting over field margins and road verges across the Site.	1	2
Skylark (*Alauda arvensis*)	Red List	Common resident breeder, autumn migrant and winter visitor	Skylark were recorded in almost all arable fields north of the stream, and smaller numbers were recorded in grassland fields. Most were in small groups, although some flocks of up to 37 were recorded.	31	66
Starling (*Sturnus vulgaris*)	Red List	Abundant resident breeder, passage migrant and winter visitor	Small groups were recorded foraging in the arable fields across the Site with a few larger flocks noted (up to 32 individuals).	49	65
Fieldfare (*Turdus pilaris*)	Sch. 1 (W&CA)/ Red List	Common winter visitor, rare in summer	Small to medium mixed winter thrush flocks were recorded across the Site, with no particular hotspots of activity.	169	276

Species	Protection/ UK Status/- Country Status	Regional Status[20]	On-site Distribution	Population in the Site	
				Mean WBS Count	Maximum WBS Count
Redwing (*Turdus iliacus*)	Sch. 1 (W&CA)/ Red List	Common winter visitor	Small to medium mixed winter thrush flocks were recorded across the Site, with no particular hotspots of activity.	260	466
Song thrush (*Turdus philomelos*)	Red List	Common resident breeder, recent decline; winter visitor	Low numbers of birds were recorded each month, largely associated with woodland edge habitats.	3	5
Mistle thrush (*Turdus viscivorus*)	Red List	Common resident breeder	A pair were recorded in 2018 and a single individual was recorded in the north east of the Site in Dec. 2020.	<1	1
House sparrow (*Passer domesticus*)	Red List	Common resident breeder, recent decline	Most records were associated with on-site farm buildings, with a small number within the eastern boundary hedgerow just north of Burbage Common Road.	21	39

Species	Protection/ UK Status/- Country Status	Regional Status[20]	On-site Distribution	Population in the Site	
				Mean WBS Count	Maximum WBS Count
Dunnock (*Prunella modularis*)	Amber List	Abundant resident breeder, passage migrant	Recorded within or near hedgerows across the entire site.	18	21
Meadow pipit (*Anthus pratensis*)	Amber List	Common passage migrant, fairly common winter visitor, uncommon breeder	Low numbers of birds were recorded across the Site on every survey.	6	7
Bullfinch (*Pyrrhula pyrrhula*)	Amber List	Common resident breeder	Recorded in low numbers on most surveys, associated with hedgerow and woodland edge habitats.	2	7
Linnet (*Linaria cannabina*)	Red List	Common resident breeder and passage migrant, less common in winter	Small groups were recorded, all on the peripheries of the Site.	4	12

Species	Protection/ UK Status/- Country Status	Regional Status[20]	On-site Distribution	Population in the Site	
				Mean WBS Count	Maximum WBS Count
Reed bunting (*Emberiza schoeniclus*)	Amber List	Common resident breeder, recent decline	Recorded on every survey during the update surveys with the largest number recorded on the Dec. 2020 survey. Recorded within on-site hedgerows to the north-east of Elmesthorpe Plantation.	11	27
Yellowhammer (*Emberiza citrinella*)	Red List	Common resident breeder, recent decline	Low numbers were scattered across the Site, although higher numbers were recorded within hedgerows to the north-east of Elmesthorpe Plantation.	15	22

Table A2.3: Species List of Bird Species Recorded during the WBS not listed on BoCC or WCA.

Species Recorded	**Scientific Name**
Pheasant	*Phasianus colchicus*
Red-legged partridge	*Alectoris rufa*
Cormorant	*Phalacrocorax carbo*
Grey heron	*Ardea cinerea*
Buzzard	*Buteo buteo*
Moorhen	*Gallinula chloropus*
Woodpigeon	*Columba palumbus*
Collared dove	*Streptopelia decaocto*
Great spotted woodpecker	*Dendrocopos major*
Jay	*Garrulus glandarius*
Magpie	*Pica pica*
Jackdaw	*Corvus monedula*
Rook	*Corvus frugilegus*
Carrion crow	*Corvus corone*
Raven	*Corvus corax*
Long-tailed tit	*Aegithalos caudatus*

Species Recorded	**Scientific Name**
Blue tit	*Cyanistes caeruleus*
Great tit	*Parus major*
Nuthatch	*Sitta europaea*
Treecreeper	*Certhia familiaris*
Goldcrest	*Regulus regulus*
Wren	*Troglodytes troglodytes*
Blackbird	*Turdus merula*
Robin	*Erithacus rubecula*
Pied wagtail	*Motacilla alba*
Chaffinch	*Fringilla coelebs*
Greenfinch	*Chloris chloris*
Goldfinch	*Carduelis carduelis*

Annex 3 ◆ Breeding Bird Surveys

METHODOLOGY

A3.1 The Extended Phase 1 Habitat survey noted a range of habitats within and adjacent to the Site boundaries have the potential to support large numbers of breeding birds, including grassland, agricultural land, woodland, buildings, waterbodies, and hedgerows. Therefore, a full breeding bird survey (BBS) was deemed necessary to determine the on-site breeding bird assemblage.

A3.2 The initial BBS was undertaken in 2018 with reference to standard methodology, entailing a modified Common Bird Census (CBC) 'territory mapping' approach. This involves the completion of three visits to the Site, undertaken between April and July, i.e. at the height of the breeding bird season for lowland Britain.

A3.3 An additional, single pilot BBS was carried out on 02 May 2019 to determine any changes, if they occurred, to the breeding bird assemblage within the Site. An update BBS was subsequently carried out in spring 2021.

A3.4 Following best practice, the survey visits were timed to start around first light, to coincide with the period of peak activity for birds, most particularly passerine songbird species. They were also undertaken during suitable weather conditions, i.e. days/periods with strong winds and heavy or persistent rain were generally avoided.

A3.5 The dates and timings of the 2021 survey visits and the weather conditions encountered are summarised in Table A3.1.

Table A3.1: Date, Timing and Weather Conditions During the 2021 Breeding Bird Survey Visits

Survey	Date	Start/Finish Time	Precipitation	Wind (Beaufort)	Visibility
1	09.04.21	06:15 – 10:45	Light drizzle for first 30 minutes	2-3	Good
2	12.05.21	05:15 - 09:15	Nil	2-4	Good
3	09.06.21	05:15 - 09:15	Nil	0-1	Good

A3.6 The survey methodology involved walking to within c.50m of all parts of the Site and recording all birds listed within the Birds of Conservation Concern report[21] and their activity status, with a particular emphasis placed upon those elements considered to relate to, or be indicative of, breeding. This ensured that the survey identified all birds using the margins of the Site, as well as those in the interior.

A3.7 The surveys were completed by three experienced ornithologists on each survey day.

A3.8 Following the completion of the survey, the breeding status of each bird species identified at the Site was determined according to the nature and frequency of the behavioural elements recorded, as set out overleaf in Table A3.2.

Table A3.2: Summary of Field Evidence Used to Determine Breeding Bird Status.

Status	**European Bird Census Council (EBCC) Criteria for Categorisation of Breeding Status**
Confirmed	• Distraction-display or injury feigning; • Used nest or eggshells found (occupied or laid within period of survey); • Recently fledged young (nidicolous *species*) or downy young (nidifugous species); • Adults entering or leaving nest-site in circumstances indicating occupied nest (including high nest or nest-holes, the contents of which cannot be seen) or adult seen incubating; • Adult carrying faecal sac or food for young; • Nest containing eggs; or • Nest with young seen or heard.

[21] Eaton, M.A., Aebischer, N.J., Brown, A.F., Hearn, R.D., Lock, L., Musgrove, A.J., Noble, D.G., Stroud, D.A. and Gregory, R.D. (2015). *Birds of Conservation Concern 4: the population status of birds in the UK, Channel Islands and Isle of Man*. British Birds, Vol. 108, 708-746.

Status	European Bird Census Council (EBCC) Criteria for Categorisation of Breeding Status
Probable	• Pair observed in suitable nesting habitat in breeding season; • Permanent territory presumed through registration of territorial behaviour (song, etc.) on at least two different days a week or more apart at the same place; • Courtship and display; • Visiting a probable nest site; • Agitated behaviour or anxiety calls from adults; • Brood patch on adult examined in the hand; or • Nest building or excavating nest-hole.
Possible	• Species observed in breeding season in possible nesting habitat; or • Singing male(s) present (or breeding calls heard) in breeding season.
Non-breeder	• Feeding birds only; • Birds flying over only; or • Lack of suitable breeding habitat.

A3.9 The BBS was carried out by experienced ornithologists, at an appropriate time of year for the locality, and in suitable weather conditions. It is therefore considered that the results provide a representative overview of the breeding bird interest at the Site.

A3.10 An assessment of the individual bird species recorded in the Site, as well as the overall assemblage, is subsequently made with reference to the national and local conservation status of the different breeding species according to the following key lists/criteria:

- Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) – affords greater protection to certain breeding species that are considered appropriately at risk nationally and are listed for additional protection under Schedule 1 accordingly;

- Birds of Conservation Concern1 (BoCC) in England – Under this approach UK bird populations are assessed, using quantitative criteria, to determine the population status of each species and then placed on one of three lists; Red, Amber or Green:
  - Red list species are of high conservation concern, being either globally threatened, having historical UK population declines between 1800 and 1995, a rapid population decline, or breeding range contraction by 50% or more in the last 25 years;
  - Amber list species are of medium conservation concern due to a number of factors, for example having suffered between 25% and 49% contraction of UK breeding range or a 25-49% reduction in breeding or non-breeding populations over the last 25 years. Species which have a five year mean of 1-300 breeding pairs in the UK, or an unfavourable European conservation status, or for which the breeding population in the UK represents 20%, or more of the European breeding populations are also listed on the Amber list; and
  - Green list species have a favourable conservation status.
- Natural Environment and Rural Communities Act 2006: Section 41 List of Species of Principal Importance for Conservation of Biodiversity; and

- Local status in The Leicestershire and Rutland Annual Bird Report 2015[22].

Limitations

A3.11 It is considered that 'double counting' could affect results, particularly with the whole-area search approach where birds could be flushed from one field to another. With reference to Wilson et al. (1996), although this source of error cannot be eliminated, it can be minimised by taking account (namely through the detailed recording of bird movements on site plans) of birds flushed to fields yet to be counted. In addition, the surveyors remained in contact by phone to highlight any notable species, or groups, that may be moving into adjacent count areas to reduce the risks of double counting.

A3.12 The surveys were not limited by seasonal nor climatic factors and were undertaken during optimal months. The surveys are therefore considered a robust and reliable basis for decision making.

RESULTS

A3.13 A number of records were returned by LRERC within the search radius, particularly around Burbage Common and Woods. Four species were recorded within the Site, namely: yellowhammer (Emberiza citrinella), lapwing (Vanellus vanellus), song thrush (Turdus philomelos) and lesser spotted woodpecker (Dendrocopos minor), all between 2005 and 2014. Further species records pertinent to habitats within the Site include: barn owl (*Tyto alba*), hobby (Falco subbuteo), reed bunting (Emberiza schoeniclus), linnet (*Linaria*

[22] Baker, R., Graham, J., Croxtall, B., Dovis, R., Lister, S., Skevington, M. (2017) *The Leicestershire & Rutland Bird Report 2015.* The Leicestershire & Rutland Ornithological Society, 19-131.

cannbina), red kite (Milvus milvus), yellow wagtail (Motacilla flava), house sparrow (*Passer domesticus*), grey partridge (*Perdix perdix*), dunnock (*Prunella modularis*), bullfinch (*Pyrrhula pyrrhula*) and starling (*Sturnus vulgaris*).

A3.14 The results of the BBS are provided in Table A3.3, which gives a summary of all species of conservation concern recorded across the Site. The locations of notable birds recorded during the 2021 surveys are illustrated on Figures 12.8 to 12.10 (document references 6.3.12.8 – 6.3.12.10).

A3.15 Table A3.4 provides a full list of those species recorded that are not considered to be of conservation concern.

A3.16 In summary, the 2021 BBS recorded 59 species birds, of which 23 are of conservation concern. Of the 23 conservation concern species recorded within the Site, 14 are considered to be probably breeding, namely: dunnock, grey partridge, house sparrow (Passer domesticus), lapwing, linnet, mallard (Anas platyrhynchos), skylark (A*lauda arvensis*), song thrush, stock dove (Columba oenas), willow warbler (*Phylloscopus trochilus*), yellowhammer and yellow wagtail. A further three were considered to be possible breeders, namely: kestrel (*Falco tinnunculus*), meadow pipit (*Anthus pratensis*) and starling.

A3.17 Activity was generally spread evenly across the Site, although abundance and diversity of birds was highest around hedgerows, ponds and ditches and the on-site buildings. Farmland birds, including a number of declining species, were associated with the agricultural fields and hedgerows. This included a moderate population of skylark and smaller populations of yellowhammer, linnet and lapwing.

A3.18 In addition to those species listed within Table A3.3 four other notable species were recorded during the 2018 BBS but were not observed on-site during the update surveys, namely mute swan (*Cygnus olor*), lesser black backed gull (*Larus fuscus*), mistle thrush (*Turdus viscivorus*), and tree sparrow (*Passer montanus*). Lesser black-backed gull and mute swan were considered to be non-breeders. Low numbers of mistle thrush were thought to be probably breeding on-site with an estimate of 2-3 pairs. A single male tree sparrow was recorded within suitable habitat along the motorway corridor in the north-east of the Site. Given the lack of recordings of these species during the 2021 BBS it is considered likely that these species are not breeding within the Site.

A3.19 A single barn owl was seen hunting during a bat survey in 2018. No nesting site was located, but it is possible that a tree cavity was used. However, no barn owls or evidence of barn owls has been recorded during any of the other surveys on-site and as such it is considered likely that this species is using the Site for occasional foraging only.

A3.20 Due to the presence of breeding populations of a number of declining farmland species the breeding bird assemblage is considered to be of District-level value.

TableA3.3: A Summary of the Bird Species of Conservation Concern Recorded during the Breeding Bird Survey.

Species	**Protection/UK Status/Country Status**	**Regional Status (Leicestershire Bird Report)**	**On-site Status**	**Population within the Site**
Greylag goose (*Anser anser*)	Amber List/Sch 1	Fairly common to common feral resident and uncommon breeder	Non-breeding	A group of 4 birds were recorded flying over the site during the second survey.
Mallard (*Anas platyrhynchos*)	Amber List	Common autumn and winter visitor, fairly common breeder	Probably breeding	Individuals, pairs and groups of birds were recorded across the Site during the first two survey visits, concentrated around the Site's pond and ditch network. Only birds flying over the Site were observed on the final survey. 8-12 pairs.
Grey partridge (*Perdix perdix*)	Red List/S.41	Uncommon resident breeder	Probably breeding	A small number (peak of 5) including pairs recorded on every survey in the arable fields near to Woodhouse Farm. 3-4 pairs.

Species	Protection/UK Status/Country Status	Regional Status (Leicestershire Bird Report)	On-site Status	Population within the Site
Lapwing (*Vanellus vanellus*)	Red List/S.41	Abundant winter visitor, fairly common migrant breeder	Probably breeding	10 individuals were recorded in arable fields in the centre and west of the Site during each of the first two surveys with pairs recorded on both occasions. Birds were recorded showing signs of aggression, making alarm calls and displaying. A lower number (6) of lapwing were observed on the final survey. This may be due to the cryptic nature of the species when on the nest or may indicate a lower than previously expected breeding population. 2-5 pairs.
Snipe (*Gallinago gallinago*)	Amber List	Fairly common passage and winter visitor, rare breeder	Non-breeding	One individual was recorded calling in the north-east of the Site during the first survey. It is likely that this bird was on passage, as suitable breeding habitat is scarce within the Site and the species was not recorded during subsequent surveys.

Species	Protection/UK Status/Country Status	Regional Status (Leicestershire Bird Report)	On-site Status	Population within the Site
Herring gull (*Larus argentatus*)	Red List/S.41	Common winter visitor, uncommon in summer, new colonist	Non-breeding	A single individual was recorded foraging within the Site during the second survey. No suitable breeding habitat exists within the Site.
Stock dove (*Columba oenas*)	Amber List	Fairly common to common resident breeder	Probably breeding	Pairs and individuals were seen within or flying over the Site on all three survey visits. Suitable breeding habitat exists within buildings and tree cavities. 3-6 pairs.
Swift (*Apus apus*)	Amber List	Common migrant breeder	Non-breeding	Four were recorded flying over the Site during June. No nesting sites were located during surveys of the on-site buildings.
Kestrel (*Falco tinnunculus*)	Amber List	Fairly common resident breeder	Possibly breeding	A single male was observed in the north of the Site near Burbage Common during the first survey. Suitable habitat exists within tree cavities and buildings around the Site, although no nest sites were found. 1 pair.

Species	Protection/UK Status/Country Status	Regional Status (Leicestershire Bird Report)	On-site Status	Population within the Site
Skylark (*Alauda arvensis*)	Red List/S.41	Common resident breeder, autumn migrant and winter visitor	Probably breeding	Large numbers of Skylark were recorded across the Site with a peak of 66 individuals recorded during the second survey. A peak of 34 singing males was recorded on the final survey. Activity was largely restricted to the arable fields across the Site. A single nest was located during the 2018 survey and although none were recorded during the 2021 survey this is thought to be due to the cryptic nature of nesting skylark, it is likely that there many across the Site. 35-42 pairs.
Willow Warbler (*Phylloscopus trochilus*)	Amber List	Common migrant breeder	Probably breeding	Individuals were recorded on the site boundaries in the north-east and west of the Site during the second and third survey visits, with 2 pairs also recorded on the second survey. Due to the present of suitable nesting habitat, nesting cannot be ruled out. 1-4 pairs.

Species	Protection/UK Status/Country Status	Regional Status (Leicestershire Bird Report)	On-site Status	Population within the Site
Starling (*Sturnus vulgaris*)	Red List/S.41	Abundant resident breeder, passage migrant and winter visitor	Possibly breeding	Only observed in small numbers (total of 6) during the final survey. A pair was recorded entering a nest site during the 2018 surveys, but no such observations were made during the 2021 BBS. 4-6 pairs.
Fieldfare (*Turdus pilaris*)	Red List/Sch. 1	Common winter visitor, rare in summer	Non-breeding	Recorded on the first survey only. Assumed to be part of the remaining winter population prior to their migration.
Song Thrush *(Turdus philomelos*)	Red List/S.41	Common resident breeder, recent decline; winter visitor	Probably breeding	Males were heard singing from perches on all three survey visits. The population was concentrated on woodland and woodland edge across the Site, including the railway corridor, Burbage Wood, Freeholt Wood and the Woodland Adjacent to Aston Firs pLWS. Smaller numbers were recorded along the stream corridor and around Woodhouse Farm. 5-10 pairs.

Species	Protection/UK Status/Country Status	Regional Status (Leicestershire Bird Report)	On-site Status	Population within the Site
Redwing (*Turdus iliacus*)	Red List/Sch. 1	Common winter visitor	Non-breeding	Recorded on the first survey only. Assumed to be part of the remaining winter population prior to their migration.
House Sparrow (*Passer domesticus*)	Red List/S.41	Common resident breeder, recent decline	Probably breeding	One large colony and two smaller colonies were recorded on all three survey visits, the larger being at Woodhouse Farm, the two smaller populations at Hobbs Hayes Farm and just off-site using the eastern boundary hedgerows running northwards from Burbage Common Road. 12-15 pairs at Woodhouse Farm, 1-2 pairs at Hobbs Hayes Farm, 2-3 pairs along Burbage Common Road.
Dunnock (*Prunella modularis*)	Amber List/S.41	Abundant resident breeder, passage migrant	Probably breeding	Recorded commonly around the Site, associated with hedgerows. Most records were singing males. With a peak count of 27 singing males on the second survey. 20-30 pairs.

Species	Protection/UK Status/Country Status	Regional Status (Leicestershire Bird Report)	On-site Status	Population within the Site
Yellow Wagtail (*Motacilla flava*)	Red List/S.41	Uncommon migrant breeder, fairly common passage migrant, declining	Probably breeding	Low numbers were seen on the second and third survey visits. Records were in similar locations across the Site each month, suggesting up to 4 nest sites. 1-4 pairs.
Meadow pipit (*Anthus pratensis*)	Amber List	Common passage migrant, fairly common winter visitor, uncommon breeder	Possibly breeding	Moderate numbers were recorded in small flocks during the first survey visit, and a single bird during the second visit. None appeared to be defending breeding territories, although breeding cannot be ruled out in the grassland fields to the south-east of Woodhouse Farm. 1-2 pairs.
Bullfinch (*Pyrrhula pyrrhula*)	Amber List/S.41	Common resident breeder	Possibly breeding	A single bird was recorded on each survey in different locations across the Site. No breeding behaviour was observed although suitable habitat is present within the Site. 2-3 pairs.

Species	Protection/UK Status/Country Status	Regional Status (Leicestershire Bird Report)	On-site Status	Population within the Site
Linnet (*Linaria cannabina*)	Red List/S.41	Common resident breeder and passage migrant, less common in winter	Probably breeding	Peak count of 32 birds with 3 pairs recorded on the first survey. Located within hedgerows across the Site. 15-18 pairs.
Yellowhammer (*Emberiza citrinella*)	Red List/S.41	Common resident breeder, recent decline	Probably breeding	Singing males and pairs of birds were recorded regularly across the Site, particularly from hedgerows around arable fields. 15-18 pairs.
Reed Bunting (*Emberiza schoeniclus*)	Amber List	Common resident breeder, recent decline	Probably breeding	Singing males were recorded singing around ponds, ditches and within arable fields on all three survey visits, with a peak count of 11 birds recorded during the second survey. 3-6 pairs.

Table A3.4: Summary of Bird Species Recorded Which Are Not Considered to Be of Conservation Concern (Eaton et al., 2015).

Species	**Scientific Name**
Canada goose	(*Branta canadensis*)
Cormorant	(*Phalacrocorax carbo*)
Pheasant	(*Phasianus colchicus*)
Red-legged partridge	(*Alectoris rufa*)
Sparrowhawk	(*Accipiter nisus)*
Buzzard	(*Buteo buteo*)
Moorhen	(*Gallinula chloropus*)
Woodpigeon	(*Columba palumbus*)
Collared dove	(*Streptopelia decaocto*)
Little owl	(*Athene noctua*)
Great spotted woodpecker	(*Dendrocopos major*)
Green Woodpecker	(*Picus viridis*)
Magpie	(*Pica pica*)
Jay	(*Garrulus glandarius*)
Magpie	(*Pica pica*)
Jackdaw	(*Corvus monedula*)

Species	**Scientific Name**
Rook	(*Corvus frugilegus*)
Carrion crow	(*Corvus corone*)
Coal tit	(*Periparus ater*)
Blue tit	(*Cyanistes caeruleus*)
Great tit	(*Parus major*)
Barn swallow	(*Hirundo rustica*)
Long-tailed tit	(*Aegithalos caudatus*)
Chiffchaff	(*Phylloscopus collybita*)
Blackcap	(*Sylvia atricapilla*)
Lesser whitethroat	(*Sylvia curruca)*
Common whitethroat	(*Sylvia communis*)
Goldcrest	(*Regulus regulus*)
Wren	(*Troglodytes troglodytes*)
Nuthatch	(*Sitta europaea*)
Treecreeper	(*Certhia familiaris*)
Blackbird	(*Turdus merula*)
Robin	(*Erithacus rubecula*)

Species	**Scientific Name**
Pied wagtail	(*Motacilla alba*)
Chaffinch	(*Fringilla coelebs*)
Greenfinch	(*Chloris chloris*)
Goldfinch	(*Carduelis carduelis*)

Annex 4 ◆ Bat Surveys

METHODOLOGY

A4.1 During the Extended Phase 1 Habitat surveys, the mosaic of arable farmland, grassland, hedgerows, and woodland edge habitats was identified as having the potential to support foraging and commuting bats. In addition, a number of mature trees, buildings and a bridge within or immediately adjacent to the Site were considered to have the potential to support roosting bat species.

A4.2 The following surveys for bats were therefore undertaken, with reference to national best practice guidelines[23]:

- Bat Roosting:
  - Daytime inspections of mature trees for bat roosting potential;
  - Daytime inspections of farm buildings and a bridge for bat roosting potential; and
  - Building and bridge emergence/re-entry surveys.
- Bat Foraging/Commuting Activity:
  - Manual transect surveys; and
  - Automated detector surveys.

Investigations of Bat Roosting - Trees

A4.3 All suitable trees within the Site boundary were first surveyed for their potential to support roosting bats in May 2018 and this survey was updated in May 2019. A further update survey was undertaken on 21 May 2021, which is discussed in more detail here.

A4.4 Areas of the Site were identified which were considered to be at no risk of significant adverse impacts to potentially roosting bats; trees within these areas were not subject to survey. This included woodland edges and trees deemed to be sufficiently offset by a development buffer or those areas of the Site proposed for green infrastructure and/or green open space provision. Additionally, the desk-based review identified areas within the Site in which it is considered that there could be significant adverse impacts on potentially roosting bats as a result of the development proposals. This included woodland and trees located within proposed construction zones. Trees within these areas were subject to survey.

[23] Hundt, L. (2012). *Bat Surveys: Good Practice Guidelines, 2nd Edition*. Bat Conservation Trust, London

A4.5 The tree survey involved a visual assessment of trees for the presence of, or potential to support, roosting bats. The survey was completed by a bat licensed ecologist in accordance with best practice guidelines. The visual assessment was undertaken in 2018 and 2019 and updated on 21 May 2021. The trees were searched as thoroughly as possible from ground level, with the use of binoculars where necessary, on all elevations, where accessibility allowed.

A4.6 Suitable features on trees for roosting bats include:

- Loss/peeling/fissured bark;
- Natural holes e.g. rot holes and holes from fallen limbs;
- Woodpecker holes;
- Cracks/splits or hollow tree trunks/limbs; and
- Thick-stemmed ivy/epicormic growth.

A4.7 Signs of roosting bats include:

- Bat/s roosting in-situ;
- Bat droppings within or beneath a feature;
- Staining around or beneath a feature;
- Oily marks (staining) around roost access points;
- Audible squeaking from the roost (particularly on a warm summer afternoon);
- Large/regularly used roosts or regularly used sites may produce an odour; and
- Flies around the roost, attracted by the smell of guano.

A4.8 Based upon the results of the visual assessment and features/evidence identified as above, the following ratings for trees were used during the assessment:

- Known or confirmed roost - European Protected Species (EPS) licence required for works to tree to be completed lawfully;
- High potential - Multiple highly suitable features capable of supporting large roosts;
- Medium potential - Definite bat roosting potential, but with fewer suitable features than High potential;
- Low potential - Trees supporting a single feature, or features which may have limited potential for small numbers of roosting bats; and

- Negligible - No potential to support roosting bats.

Limitations

A4.9 It should be noted that this type of assessment is based on features visible from ground level and is not considered to be a definitive bat roosting survey. Additional survey work may therefore be required to establish if any bats are roosting within the trees that have potential and are to be subject to felling/tree surgery, and, if present, to establish the species, number and roost type/status. If trees are found to support bat roosts during pre-commencement investigations, such works would be subject to a European Protected Species (EPS) mitigation licence from Natural England in order for the work to commence lawfully.

Investigations of Bat Roosting – Buildings and Rail Bridge

Bat Roost Assessment

A4.10 A preliminary internal/external visual assessment of all buildings within the Site was undertaken on in 2018 and updated 28 May 2019. This was undertaken by a Natural England bat licensed ecologist and an assistant, in order to search for any evidence or potential of the buildings to support roosting bats. Additionally, a visual roost assessment of Burbage Common Road Railway Bridge pLWS was undertaken on 19 March 2021.

A4.11 All external features considered potentially suitable for bats were assessed, using a high powered torch, and binoculars and endoscope where necessary, from all aspects, where accessibility allowed. In addition, an internal inspection of all accessible loft voids was undertaken. Suitable roost features in buildings include:

- Cracks/crevices in stone/brickwork/timber;
- Missing/broken/raised roof/ridge/hanging tiles;
- Loose/lifted lead flashing/bitumen felt;
- Loft voids (particularly if relatively undisturbed, potential bat access points present, clear flight space with simple truss formation, roof lining and insulation present);
- Gaps in soffits, barge boards or fascias; and
- Cavity walls with potential bat access.

A4.12 Signs of bat activity searched for include:

- Bats present (live, dead or skeletons);
- Droppings;
- Feeding remains, such as clusters of moth/butterfly wings and beetle wingcases;

- Urine staining below a potential access point/feature;
- Oily marks (staining) around potential roost access point/feature;
- Audible squeaking from behind roofing felt or timber boarding (particularly on a warm summer afternoon); and
- Large/regularly used roosts may produce an odour.

A4.13 On this basis, the structures assessed were assigned a rating of potential suitability for roosting bats, from negligible to confirmed roost, as follows:

- Confirmed Roost: Evidence found;
- High potential: The building includes most of the features mentioned above (or many of one);
- Medium potential: The building includes two or three of the features or a moderate number of one;
- Low potential: The building includes one of the features; and
- Negligible potential: The building is not considered suitable for roosting bats.

A4.14 The buildings were also assessed for evidence of use by barn owls, searching for signs of use, such as: droppings, feathers and pellets or for the presence of roosting/nesting birds or nest debris. The results of this assessment are presented under the breeding bird results.

Bat Emergence/Re-entry Surveys

A4.15 Emergence and re-entry surveys of all buildings within the DCO Site boundary that were determined to have potential to support roosting bats were initially carried out between May and August 2018, with update surveys undertaken between May and September 2019 and again between May and August 2021.

A4.16 In accordance with best practice guidelines, the dusk surveys commenced 15 minutes prior to sunset and continued for approximately 1.5 hours. The dawn re-entry surveys were commenced approximately 1.5 hours prior to sunrise and concluded 15 minutes after sunrise. Surveys were undertaken at an optimal time of year for identifying bat roosts (May to September) and the weather conditions were optimum for undertaking bat surveys, being relatively warm, with little wind and no rain. The survey findings are therefore considered to not be limited by seasonal or climatic factors.

A4.17 The exact dates, timing and weather conditions of every survey undertaken are provided in Table A4.1, which should be read in conjunction with Figure 12.12 (document reference 6.3.12.12) which shows the building reference numbers and their locations.

Table A4.1: Dates, Timings and Weather Conditions of Bat Emergence/Re-entry Surveys.

Building Name and Visual Assessment Roosting Potential (Low (L), Moderate (M), High (H), Confirmed (C))	Survey	Date	No. Surveyors	Timing	Sunrise /Sunset	Temp (°C)	Cloud (%)	Rain	Wind (Beaufort)
[redacted]	Dusk emergence	17/06/21	6	21:16–23:01	21:31	18–19	100	Nil	1
	Dawn re-entry	16/07/21	6	03:30–05:15	05:00	14	0-10	Nil	0
	Dusk emergence (B3a only)	17/08/21	3	20:13–22:00	20:28	15	100	Light drizzle	2 - 3
	Dusk emergence	17/06/21	3	21:16–23:01	21:31	18–19	100	Nil	1

Building Name and Visual Assessment Roosting Potential (Low (L), Moderate (M), High (H), Confirmed (C))	Survey	Date	No. Surveyors	Timing	Sunrise /Sunset	Temp (°C)	Cloud (%)	Rain	Wind (Beaufort)
[redacted]	Dawn re-entry	16/07/21	6	03:30–05:15	05:00	14	0-10	Nil	0
	Dusk emergence	17/08/21	3	20:13–22:00	20:28	15	100	Light drizzle	2–3
	Dusk emergence	20/07/21	2	21:01–22:46	21:16	20–25	5	Nil	0

Building Name and Visual Assessment Roosting Potential (Low (L), Moderate (M), High (H), Confirmed (C))	Survey	Date	No. Surveyors	Timing	Sunrise /Sunset	Temp (°C)	Cloud (%)	Rain	Wind (Beaufort)
[redacted]	Dawn re-entry	13/08/21	2	04:13–05:58	05:43	14–15	100	Nil	0–1
	Dusk emergence	20/07/21	5	21:01–22:46	21:16	20–25	5	Nil	0
	Dawn re-entry	13/08/21	5	04:13–05:58	05:43	14–15	100	Nil	0–1
	Dusk emergence	04/08/21	2	20:53–22:23	20:53	20–21	30 - 50	Nil	2

Building Name and Visual Assessment Roosting Potential (Low (L), Moderate (M), High (H), Confirmed (C))	Survey	Date	No. Surveyors	Timing	Sunrise /Sunset	Temp (°C)	Cloud (%)	Rain	Wind (Beaufort)
[redacted]	Dusk emergence	25/08/21	2	19:54–21:39	20:09	18–22	60 - 90	Nil	1

A4.18 During the surveys, surveyors were positioned so that all the significant features on the buildings could be viewed. Surveys were conducted using Elekon Batlogger M detectors, with observations of the time, location, and activity of all bats seen or heard noted. Bats were identified on the basis of their characteristic echolocation calls, which were recorded where appropriate and analysed using computer sonogram analysis (BatExplorer) to confirm species identification. Species of *Myotis* bats and long-eared bats (*Plecotus* sp.) are difficult to accurately tell apart solely from their echolocation calls and were therefore grouped as such.

Investigations of Bat Foraging/Commuting Activity

Manual Transect Surveys

A4.19 Manual transect surveys were undertaken across the Site to identify areas of bat foraging activity and commuting routes used by bats during 2021. In accordance with best practice guidelines[24], surveys were spread over the course of the active bat season and completed within the optimal survey months of May to September inclusive.

A4.20 Full details including the survey type, date, timing, and weather conditions during each of the transect surveys is given in Table A4.2**.** Weather conditions on each visit were optimum for bat surveys, being relatively warm with light to medium winds and little to no rain. The surveys are therefore not considered to be seasonally or climatically constrained.

Table A4.2: Date, Timing and Weather Conditions of Bat Activity Surveys.

Survey Date	Dusk/-Dawn	Survey Time	Sunrise/-Sunset Time	Weather conditions			
				Temp (ºC)	Cloud (%)	Rain	Wind (Beaufort Scale)
28 April	Dusk	20:27-22:27	20:27	5-9	0-10	Nil	0-2
26 May	Dusk	21:10-23:10	21:10	12-14	50-80	Nil	0-1
23 June	Dusk	21:33-23:33	21:33	17-18	60-80	Nil	0-1
26 July	Dusk	21:13-23:13	21:13	20-21	30-70	Nil	0-1

[24] Hundt L (2012). *Bat Surveys: Good Practice Guidelines, 2nd Edition,* Bat Conservation Trust

23 August	Dusk	20:15-22:15	20:15	16-20	5-10	Nil	1
24 August	Dawn	04:02-06:02	06:02	11-15	>1	Nil	1
22 September	Dusk	19:05-21:05	19:05	16-20	20	Nil	4

A4.21 Manual transect surveys were completed by experienced bat surveyors and were designed to provide a representative cover of potential foraging or commuting habitats on site, namely grasslands, hedgerows and woodland edges. The transect routes are illustrated on Figure 12.11 (document reference 63.12.11). Transect routes were walked at a slow and steady pace with 12 'pacing points', to aid in keeping pace. All bats were recorded, and their behaviour marked on survey maps in order to characterise the value of the Site and its component habitats to foraging and commuting bats.

A4.22 Activity surveys were conducted using Elekon Batlogger M detectors. Observations of the time, location, and activity of all bats seen or heard were noted. Bats were identified on the basis of their characteristic echolocation calls, which were recorded and analysed using computer sonogram analysis (BatExplorer) to confirm species identification. Species of *Myotis* bats and long-eared bats (*Plecotus* sp.) are difficult to accurately tell apart solely from their echolocation calls and were therefore grouped as such.

Automated Detector Surveys

A4.23 To supplement the bat transect surveys, bat activity within the Site was also sampled using static bat detectors which automatically trigger and record bat echolocation calls. Anabat Express bat detectors (hereafter referred to as 'Anabats') were deployed in throughout the Site, as shown on Figure 12.11 (document reference 6.3.12.11).

A4.24 Anabats were deployed on a monthly basis throughout April to September 2021. The Anabats were fixed in secure locations, with an external microphone attached 1-3m above ground and directed away from the tree to maximise detection sensitivity. Anabats were deployed and left in situ for a minimum period of five nights. Weather data for the sampling period was obtained from the nearest weather station using the weather underground website (www.wunderground.com). Tables A4.3 and A4.4 gives the sampling dates, microphone details and weather conditions for the Anabats deployed during the recording periods.

Table A4.3: Anabat Sampling Dates and Details.

Sampling Period	Anabat ID	Microphone	
		Ht (m)	Direction
23/04/2021–28/04/2021	1	2.0	E
	2	2.0	E
	3	2.5	S
	4	1.5	W
	5	1.7	E
	6	1.8	SW
	7	1.7	S
	8	2.0	SW
	9	2.0	NW
	10	1.5	NW
	11	2.0	SE
	12	1.5	SE
	13	1.5	N
	14	1.0	SW
21/05/2021–26/05/2021	1	1.0	NW
	2	1.0	W

Sampling Period	Anabat ID	Microphone	
		Ht (m)	Direction
	3	1.0	E
	4	1.0	SSW
	5	1.5	SE
	6	1.5	NW
	7	1.0	W
	8	2.0	NE
	9	1.5	NW
	10	1.5	NW
	11	1.5	SE
	12	1.0	SE
	13	1.5	N
	14	1.0	SW
18/06/2021–23/06/2021	1	1.5	E
	2	1.0	NW
	3	1.5	E
	4	1.5	SW

Sampling Period	Anabat ID	Microphone	
		Ht (m)	Direction
	5	1.5	SW
	6	1.5	NW
	7	1.5	NE
	8	1.5	NE
	9	1.0	W
	10	2.5	NW
	11	1.5	W
	12	1.25	SE
	13	2.0	W
	14	1.5	SW
21/07/2021–26/07/2021	1	2.0	E
	2	1.5	W
	3	1.5	E
	4	1.5	E
	5	2.0	S
	6	2.0	E

Sampling Period	Anabat ID	Microphone	
		Ht (m)	Direction
	7	1.5	W
	8	1.5	E
	9	2.0	NW
	10	1.5	W
	11	1.5	W
	12	1.0	S
	13	1.5	NW
	14	1.5	S
18/08/2021–23/08/2021	1	1.5	NE
	2	1.5	NW
	3	1.5	NE
	4	1.9	NE
	5	2.0	SE
	6	1.8	N
	7	1.7	E
	8	1.5	NE

Sampling Period	Anabat ID	Microphone	
		Ht (m)	Direction
	9	1.8	NW
	10	2.0	NW
	11	1.5	NW
	12	1.5	SW
	13	2.0	N
	14	1.5	NW
22/09/2021–27/09/2021	1	2.0	NE
	2	2.0	W
	3	1.5	NE
	4	2.0	NE
	5	2.5	S
	6	2.0	E
	7	2.0	W
	8	1.8	NE
	9	2.0	SW
	10	1.5	N

Sampling Period	Anabat ID	Microphone	
		Ht (m)	Direction
	11	2.0	NW
	12	2.0	SE
	13	2.0	NE
	14	1.5	NW

A4.25 The echolocation calls recorded by the Anabats were checked manually using sonogram analysis (AnalookW) to confirm the species identification of each bat call. Species of *Myotis* bats and long-eared bats (*Plecotus* sp.) are difficult to accurately tell apart solely from their echolocation calls and were therefore grouped as such.

Limitations

A4.26 During the May transect surveys, two of the SD cards within the Batloggers were corrupted and therefore data could not be retrieved from this survey. Therefore, the data shown on Figure 12.15 (document reference 6.3.12.15) for transects T1 and T3 have been manually inputted based on survey maps and notes recorded in the field. These two transects only show individual bats observed along the route as opposed to the location of a bat call recording. However, it is considered that sufficient activity data and a reliable appreciation of the value of the Site for foraging/commuting bats has been achieved through the number of manual bat transect surveys completed and the level of Anabat recording.

A4.27 In addition, the identification of calls and species using Analook software is dependent upon the quality of the recording made which can be influenced by the following factors, which may limit levels of activity and species recorded:

- Weather conditions – rainfall and wind;
- Distance of bat from Anabat;
- Presence of obstructions through which the noise must pass i.e. trees; and
- Proximity of other noise sources such as roads.

RESULTS

Investigations of Bat Roosting – Trees

A4.28 The daytime assessment of 'at risk' trees within the Site identified a total of 93 trees as having the potential to support roosting bats, with 11 trees identified as high potential, 25 as moderate potential and 57 as low potential. The remainder of trees on Site were considered to have negligible bat roost potential.

A4.29 The tree bat roost schedule provided in Table A4.5 describes the level of bat roost potential with reference to the Bat Conservation Trust bat survey guidelines[25]. The location of trees with bat roosting potential (high, medium or low), or confirmed roosts, is depicted on Figure 12.13 (document reference 6.3.12.13).

Table A4.5: Summary of Results of Tree Assessments for Roosting Bats.

Tree No.	Species	Age Class	Comments	Bat Roosting Potential/Confirmed
T1	Poplar	Mature	Dense ivy and bird box	Low
T2	Poplar	Mature	Snapped branches	Low
T3	Common ash	Mature	Hollow trunk	High
T4	Common ash	Mature	Flaking bark	Moderate
T5	Common ash	Mature	2 hollow stems	High
T6	Common ash	Dead	Splits in the fallen tree	Moderate
T7	Common ash	Mature	Dense ivy	Low
T8	English oak	Mature	Due to size and age	Low
T9	Common ash	Mature	Knot hole c. 4m high on northern aspect	Moderate

[25] Hundt, L. (201t1982) *Bat Surveys: Good Practice Guidelines*, 2nd edition, Bat Conservation Trust.

Tree No.	Species	Age Class	Comments	Bat Roosting Potential/Confirmed
T10	Common ash	Mature	Two woodpecker holes and flaking bark	High
T11	English oak	Mature	A split c. 3m high on southern aspect and dense ivy	Low
T12	English oak	Mature	Very large. No features seen from ground but minor splits/cracks and could be some on north west aspect	Low
T13	English oak	Mature	Dense ivy	Low
T14	Common ash	Mature	Minor limb hole on southern aspect of one of the stems at c. 6m high.	Low
T15	Common ash	Mature	Rot hole on one of the smaller stems on southern aspect c.1.5m high. Does not go up very far. Potentially some minor splits/cracks higher up main stem	Low
T16	English oak	Mature	Rot hole at bottle of 2 limbs. c.3.5m high on south west aspect. Minor splits/cracks	Moderate
T17	English oak	Mature	Dense ivy so likely to be minor splits/cracks. No obvious features observed	Low

Tree No.	Species	Age Class	Comments	Bat Roosting Potential/Confirmed
T18	English oak	Mature	Splits and cracks everywhere but most superficial	Moderate
T19	English oak	Mature	Ivy. Very large so likely to be splits.	Low
T20	English oak	Mature	Dense ivy	Low
T22	English oak	Mature	Damage to trunk and strange growth formation which has created a BRP cavity in the trunk at c.3.5m high on north west aspect	Moderate
T23	English oak	Mature	Several knot holes and crossing branches	Low
T24	Not recorded	Not recorded	Very large, three birds nests, no obvious BRP features, but few minor cracks/split/broken branches	Low
T25	Common ash	Mature	Minor limb hole on south east aspect c.3m high.	Low
T26	Willow sp.	Mature	Flaking bark	Low
T27	Willow sp.	Mature	Flaking bark	Low

Tree No.	Species	Age Class	Comments	Bat Roosting Potential/Confirmed
T28	English oak	Mature	Flaking bark with sone split branches (tree is offsite but hanging onto site)	Low
T29	English oak	Mature	Some knot holes (tree is offsite but hanging onto site)	Low
T30	English oak	Mature	Upwards facing knot hole	Low
T31	English oak	Mature	Knot holes on a hollow limb	Moderate
T32	English oak	Mature	Strange bent over growth formation. Potential crevices in damaged/bent section	Low
T33	English oak	Mature	Looks like it's been cut off or torn off at top of trunk, but lots of new stems growing up from trunk. Splits/cracks, may be other BRP features at top that can't be seen from ground	High
T34	Common ash	Mature	Limb holes at c.4.5m and 7m high on west aspect	Moderate
T35	English oak	Mature	Minor split/cracks/flaking bark	Low
T36	Eucalyptus sp.	Mature	Some cavities	Moderate

Tree No.	Species	Age Class	Comments	Bat Roosting Potential/Confirmed
T37	English oak	Mature	Minor splits, cracks and flaking bark in some of the smaller limbs	Low
T38	English oak	Mature	Some knot holes	Low
T39	English oak	Mature	Trunk split	Low
T40	English oak	Mature	Small hazard beam	Low
T41	English oak	Mature	Knot holes	Low
T42	English oak	Mature	Split and hollow limbs	Low
T43	English oak	Mature	Stump with splits and hollows	Moderate
T44	English oak	Mature	Split branches	Moderate
T45	Horse chestnut	Mature	Dense ivy and small cavities	Low
T46	Common ash	Mature	Dead hollow trunk	High
T47	English oak	Mature	Hollow trunk and some flaking bark	High
T48	English Oak	Mature	Some crevices	Low
T49	English oak	Mature	Rot holes	Low
T50	Common ash	Mature	Dead and decaying branches. Rot holes from cut limbs	Low

Tree No.	Species	Age Class	Comments	Bat Roosting Potential/Confirmed
T51	Common ash	Mature	Splits and rot at end of limbs	Low
T52	Common ash	Mature	Very thick ivy and rot holes	Moderate
T53	Common ash	Mature	Knot hole	Low
T54	Common ash	Mature	Knot holes	Low
T55	Not recorded	Mature	Split limb holes	Moderate
T56	Not recorded	Not recorded	Hazard beam, healed splits	Moderate
T57	Not recorded	Not recorded	Healed splits	Low
T58	Not recorded	Not recorded	Knot holes and rot holes	Low
T59	Not recorded	Not recorded	Knot holes and split ends	Low
T60	Not recorded	Not recorded	Age and creviced bark, some split ends of branches	Low
T61	Not recorded	Not recorded	Age and creviced bark, some split ends of branches	Low
T62	Not recorded	Not recorded	Upwards facing rot hole	Low

Tree No.	Species	Age Class	Comments	Bat Roosting Potential/Confirmed
T63	Not recorded	Not recorded	Healed split knot hole	Low
T64	Common ash	Mature	Knot holes	Low
T65	Common ash	Mature	Large knot holes with small cavities	Moderate
T66	English oak	Mature	Rot holes and hollow limbs?	Moderate
T67	Common ash	Mature	Dead hollow trunk with open top	Low
T68	Common ash	Mature	Rot holes and hollow limbs	Moderate
T69	Common ash	Mature	Large woodpecker hole on west aspect c.9m high. also, some other splits/cracks	High
T70	Common ash	Mature	Lateral crack in main stem but quite low down and only a few cm deep from c.0.5-1.5m from ground on south east aspect.	Low
T71	Common ash	Mature	Deadwood and cavities everywhere. Lots of BRP cavities, splits and flaking bark.	High
T72	Common ash	Mature	Rot hole and limb tear. Possibly hollow limbs.	Low

Tree No.	Species	Age Class	Comments	Bat Roosting Potential/Confirmed
T73	Common ash	Mature	Hollow and split trunk likely to be exposed	Low
T74	English oak	Over mature	Large rot holes and splits	Moderate
T75	Common ash	Mature	Long partially healed crack up trunk.	Moderate
T76	Not recorded	Not recorded	Split in limb. Bird box	Low
T77	English oak	Mature	Several old cut limbs and rot hole developing. potential for large cavities	Moderate
T78	English oak	Mature	-	Low
T79	English oak	Mature	Splits/cracks as well as broken limbs and tear out damage with healing growth forming a crevice (shallow)	Moderate
T80	Common ash	Mature	Minor splits/cracks	Low
T81	Common ash	Mature	Hollow cavity in upper limb, which may be open at the top (reaching its BRP) also flaking bark and damaged limb also hollow cavity at base.	High

Tree No.	Species	Age Class	Comments	Bat Roosting Potential/Confirmed
T82	English oak	Mature	No decent BRP features seen from ground but very large tree likely to have some cracks unseen. Few small crevices around limb base.	Low
T83	Common ash	Mature	Rotten base, creating upwards developing cavity. Also, another limb hole on lower branch on south aspect at c.3.5m and on north aspect at c.4m	Moderate
T84	English oak	Mature	Few cracks in bark but nothing major spotted.	Low
T85	Common ash	Mature	Damage at base of southern stem, creating a crevice upwards. Also, clean limb hole on south aspect of southern limb at c.5m high.	Moderate
T86	Common ash	Mature	One very good limb hole on north aspect at c.5m high also another limb hole that is downward-developing at c.4m high on north west aspect.	High
T87	Common ash	Early mature	Minor splits/cracks/limb holes	Low

Tree No.	Species	Age Class	Comments	Bat Roosting Potential/Confirmed
T88	Common ash	Mature	Limb hole at c.10m on west aspect. Also, strange tear-out wound with some decay = potentially unseen BRP.	Moderate
T89	Not recorded	Not recorded	Stumpy with cracks and rot	Low
T90	Common ash	Mature	Major tear-out on western stem, leading to a big crack in the remaining bark. Few minor limb holes on other stem.	Moderate
T91	Common ash	Mature	Minor limb holes and splits/cracks	Low
T92	Common ash	Mature	Limb hole which is mostly healed up but may be a small crevice leading into the limb on north aspect c.5m high.	Low
T93	Common ash	Mature	Several limb holes a c.5.5m on north west aspect and on north east aspect at c.4m. Flaky bark/deadwood in eastern stem.	High
T94	English oak	Mature	Minor splits/cracks and ivy.	Low
Totals		93		

Tree No.	Species	Age Class	Comments	Bat Roosting Potential/Confirmed
Confirmed roost		0		
High potential		11		
Moderate potential		25		
Low potential		57		

Investigations of Bat Roosting – Buildings and Railway Bridge

Day-time Assessment

A4.30 The results of the preliminary internal/external inspections of buildings located within the Site are illustrated on Figure 12.12 (document reference 6.3.12.12). The assessment identified a number of buildings with moderate to high potential and a rail bridge with moderate potential to support roosting bats. The value of each of the buildings and railway bridge within the Site for roosting bats is summarised below within Table A4.6.

Table A4.6: Preliminary Bat Roost Assessment of Buildings

Building ID No.	Description	Evidence of Bats/Roosting Potential
[redacted]	Single storey, brick stables, pitched roof with small clay tiles. Large wood soffit and barge boards	Moderate potential Access through stable doors and open windows as well as a gap at the top of the gable end. Potential to roost under tiles and roofing felt.
	Single storey brick barn conversion with flat clay tiles and loft conversion. Constructed in the last 5 years.	Moderate potential Occasional slipped tiles and missing mortar on south side.
	[redacted]	Confirmed roost Large number of fresh brown long-eared and pipistrelle droppings found by the [redacted] Single pipistrelle within a [redacted]
	Two-storey extension to Building 3a with pitched tiled roof.	Moderate potential
	Storage shed 2 sections, wooden frame corrugated steel sheet, plywood walls	Negligible potential

Building ID No.	Description	Evidence of Bats/Roosting Potential
[redacted]	Farm butchery building with metal sheet walls and pitched corrugated asbestos sheet roof.	Negligible potential
	Long barn, mostly open with two half conjunction timber walls (otherwise open) and pitched corrugated metal sheet roof	Negligible potential
	Long building with metal sheet walls and pitched corrugated asbestos sheet roof. (no access at time of survey)	Negligible potential
	Large barn, open on south side with metal sheet walls and pitched corrugated asbestos sheet roof.	Negligible potential
	Large barn, open on north side with metal sheet walls and multi-pitched corrugated asbestos sheet roof.	Negligible potential
	Corrugated metal barn with timber frame and open on west aspect	Negligible potential

Building ID No.	Description	Evidence of Bats/Roosting Potential
[redacted]	Long barn with metal sheet walls and pitched corrugated asbestos sheet roof.	Negligible potential
	Two-storey brick chalet construct with pitched clay tile roof and double garage.	Moderate potential Missing mortar and occasional cracked tiles. elevation.
	Single storey bungalow with brick walls and concrete tiles	Negligible potential
	Single storey, corrugated metal agricultural shed, open to west.	Negligible potential
	Single storey, brick-built dog kennels office with pitched felt roof.	Negligible potential
	Built after survey bat roost assessment	Negligible potential
	Single storey, brick-built kennel blocks with pitched felt roof and stable style doors to each kennel.	Negligible potential

Building ID No.	Description	Evidence of Bats/Roosting Potential
[redacted]	Two-storey, red brick new build with slate pitched roof.	Negligible potential
	Big metal barn	Negligible potential
	Fairly modern, single storey L-shaped house, part-converted in loft. Brick-built with slate pitched roof.	Moderate potential Few slipped slates for access
	Two-storey farmhouse with brick walls and pitched clay tile roof. Rendered on front elevation. Two dormer windows extended on rear elevation.	Moderate potential Several slipped tiles and potential lifted lead flashing around dormers as well as Bitumen felt roof lining.
	Timber garage with corrugated shallow-pitched roof	Negligible potential
	Metal barn with flat roof and open sides.	Negligible potential
	Part-metal, part-corrugated asbestos sheet roof. Open sided on both sides	Negligible potential

Building ID No.	Description	Evidence of Bats/Roosting Potential
[redacted]	Large, corrugated metal roof. Open front with conjunction timber walls.	Negligible potential
	Small shed in corner of field.	Negligible potential
	Metal barn with corrugated domed roof. Two large metal doors with large gap over top.	Negligible potential
	Big concrete block barn/warehouse with corrugated asbestos roof. Wooden door	Negligible potential
	Long, single-storey brick outbuilding with clay tiles, pitched roof. Open to rafters inside	Moderate potential – emergences/re-entry surveys confirmed roost
	Single storey outbuildings attached to B29 with corrugated metal roof.	Negligible potential
	Static caravan	Negligible potential
	Static caravan, pre-fabricated walls and felt roof.	Negligible potential

Building ID No.	Description	Evidence of Bats/Roosting Potential
[redacted]	Static caravan.	Negligible potential
	Brick bridge crossing a rail track	Moderate potential - Several areas of missing mortar and a deep crevice under the arch

Emergence/Re-entry Surveys

A4.31 All buildings/structures with moderate to high bat roost potential, and at risk of potential adverse impacts from the proposed development, were subject to detailed emergence and re-entry surveys. Results of the emergence/re-entry surveys are discussed in turn below in relation to each of the buildings surveyed and summarised within Table A4.7.

Building 2 – Gobble Land

A4.32 During the first dusk emergence surveys on 17 June 2021, two common pipistrelle bats were recorded from a missing roof tile on the single storey extension on the northern aspect. The emergences were at 21:51 with sunset being at 21:31.

A4.33 No bats were recorded re-entering Building B2 during the dawn survey on 16 July 2021.

A4.34 The maximum roost count is therefore two common pipistrelle bats within Building 2.

A4.35 During the surveys, common pipistrelle, noctule, a *Myotis* species and long-eared bats were recorded active at the Site.

A4.36 In 2018 and 2019, a maximum count of a single long-eared bat was recorded within building B2.

[redacted]

A4.37 During the first dusk emergence survey on 17 June 2021, a total of eight common pipistrelle bats were recorded emerging from [redacted] one was recorded emerging from a [redacted] at 21:55; two emerged from the apex of the [redacted] at 21:59 and 22:01; two were recorded emerging from the [redacted] at 22:03 and 22:04; two were recorded emerging from the [redacted] at 22:46; one was recorded emerging from middle of the [redacted] at 22:12 with sunset being at 21:16.

A4.38 During the dawn re-entry survey on 16 June 2021, one common pipistrelle was recorded re-entering the [redacted] end at 04:17, with sunrise being at 05:01.

A4.39 During the second dusk emergence survey on 17 August 2021, a single common pipistrelle was recorded emerging from the eastern aspect of the building at 20:36, with sunset being at 20:13.

A4.40 The maximum roost count is therefore eight bats comprising all common pipistrelle within [redacted] In 2019, a total of nine bats comprising three common pipistrelle bats and six long-eared bats were recorded within [redacted]

A4.41 During the surveys, common pipistrelle and noctule bats were recorded active at the Site.

A4.42 In 2018 and 2019, a maximum count of three common pipistrelle and six long eared bats were recorded within building B3a.

Building 12 -Wincott Land

A4.43 No bats were recorded emerging from Building 12 during the first dusk emergence surveys and the dawn re-entry survey in 2021.

A4.44 During the second dusk emergence survey on 17 August 2021, a single common pipistrelle bat was recorded emerging form a gap between the tiles and the wood plinth above the bay window on the south-eastern aspect of Building 12 at 20:42, with sunset being at 20:28.

A4.45 The maximum roost count is therefore one common pipistrelle within Building 12 in 2021. A total of three common pipistrelle and six long eared bats were recorded within Building 12 in 2018 and 2019.

A4.46 During the surveys, common pipistrelle, soprano pipistrelle and noctules bats were recorded active at the Site.

A4.47 In 2018 and 2019, a maximum count of three common pipistrelle were recorded within building 12.

Building 20 – Hobs Hayes and Free Holt

A4.48 During the first dusk emergence survey on 20 July 2021, a single common pipistrelle was recorded emerging from the gap between the fascia board and wall gutting on the northern aspect of Building 20 at 21:56, with sunset at 21:01.

A4.49 No bats were recorded re-entering Building 20 during the dawn re-entry survey on 13 August 2021.

A4.50 The maximum roost count is therefore one common pipistrelle within Building 20 in 2021.

A4.51 During the surveys, common pipistrelle, soprano pipistrelle and noctules bats were recorded active at the Site.

A4.52 No bat roosts were recorded in this building in 2018 or 2019.

Building 26 – Hobs Hayes and Free Holt

A4.53 No bats were recorded dusk emergence survey on 20 July 2021.

A4.54 During the first dawn re-entry survey on 13 August 2021, two common pipistrelle were recorded flying around the lean-to at the start of the survey and seen emerging at 04:49, with sunrise being at 04:13.

A4.55 The maximum roost count is therefore two common pipistrelle within Building 26 in 2021.

A4.56 During the surveys, common pipistrelle, soprano pipistrelle, noctule and long eared bats were recorded active at the Site.

A4.57 No bat roosts were recorded in this building in 2018 or 2019.

Railway Bridge

A4.58 No bats were recorded emerging or re-entering from the crevices within the railway bridge on 04 and 13 August 2021.

A4.59 During the surveys, common pipistrelle, soprano pipistrelle and noctule bats were recorded active at the Site.

Table A4.7: Summary Results of Detailed Emergence/Re-Entry Surveys 2021.

Building No.	Visual Assessment	Detailed Emergence/Re-entry Surveys						Maximum Roost Count
		Date	First Dusk Emergence Survey	Date	Dawn Re-entry Survey	Date	Second Dusk Emergence Survey	
[redacted]	Moderate	17/06/21	0	16/07/21	0			0
	Moderate	17/06/21	2 common pipistrelle emerged	16/07/21	0			2 common pipistrelle
	Confirmed	17/06/21	8 common pipistrelle emerged	16/07/21	1 common pipistrelle re-entered	17/08/21	1 common pipistrelle emerged	8 common pipistrelle
	Moderate	17/06/21	0	16/07/21	0			0
	Moderate	17/06/21	0	16/07/21	0	17/08/21	1 common pipistrelle emerged	1 common pipistrelle

Building No.	Visual Assessment	Detailed Emergence/Re-entry Surveys						Maximum Roost Count
		Date	First Dusk Emergence Survey	Date	Dawn Re-entry Survey	Date	Second Dusk Emergence Survey	
[redacted]	Moderate	20/07/21	1 common pipistrelle emerged	13/08/21	0			1 common pipistrelle
	Moderate	20/07/21	0	13/08/21	0			0
	Moderate	20/07/21	0	13/08/21	0			0
	Moderate	25/08/21	0	04/08/21	0			0

Investigations of Bat Foraging/Commuting Activity

A4.60 Bat foraging and commuting activity recorded during the course of both transect and automated detector surveys undertaken between April and September 2021 is summarised by species/genus below and illustrated on Figures 12.14 to 12.20. The automated detector survey results summarised in Table A4.8.

Species Diversity and Abundance

A4.61 In 2021, up to nine species of bat (*Myotis* and *Plecotus* species were not identified to species level) were confirmed to be foraging and/or commuting within the Site during the course of the activity surveys. The vast majority of this behaviour, 79.9% of Anabat recordings, related to common pipistrelle bats. Noctule bats comprised just 11.0% of all Anabat recordings, and *Myotis* and serotine bats were infrequently recorded comprising only 1.6% and 1.3% respectively of all Anabat calls. The following bat species were also recorded during the course of Anabat sampling, but their relative abundance was so low that the total proportion of calls recorded was less than 1% of the total: soprano pipistrelle, *Plecotus* bats species, Leisler's bat, Nathusius' pipistrelle and barbastelle. The abundance and distribution of bats were largely similar to that of the 2018 and 2019 bat activity surveys. The relative abundance and distribution of each species recorded is discussed further below.

A4.62 The highest levels of activity were recorded in June and September with the majority of activity being towards the south of the Site recorded on the automated detectors in locations 11,12 and 13 on Figure 12.11 (document reference 6.3.12.11). Activity in the north western corner (locations 6, 7 and 10) was relatively high throughout the year except for August which recorded a higher level of activity along the western boundary at location 8. This is somewhat reflected within the transect activity survey data with the exception of April which recorded little to no activity across the site. Bats were recorded using the majority of the hedgerows and woodlands for commuting and foraging across the Site.

Common and Soprano Pipistrelle

A4.63 Common pipistrelle recordings were most frequent and most widely distributed across the Site with a slightly higher level of activity observed nearer Aston Fir and Freeholt Wood to the west of the Site and along the stream connected to it. There were very few soprano pipistrelle calls throughout the Site.

A4.64 Common and soprano pipistrelle bats are considered to be widespread and common across Leicestershire and the rest of the UK. Soprano pipistrelles are listed as species of principal importance for conservation in England. The populations supported by the Site are therefore considered to be of Local value.

Noctule Bats

A4.65 Noctule bats were the second most frequently recorded species with the highest levels of activity being within the eastern and southern fields of the Site.

A4.66 Noctule bats are considered widespread and common across Leicestershire and the rest of the UK. The species is listed as species of principal importance for conservation in England. To populations supported by the Site are therefore considered to be of Local value.

Myotis sp. Bats

A4.67 *Myotis* sp. bat recordings were contributed to with the highest levels of activity observed adjacent to the woodland to the south of site and along the stream connected to it.

A4.68 *Myotis* sp. bats are considered to be widespread and common across Leicestershire and the rest of the UK with the exception of Bechstein's bat, which is restricted to parts of southern England and South Wales. Bechstein's bat is listed as species of principal importance for conservation in England, however the species is unlikely to be present on site. Therefore, the populations supported by the Site are therefore considered to be of Local value.

Serotine

A4.69 Serotine activity was most frequently recorded along the stream to towards the south of the Site.

A4.70 Serotine bats are considered to be widespread and common across Leicestershire and the rest of the UK. The populations supported by the Site are therefore considered to be of Local value.

Plecotus sp. Bats

A4.71 *Plecotus* sp. bat recordings contributed to less than 1% of calls recorded with activity throughout the Site with the majority of activity being towards the north west adjacent to woodland areas and streams.

A4.72 Brown long-eared bats are considered to be widespread and common across Leicestershire and the rest of the UK and grey long-eared bats are restricted to the south coast and south west of England, with the exception of a single individual identified in Leicestershire. Brown long-eared bats are listed as species of principal importance for conservation in England. The populations supported by the Site are therefore considered to be of Local value.

Leisler's Bat

A4.73 Leisler's bat recordings contributed to less than 1% of calls recorded with activity distributed throughout the Site. Leisler's bat activity was only recorded in August and September.

A4.74 Leisler's bats are considered to be widespread and common across Leicestershire and the rest of the UK. The populations supported by the Site are therefore considered to be of Local value.

Nathusius' Pipistrelle

A4.75 Nathusius' pipistrelle activity recordings contributed to less than 1% of calls recorded with activity observed in pockets to the north along the stream, to the east around location 7, to the west adjacent to the woodland and along the stream to the south of the Site connecting to the woodland.

A4.76 Nathusius' pipistrelle bats are considered to be rare but widespread across Leicestershire and the rest of the UK. The populations supported by the Site are therefore considered to be of Local value.

Barbastelle

A4.77 A single barbastelle bat was recorded in August within the north of the Site along the stream connected to Burbage Common woodland (automated detector location 1).

A4.78 Barbastelle bats are considered to be a rare species limited to southern and central England and Wales. The species is listed as species of principal importance for conservation in England. However, the level of activity was very low, and the populations supported by the Site are therefore considered to be of Local value.

Evaluation of Overall Assemblage

A4.79 The abundance and diversity of bat species recorded on site is considered to be typical of an urban edge farmland site in Leicestershire with common and widespread generalist species such as common bats accounting for the vast majority of foraging and commuting activity. However, a number of rarer 'specialist' species were recorded on site including Nathusius pipistrelle, Leisler's bats and barbastelle.

A4.80 it is considered that the Site supports some important habitats for foraging or commuting individuals of these rarer species, mainly along the Site boundaries. This relates primarily to the woodland habitats along the western boundary of the Site and the streams and hedgerows within the Site which are connected to these woodlands.

A4.81 Overall, the bat assemblage is considered to be of Local importance.

Table A4.8: Summary of 2021 Static Detector (Anabat) Surveys

Survey Month	Locations	Common pipistrelle	Long-Eared bat	Nathusius' pipistrelle	*Myotis* sp.	Barbastelle bat	Leisler's Bat	Noctule	Soprano pipistrelle	Serotine	Total
April	1	5	0	0	1	0	0	0	1	0	7
	2	4	0	0	1	0	0	0	0	1	6
	3	6	0	0	1	0	0	0	0	0	7
	4	5	0	0	1	0	0	1	0	0	7
	5	1	2	0	0	0	0	2	0	0	5
	6	303	0	0	3	0	0	0	0	0	306
	7	316	0	0	3	0	0	1	8	0	328

Survey Month	Locations	Common pipistrelle	Long-Eared bat	Nathusius' pipistrelle	*Myotis* sp.	Barbastelle bat	Leisler' s Bat	Noctule	Soprano pipistrelle	Serotine	Total
	8	9	0	0	0	0	0	5	1	0	15
	9	55	0	0	1	0	0	3	0	3	62
	10	300	0	0	2	0	0	0	24	0	326
	11	5	0	0	1	0	0	0	1	0	7
	12	4	0	0	1	0	0	72	1	0	78
	13	55	0	0	5	0	0	8	1	2	71
	14	0	0	0	0	0	0	0	0	0	0
May	1	62	0	0	0	0	0	0	0	0	62

Survey Month	Locations	Common pipistrelle	Long-Eared bat	Nathusius' pipistrelle	*Myotis* sp.	Barbastelle bat	Leisler' s Bat	Noctule	Soprano pipistrelle	Serotine	Total
	2	74	0	0	0	0	0	0	0	0	74
	3	0	0	0	0	0	0	0	0	0	0
	4	11	0	0	0	0	0	0	0	0	11
	5	2	0	0	0	0	0	0	0	0	2
	6	18	0	0	1	0	0	1	0	0	19
	7	147	0	0	10	0	0	10	0	0	158
	8	35	0	0	0	0	0	0	0	0	35
	9	0	0	0	0	0	0	0	0	0	0

Survey Month	Locations	Common pipistrelle	Long-Eared bat	Nathusius' pipistrelle	*Myotis* sp.	Barbastelle bat	Leisler' s Bat	Noctule	Soprano pipistrelle	Serotine	Total
	10	10	0	0	0	0	0	0	0	0	11
	11	5	0	0	0	0	0	0	0	0	5
	12	11	0	0	69	0	0	69	0	0	80
	13	98	0	0	3	0	0	3	0	0	110
	14	0	0	0	1	0	0	1	0	0	1
June	1	593	0	0	3	0	0	2	2	1	601
	2	98	0	0	1	0	0	5	0	0	104
	3	17	0	0	0	0	0	2	0	0	19

Survey Month	Locations	Common pipistrelle	Long-Eared bat	Nathusius' pipistrelle	*Myotis* sp.	Barbastelle bat	Leisler' s Bat	Noctule	Soprano pipistrelle	Serotine	Total
	4	4522	0	0	0	0	0	19	4	90	4635
	5	17	0	0	4	0	0	59	0	0	80
	6	159	0	0	0	0	0	30	0	3	192
	7	792	0	1	1	0	0	97	0	16	907
	8	203	0	0	0	0	0	8	0	0	211
	9	68	0	0	0	0	0	30	0	0	98
	10	147	1	0	7	0	0	18	0	3	176
	11	171	0	0	0	0	0	25	0	5	201

Survey Month	Locations	Common pipistrelle	Long-Eared bat	Nathusius' pipistrelle	*Myotis* sp.	Barbastelle bat	Leisler' s Bat	Noctule	Soprano pipistrelle	Serotine	Total
	12	1385	0	0	9	0	0	81	1	4	1480
	13	1983	0	0	8	0	0	123	0	2	2116
	14	11	0	0	1	0	0	16	0	2	30
July	1	15	0	0	0	0	0	0	1	0	16
	2	23	0	1	1	0	0	5	0	15	45
	3	364	0	1	3	0	0	57	0	4	429
	4	368	0	0	2	0	0	50	1	1	422
	5	117	0	0	0	0	0	84	0	3	204

Survey Month	Locations	Common pipistrelle	Long-Eared bat	Nathusius' pipistrelle	*Myotis* sp.	Barbastelle bat	Leisler' s Bat	Noctule	Soprano pipistrelle	Serotine	Total
	6	167	0	0	0	0	0	104	0	1	272
	7	232	0	7	1	0	0	70	1	0	311
	8	100	0	0	2	0	0	39	5	3	149
	9	190	0	0	1	0	0	84	1	11	287
	10	129	0	0	4	0	0	3	2	1	139
	11	1964	0	1	18	0	0	142	0	39	2164
	12	87	0	0	0	0	0	9	0	0	96
	13	270	0	0	49	0	0	14	6	0	339

Survey Month	Locations	Common pipistrelle	Long-Eared bat	Nathusius' pipistrelle	*Myotis* sp.	Barbastelle bat	Leisler' s Bat	Noctule	Soprano pipistrelle	Serotine	Total
	14	2479	0	0	3	0	0	1493	2	1	3978
August	1	1470	1	0	13	1	2	25	7	0	1519
	2	114	0	0	5	0	1	54	2	0	176
	3	89	0	0	6	0	1	20	6	0	122
	4	520	0	0	1	0	0	28	3	0	552
	5	226	0	0	8	0	7	140	0	0	381
	6	217	0	0	0	0	0	102	0	0	319
	7	616	2	0	10	0	0	65	2	7	702

Survey Month	Locations	Common pipistrelle	Long-Eared bat	Nathusius' pipistrelle	*Myotis* sp.	Barbastelle bat	Leisler' s Bat	Noctule	Soprano pipistrelle	Serotine	Total
	8	1065	0	0	3	0	0	21	16	0	1105
	9	51	0	0	0	0	0	6	0	0	57
	10	79	0	0	3	0	2	41	0	0	125
	11	0	0	0	0	0	0	0	0	0	0
	12	184	0	0	0	0	1	62	2	0	249
	13	495	0	0	56	0	1	342	8	0	902
	14	34	0	0	3	0	0	11	1	0	49
	1	615	0	1	7	0	0	2	4	16	646

Survey Month	Locations	Common pipistrelle	Long-Eared bat	Nathusius' pipistrelle	*Myotis* sp.	Barbastelle bat	Leisler' s Bat	Noctule	Soprano pipistrelle	Serotine	Total
September	2	40	0	0	4	0	0	0	0	0	44
	3	97	16	0	7	0	0	30	1	2	153
	4	202	1	0	3	0	0	6	0	15	335
	5	97	0	0	0	0	0	11	0	3	405
	6	1439	0	0	2	0	0	4	1	6	1452
	7	19	0	0	2	0	0	10	0	0	211
	8	1474	0	1	4	0	0	8	6	14	1700
	9	48	0	1	6	0	0	8	1	4	69

Survey Month	Locations	Common pipistrelle	Long-Eared bat	Nathusius' pipistrelle	*Myotis* sp.	Barbastelle bat	Leisler' s Bat	Noctule	Soprano pipistrelle	Serotine	Total
	10	35	0	0	11	0	0	40	1	7	94
	11	992	0	0	89	0	1	83	34	206	1557
	12	975	0	0	86	0	0	68	25	13	2358
	13	1309	2	0	56	0	1	123	71	10	1572
	14	11	0	0	0	0	0	78	1	0	90
Total		30725	25	14	607	1	17	4233	255	514	38438
% of Passes		79.9%	0.1%	<0%	1.6%	<0%	<0%	11.0%	0.7%	1.3%	

Annex 5 ◆ Great Crested Newt Surveys

METHODOLOGY

A5.1 There are nine waterbodies present within the Site and a further 42 waterbodies located within 500m of the Site as shown on Figure 12.22 (document reference 6.3.12.22).

A5.2 An initial assessment of the suitability of the offsite waterbodies to support populations of great crested newts was undertaken using mapping and aerial photography to establish potential barriers to movement and habitat connectivity from these waterbodies to the Site. On this basis a large number of ponds within 500m were scoped out of subsequent surveys.

Habitat Suitability Assessment

A5.3 A Habitat Suitability Index (HSI) assessment, as developed by Oldham et al. (2000)[26], was completed to assess the suitability of water bodies to support great crested newts (GCN). The HSI assessment follows a standardised assessment criteria using habitat components such as water quality, fish/waterfowl presence and surrounding terrestrial habitat quality to derive a suitability score, or 'index'. Water bodies with high scores are considered more likely to support great crested newt compared to those with lower scores. HSI scores and the inferred suitability of the waterbodies assessed to support great crested newt are described within Table A5.1.

Table A5.1: HSI Scores and Inferred Pond suitability.

HSI Score	Pond Suitability to Support Great Crested Newts
<0.5	Poor suitability
0.5 – 0.59	Below average suitability
0.6 – 0.69	Average suitability

[26] Oldham R.S., Keeble J., Swan M.J.S. & Jeffcote M. (2000). *Evaluating the suitability of habitat for the Great Crested Newt* (Triturus cristatus). Herpetological Journal 10 (4), 143-155

HSI Score	Pond Suitability to Support Great Crested Newts
0.7 – 0.79	Good suitability
> 0.8	Excellent suitability

A5.4 The HSI assessment was completed on 16 April 2018 and 14 April 2022 and covered a total of 11 water bodies (seven on-site and four off-site) to which access could be obtained, namely: P2, P3, P5, P6, P7, P23, P35, P36, P62, 65 and 69.

Presence/Absence Surveys

A5.5 The presence/absence great crested newts within accessible water bodies was determined using a combination of environmental DNA (eDNA) surveys and conventional pond surveys.

eDNA surveys

A5.6 Environmental DNA (eDNA) is DNA that is collected from the environment in which an organism lives. In aquatic environments, animals including amphibians shed cellular material into the water via their saliva, urine, faeces, skin cells, etc. This DNA may persist for several weeks, and can be collected through a water sample, and analysed to determine if the target species of interest (great crested newt) is/has been present in the waterbody.

A5.7 Water samples were taken by a Natural England great crested newt licensed EDP ecologist, and an assistant, in accordance with the methodologies set out by the Freshwater Habitats Trust[27], using separate sterile equipment packs for the collection of eDNA samples. Briefly, the protocol involved:

- Collecting 20 water samples from selected areas evenly spread around the accessible perimeter of the waterbody including, both open water and vegetated areas;
- At each sampling location, a ladle of water was collected by stirring the water column without stirring up sediment and poured into the provided sampling bag. When all 20 ladles were collected, the bag was shaken thoroughly; and
- 15ml of this mixed sample was then pipetted into each of the six conical tubes containing preserving fluid and each tube was shaken thoroughly to homogenise the

[27] Biggs J, Ewald N, Valentini A, Gaboriaud C, Griffiths RA, Foster J, Wilkinson J, Arnett A, Williams P and Dunn F 2014. Analytical and methodological development for improved surveillance of the Great Crested Newt. Appendix 5. Technical advice note for field and laboratory sampling of great crested newt (*Triturus cristatus*) environmental DNA. Freshwater Habitats Trust, Oxford

sample. There are six tubes per waterbody.

A5.8 These tubes were then labelled appropriately and couriered to the laboratory for real-time polymerase chain reaction (PCR) analysis as detailed within Biggs et al. (2014).

A5.9 eDNA surveys were initially undertaken, of the nine accessible water bodies subject to the HSI assessment, on 17 April 2018.

A5.10 An updated and expanded eDNA survey (covering additional ponds not accessed in 2018) was undertaken on 27/28 June 2019 (ponds P3, P5, P7, P33, P35, P36, P38, P62 and P63) and 01 July 2019 (P49).

A5.11 A further update eDNA survey was undertaken on 16 April 2021, during which ponds P2, P3, P5, P6, P7, P23, P35, P36, 45, 49 and P62 and an additional wet ditch on-site were surveyed.

Conventional Pond Surveys

A5.12 In 2018, conventional pond surveys were also undertaken to investigate presence/absence of great created newts and, if present, undertake a population assessment. Survey visits were undertaken with reference to the survey methodology set out in the English Nature Guidelines[28]. In accordance with the guidelines, the following three preferred survey techniques were employed:

- Torching: This involves searching water bodies by torchlight between dusk and midnight and is an effective means of detecting adult newts. Each surveyor used a 1,000,000 candle power torch during this part of the survey;
- Bottle Trapping: This involves the use of funnel traps (made from 2-litre plastic bottles) that are inserted into the water along the margin of the water bodies during the evening and checked the following morning. Access permitting, the traps are spaced at roughly 2m intervals around the margins of the ponds; and
- Egg Searching: A search of any suitable aquatic vegetation to check for great crested newt eggs.

A5.13 The standard survey procedure typically involves a minimum of four survey visits to each pond to confirm the presence/likely absence of great crested newt. If during any of these four visits, evidence is found of great crested newt, then a further two survey visits are required to allow for an estimate of population size. Nine ponds were subject to two visits and, although no great crested newts were recorded, positive eDNA results were returned for four ponds and therefore four further conventional surveys were undertaken of these ponds. The five ponds with negative eDNA results were not subject to further survey.

[28] English Nature (2001). Great Crested Newt Mitigation Guidelines, English Nature, Peterborough

A5.14 The dates of the 2018 conventional pond survey visits and the conditions during these surveys are summarised in Table A5.2.

Table A5.2: Dates, Timings and Conditions for the Conventional Pond Surveys 2018.

Visit	Date (evening)	Air temp. (°C)
1	16/04/2018	14.0
2	23/04/2018	11.0
3	30/04/2018	6.8
4	08/05/2018	11.0
5	22/05/2018	8.0
6	04/06/2018	11.0

A5.15 In 2019, following a positive eDNA result for pond P63 (off-site to the north), six conventional pond surveys were undertaken of this pond. The dates and the conditions during these surveys are summarised in Table A5.3.

Table A5.3: Dates, Timings and Conditions for the Conventional Pond Surveys 2019.

Visit	Date (evening)	Air temp. (°C)
1	14/05/2019	11.0
2	18/05/2019	15.0
3	22/05/2019	14.0
4	05/06/2019	17.0

Visit	Date (evening)	Air temp. (°C)
5	10/06/2019	10.0
6	16/06/2019	15.0

Limitations

A5.16 With the exception of the eDNA survey of pond P49 in 2019 (see below), the timing and conditions during the surveys are in line with best practice guidelines and as such, it is not considered that they were limited by seasonal or climatic factors.

A5.17 The eDNA survey conducted on pond P49 (on 01 July 2019) was undertaken just outside of the accepted survey season for eDNA of mid-April to June. However, considering the samples were taken within 16 hours of the end of the optimal survey period, the negative result is considered to be valid. Additionally, the eDNA survey of this pond was updated during the optimal period in 2021 and was found to be negative.

A5.18 High turbidity, vegetation and/or rainfall limited visibility in some water bodies during the torchlight surveys and may have resulted in great crested newt being undetected; however, the survey design, which includes other survey techniques, is specifically intended to reduce the significance of this limitation.

RESULTS

A5.19 Records of amphibians, namely common frogs, common toads and smooth newts within 1km of the Site were returned during the desk study.

A5.20 The Site itself supports little aquatic habitat, which is of below average quality for great crested newt, and a small amount of suitable terrestrial habitat confined to field boundaries and patches of woodland.

Habitat Suitability Assessment

A5.21 The results of the 2018 habitat suitability assessment of the nine accessible waterbodies surveyed for their suitability to support populations of great crested newt are summarised within Table A5.4.

Table A5.4: Suitability of Ponds Assessed for their Potential to Support Great Crested Newt using the Standard Habitat Suitability Index.

Pond number	HSI score	Inferred pond suitability for great crested newts
P2	0.31	Poor
P3	0.69	Average
P5	0.53	Below average
P6	0.49	Poor
P7	0.31	Poor
P23	0.48	Poor
P35	0.48	Poor
P36	0.41	Poor
P62	0.43	Poor
P65	0.61	Average
P69	0.37	Poor

Presence/Absence Surveys

eDNA surveys

A5.22 In 2018, four of the nine waterbodies tested positive for great crested newt eDNA, namely waterbodies P2, P7, P35 and P62. As no great crested newts were found in these waterbodies during the conventional pond surveys, a second eDNA sample was taken from which only P2 returned a positive result.

A5.23 In 2019, only P63 returned a positive eDNA result and in 2021 all sampled ponds tested negative.

Conventional Pond Surveys

A5.24 The results of the conventional pond surveys undertaken in 2018 and 2019 are provided in Tables A5.5 and A5.6 respectively. In summary, no great created newts (or eggs or larvae) were recorded during any of these surveys.

CONCLUSIONS

A5.25 Based on these findings it is concluded that the Site previously supported a small, non-breeding population of great crested newt but this has since declined to undetectable levels. Further update survey should be undertaken in future to establish if the population has recovered/increased, however.

Table A5.5: Conventional Pond Survey Results 2018.

Date	Visit No.	Pond No.	No. of Traps	Trapping Results	Torching Results	Other Pertinent Information
16/04/2018	1	P2	11	1m SN	Nil	
		P3	20	Nil	2 f SN/PN	
		P5	24	Nil	Nil	
		P6	8	Nil	Nil	
		P7	5	Nil	Nil	
		P23	25	Nil	Nil	Carp
		P35	28	Nil	Nil	
		P36	15	Nil	Nil	
		P62	15	Nil	Nil	

Date	Visit No.	Pond No.	No. of Traps	Trapping Results	Torching Results	Other Pertinent Information
23/04/2018	2	P2	5	Nil	Nil	
		P3	12	1 juv SN/4 m SN	Nil	
		P5	26	Nil	Nil	
		P6	8	Nil	Nil	
		P7	5	Nil	Nil	
		P23	24	Nil	Nil	
		P35	28	Nil	Nil	Various fish
		P36	Nil	Too shallow	Nil	Moor hen
		P62	15	Nil	Nil	
30/04/2018	3	P2	10	Nil	Nil	Snipe
		P23	24	Nil	Nil	Mallard and fish
		P35	28	Nil	Nil	Mallards, fish and tadpole
		P62	17	Nil	Nil	
08/05/2018	4	P2	10	Nil	Nil	

Date	Visit No.	Pond No.	No. of Traps	Trapping Results	Torching Results	Other Pertinent Information
		P23	24	Nil	Nil	Carp, Tadpoles
		P35	28	Nil	Nil	Mallard, fish and tadpoles
		P62	17	2 m SN	Nil	
22/05/2018	5	P2	10	Nil	Nil	Mallard, carp
		P23	25	Nil	Nil	
		P35	35	Nil	Nil	Frog, mallard, goldfish, stickleback
		P62	15	Nil	Nil	
04/06/2018	6	P2	5	Nil	Nil	Tadpoles
		P23	20	Nil	Nil	
		P35	20	Nil	Nil	Tadpoles small fish
		P62	Nil	Too shallow	Nil	

Table A5.6: Conventional Pond Survey Results 2019 (pond P63 only)

Date	Visit No.	No. of Traps	Trapping Results	Torching Results	Other Pertinent Information
14/05/2019	1	15	Nil	Nil	Fish (sticklebacks) in traps
18/05/2019	2	30	Nil	Nil	Fish
22/05/2019	3	30	Nil	Nil	Fish and waterfowl
05/06/2019	4	30	Nil	Nil	Fish in traps
10/06/2019	5	30	Nil	Nil	Heavy rain during torching
16/06/2019	6	30	Nil	Nil	Fish

Annex 6 ◆ Reptile Survey

METHODOLOGY

A6.1 The Site supports habitats of varying suitability for reptiles; large area of arable fields with ponds and wetland around the Site.

A6.2 To confirm the presence, or likely absence, of reptiles from the Site detailed refugia based reptile surveys were undertaken with reference to best practice guidelines[29]. Surveys were initially undertaken at the Site (land south of the railway line) between May and September 2018 and expanded to include land north of the railway line in 2019. An update survey was undertaken between April and October 2021.

A6.3 During the 2021 update survey a total of 469 artificial reptile refugia, comprising roofing felt sheets measuring approximately 1m x 0.5m, were deployed in suitable habitat across the Site over three visits on 25 March, 08 April and 13 April 2021 (see Figure 12.23). The reptile refugia were left undisturbed *in situ* for a period of at least a week prior to the commencement of the reptile surveys. A total of seven reptile survey visits were completed at the Site. Details of the weather conditions recorded during each survey visit are summarised in Table A6.1.

Table A6.1: Date, Timing and Weather Conditions of Reptile Survey Visits during 2021

Visit Date	Start/-Finish Time	Air Temp Range (°C)	Wind Speed (Beaufort)	Cloud Cover (%)	Rain During Survey
23/04/21	10:00-11:30	9.0-16.0	0-3	0-10	Nil
29/04/21	11:00-12:30	9.0-14.2	1-2	50-80	Nil
23/06/21	11:30-15:30	17.0-20.0	1-4	40-60	Nil
16/07/21	06:00-08:45	14.0-19.0	0-2	0-5	Nil
17/08/21	10:45-13:50	15.0-18.0	3-4	100	Occasional very light drizzle

[29] Froglife (1999). *Froglife Advice Sheet 10: reptile survey.* Froglife, London

17/09/21	10:00-12:30	15.0-18.0	0-3	80-100	Nil
01/10/21	11:30-14:45	15.0	3	20-100	Occasional light drizzle

A6.4 During each survey visit, artificial refugia were individually checked and any reptiles observed were recorded with notes on their life stage (adult/juvenile) and sex, where possible.

A6.5 The peak count - the maximum total number of adult individuals of a particular species that was recorded during any one visit – can be used to estimate the 'population status' of the reptile species present at the Site, as summarised in Table A6.2.

Table A6.2: Population Status using Peak Counts

Species	**Population Size Class Category[30]**		
	Low	**Good**	**Exceptional**
Slow worm	< 5	5 – 20	> 20
Common lizard	< 5	5 – 20	> 20
Grass snake	< 5	5 – 10	> 10
Adder	< 5	5 – 10	> 10

Limitations

A6.6 In 2018, reptile survey visits 3 and 4 were undertaken in suboptimal weather conditions, namely a slight drizzle on both days. However, given the results of subsequent surveys, the weather is not considered to have compromised the results. All other reptile surveys were undertaken in suitable weather conditions and within recognised optimal months for reptile surveys.

30 Froglife (1999). *Froglife Advice Sheet 10: reptile survey.* Froglife, London

A6.7 During the 2021 survey a large number of the refugia were removed, with a reduction in number found occurring from the third visit onward, and with approximately 40% remaining by the final visit. This is likely to have resulted in the under recording of reptiles during the course of this survey, which should be taken into account when interpreting the results.

RESULTS

A6.8 The desk study returned records of seven grass snakes (*Natrix helvetica*) in Burbage and Elmesthorpe from 2012 to 2014 and a single adder (*Vipera berus*) at Hinckley Golf Club in 2005.

A6.9 During the surveys in 2018, 2019 and 2021 a small number of grass snakes, and a single slow worm, have been recorded at the Site. The maximum count of grass snake was 4 in 2018, and 1 in both 2019 and 2021. The single slow worm was recorded during the 2019 survey only. Accordingly, low populations of both species are present within the Site.

A6.10 The aggregated sightings of reptiles from the three surveys are illustrated on Figure 12.23 (document reference 6.3.12.23).

Annex 7 ◆ Invertebrate Surveys

A7.1 Invertebrate surveys undertaken at the Site comprise an initial habitat scoping survey undertaken in May 2018 and targeted surveys (winter egg searches) for white-letter hairstreak butterfly (*Satyrium w-album*) undertaken in March 2019 and again in February 2021. These surveys are described further below.

HABITAT SCOPING STUDY

Methodology

A7.2 The methodology described below is based on recommendations for surveying grassland and scrub/broadleaved woodland edge habitats for invertebrate conservation evaluation outlined in Drake *et al*. (2007).

Desk study

A7.3 Prior to conducting fieldwork, existing information pertaining to the invertebrate fauna of the Site was reviewed. This involved a review of historic invertebrate records from within a one-kilometre radius of the survey area as well as statutory and non-statutory sites of nature conservation importance within a 2km radius. Historic and statutory/non-statutory site data consulted was supplied by Leicestershire and Rutland Environmental Records Centre (LRERC) and resulted from a data-search specific to the survey area commissioned by EDP for the purpose of this project.

Field survey

A7.4 The Site was surveyed by an experienced specialist invertebrate ecologist over a two-day period on 23 and 24 May 2018.

A7.5 The entire Site (as defined at the time) was walked and detailed, geo-referenced target notes recorded. Target notes referenced both features of particular value as invertebrate habitat and general habitat. A photographic record was also made of key features recorded during the survey, these providing resolution to target note data.

A7.6 No sampling was undertaken during the survey; however, a basic list of species identifiable without requirement of microscopic identification was collected.

Limitations

A7.7 The majority of species recorded during the survey included more visible and easily spotted species. These consist mainly of common generalist invertebrates and cannot be seen alone as constituting an adequate representation of the Site's invertebrate fauna. It is imperative therefore that the species records cannot be seen as a substitute for more detailed and targeted invertebrate sampling and species records are purely presented as

background information purposes.

A7.8 Local record centre species data provides positive records of species recorded; however, the species records within a given area are dependent on the recording effort of individuals and are often biased towards certain well-recorded groups e.g. butterflies and moths, dragonflies and damselflies etc. and the paucity of recording of less easily recognised species cannot be seen as proof of a lack or absence of such species. The records provided by LRERC for the purpose of the current project did not appear to include RDB or Nationally Scarce species other than those also listed under Section 41 of the NERC Act 2006.

A7.9 The Site was walked in its entirety and every effort was made to record habitat features of potential conservation value for invertebrates at a suitable resolution to inform a robust scoping study. However, the recognition of key habitat features with potential to support important invertebrate species or species assemblages is based on knowledge and experience. It cannot be guaranteed that habitats considered to have high conservation potential would be confirmed as such if surveyed in detail, or conversely, some habitat features supporting uncommon species or species assemblages may have been overlooked during the survey.

Results - Desk study

A7.10 Relevant nature conservation designations within 2km of the Site are as follows:

- Burbage Wood and Aston Firs Site SSSI is contiguous to the westernmost border of the survey area. The citation describes the site as being '*one of the best remaining examples of ash-oak-maple woodland in Leicestershire and is representative of semi-natural woodland developed on the clays of eastern England*'. The SSSI was designated predominately for its ancient woodland flora; and

- Burbage Common and Woods Local Nature Reserve (LNR) comprises units 1, 2 and 3 of the Burbage Wood and Aston Firs SSSI and an area of grassland and woodland/scrub habitat to the railway line immediately north of the Site. The southern boundary of this northern (non-SSSI) section of the LNR, is contiguous to a strip of the survey area immediately to the north of the railway as far east as the point where Burbage Common Road crosses the railway. Little information relating to the invertebrate fauna of Burbage Common and Woods LNR, however, 20 species of butterfly are said to occur on the site.

A7.11 Table A7.1 sets out the species of higher conservation value which have been historically recorded within close proximity to the survey area.

Table A7.1: Species of Higher Conservation Value Historically Recorded.

Common Name	Scientific Name	Conservation status/other notes
White-letter hairstreak (butterfly)	*Satyrium w-album*	NERC (2006) S41; 'Endangered' under post-2001 IUCN guidelines. Recorded within 450 metres west of the Site in 1997 and listed as 'breeding'. Breeds where elms occur in sheltered hedgerows, mixed scrub, and the edges of woodland rides, and also on large, isolated elms (Butterfly Conservation, 2018). Predominately associated with English Elm (*Ulmus procera*) and Wych Elm (*Ulmus glabra*). Uncut hedgerows with standard trees and a resource of elm and with wide field margins ensuring a resource of thistles (*Cirsium* spp.) and bramble (*Rubus fruticosus* agg.) which provide a nectar resource. The adult insect often frequents the canopy of hedgerow standards and is consequently easily overlooked. Ash (Fraxinus excelsior) and field maple (*Acer campestre*) where they occur alongside suckering hedgerow elm are thought to be important standards for white-letter hairstreak (Butterfly Conservation, 2018).
Small heath (butterfly)	*Coenonympha pamphilus*	NERC (2006) S41; 'Near Threatened' under post-2001 IUCN guidelines. Has been recorded on several occasions within 1km of the Site. The nearest records were 250m north of the Site in 1998 and 600m north of the Site in 1997. Found in a range of habitat types including grasslands, heathland and woodland clearings. Small Heath favours habitat with shorter swards than other brown butterflies. Whilst still widespread and common in the UK, the species has undergone a severe long-term population decline hence its current conservation status and inclusion as a S41 Species of Principal Importance.

Common Name	Scientific Name	Conservation status/other notes
Knot Grass	*Acronicta rumicis*	Moth species listed as NERC (2006) S41 'Research only'. These species, which were returned in the LRERC data-search, are still generally widespread and common in the UK and are not discussed further in this report.
Brown-spot Pinion	*Agrochola litura*	
Beaded Chestnut	*Agrochola lychnidis*	
Green-brindled Crescent	*Allophyes oxyacanthae*	
Mouse Moth	*Amphipyra tragopoginis*	
Large Nutmeg	*Apamea anceps*	
Dusky Brocade	*Apamea remissa*	
Sprawler	*Asteroscopus sphinx*	
Centre-barred Sallow	*Atethmia centrago*	
Minor Shoulder-knot	*Brachylomia viminalis*	
Mottled Rustic	*Caradrina morpheus*	
Latticed Heath	*Chiasmia clathrata*	
Small Square-	*Diarsia rubi*	

Common Name	Scientific Name	Conservation status/other notes
spot		
Dusky Thorn	*Ennomos fuscantaria*	
Spinach	*Eulithis mellinata*	
Ghost Moth	*Hepialus humuli*	
Rosy Rustic	*Hydraecia micacea*	
Lackey	*Malacosoma neustria*	
Broom Moth	*Melanchra pisi*	
Rosy Minor	*Mesoligia literosa*	
Shaded Broad-bar	*Scotopteryx chenopodiata*	
White Ermine	*Spilosoma lubricipeda*	
Buff Ermine	*Spilosoma luteum*	
Feathered Gothic	*Tholera decimalis*	
Blood-Vein	*Timandra comae*	
Cinnabar	*Tyria jacobaeae*	

Common Name	Scientific Name	Conservation status/other notes
Oak Hook-tip	*Watsonalla binaria*	
Dusky-lemon Sallow	*Xanthia gilvago*	
Sallow	*Xanthia icteritia*	

Results - Field Survey

A7.12 The following should be read in conjunction with Table A7.2, which lists a series of Target Notes recorded during the field survey; Figures A7.1 to A7.3, which show the Target Note locations; and Figure A7.4, which is a series of photographs taken during the survey.

General Habitat

A7.13 The Site comprises predominately mixed agricultural land. The north-west boundary of the Site followed the northwest side of the railway bank as far as Elmesthorpe and the Site's eastern boundary followed the M69 corridor. The M69 corridor south of a footbridge east of Hobbs Hayes Farms was surveyed on both sides, extending to include approximately 1km of motorway corridor running southwest from the M69/A5 motorway junction. The habitat adjacent to the southwestern border of the survey area was largely wooded and this boundary was partially shared with the Burbage Wood and Aston Firs SSSI as well as the Burbage Commons and Woods LNR which overlapped the SSSI boundary but extended to include further habitat bounding the site boundary north of the railway at the westernmost extremity of the Site.

Hedgerow, Scrub and Woodland Edge

A7.14 The Site as a whole supported a significant resource of woody habitat including hedgerow, scrub and woodland edge. The network of hedgerows within the more managed agricultural parts of the Site were frequently cut and such manicuring is generally detrimental to more specialised hedgerow invertebrates. However, some hedgerows were left uncut at the time of survey and those with wide, grassy, more herb-rich margins provided habitat of much higher potential to support scrub edge invertebrate assemblages.

A7.15 The best hedgerow habitat were more sinuous edged with wide, herb-rich margins progressing through Bramble, at the hedgerow margin, to woody hedgerow shrub and ultimately to mature native hedgerow standards such as ash (*Fraxinus excelsior*) and

pedunculate oak (*Quercus robur*). Typical woody hedgerow species occurring throughout the Site included hawthorn (*Crataegus monogyna*) and blackthorn (*Prunus spinosa*), with field maple (*Acer campestre*) tending to occur alongside these species in more diverse hedgerows. English elm was generally well represented in hedgerows throughout the survey area, often being abundant where it occurs.

A7.16 This species, together with wych elm (recorded once during the survey), is the main larval foodplant of the white-letter hairstreak, discussed elsewhere in the report. English elm was listed in 13 of the Target Notes (TN) collected during the survey and almost certainly occurred in additional hedgerows for which it was listed. Other commonly encountered woody hedgerow trees and shrubs included hazel (*Corylus avellana*), elder (*Sambucus nigra*), goat willow (*Salix caprea*), wild privet (*Ligustrum vulgare*), dogwood (*Cornus sanguinea*) and common dog rose (*Rosa canina*).

A7.17 A number of the more mature hedgerows supported wood-decay habitat favourable for saproxylic invertebrates. This resource was mainly standing wood-decay habitat in living trees, including both old hedgerow shrubs and oak and ash standards (see TN30 and Figure A7.4 – Photograph 1). Hedgerows of higher conservation potential for scrub edge and potentially wood-decay invertebrates were recorded at TNs: 19, 31, 32, 37, 40, 47, 61 and 68. Habitat with the highest potential to support White-letter Hairstreak was recorded at TNs 12, 26, 29, 33, 37, 38, 51 and 57 (see TN37 and Photograph 2) and english elm, occurring in suboptimal conditions to support this butterfly was recorded at TNs 15, 16, 17, 40 and 44.

A7.18 Besides the hedgerow habitat, a considerable scrub/woodland edge resource was recorded both along the entirety of both sides of the railway embankment at the Site's north-western boundary (see TN27 and Photograph 3) and along the embankment and associated habitat along the M69 motorway corridor (see TN55 and Photograph 4). The railway edge scrub habitat, where it formed the southeast boundary of the Burbage Commons and Woods LNR and further north-east along the railway, was frequently sinuous and bounded by a good scrub/woodland edge succession (TNs 1, 3, 26) and the area bounding the Site between the railway line and Burbage Common Road south-east railway margin supported a more or less continuous resource of hawthorn scrub, which often gave way to open tall ruderal vegetation (e.g. at TN5). Collectively this habitat added to the resource for scrub edge and grassland scrub mosaic invertebrate assemblages. Hawthorn providing a rich foraging resource during early summer (see TN5 and Photograph 5).

A7.19 The motorway marginal habitat frequently comprised a scrub grassland mosaic, often occupying a slope between the edge of the motorway and adjacent field. Scrub species occupying the motorway margins reflected those recorded within the general hedgerow and woodland habitat with hawthorn, blackthorn, field maple, hazel, ash and pedunculate oak, however the trees tended to be relatively young and resulting from planting. Bramble and common dog rose scrub added to the foraging and structural diversity for scrub grassland mosaic invertebrates and the verge grassland was often quite herb-rich, supported a range of species typically seeded and/or colonisers of motorway verges including ox-eye daisy (*Chrysanthemum leucanthemum*), common knapweed (Cen*taurea*

nigra), common vetch (*Vicia sativa*), common bird's-foot trefoil (*Lotus corniculatus*), goat's-beard (*Tragopogon pratensis*), common ragwort (*Senecio jacobaeae*), ribwort plantain (*Plantago lanceolata*), creeping buttercup (*Ranunculus repens*), meadow buttercup (*R. acris*) and various other species.

A7.20 Motorway verge scrub/grassland mosaic as above comprised much of the habitat on either side of the motorway corridor (see TNs 50 ,52, 53 and 55).

Semi-natural Broadleaved Woodland Habitat

A7.21 There was little broadleaved woodland habitat within the site boundary; however, the shared boundary with wooded elements of the Burbage Wood and Aston Firs SSSI and Burbage Common and Woods LNR, supported some edge habitat of potential to support more specialised ancient woodland invertebrates. The habitat described in TNs 32 (see Photograph 6) and 33 were of potential value. For assemblages associated with higher quality woodland edge habitat including potential for arboreal and wood-decay assemblages as well.

A7.22 Other habitat of potential to support broadleaved woodland assemblages at the Site margins occurred at TNs 63 and to the north of the railway line around TN26.

A7.23 There were additional areas of broadleaved woodland including a rather heavily shaded block just west of the M69/A5 roundabout (TN 60) and woodland plantings such as those at TNs 49 and 56. Although these habitats have potential to support arboreal invertebrate assemblages, the habitats generally lacked structural diversity and importantly were heavily shaded, supporting only species-poor, shade tolerant ground flora.

Grassland, Field Margin and Motorway Verges

A7.24 Much of the in-field habitat either comprised arable or species-poor improved grassland, these habitats being generally of low potential for invertebrates. Some of the more diverse grassland was recorded towards the south-western corner off the main survey area and the field described in TN61 was arguably the most herb-rich of the open pastures surveyed (see Photographs 7 and 8). This field was pony-grazed at the time of survey and supported a reasonable diversity and overall flowering resource with yellow composites including common cat's-ear (*Hypochaeris radicata*) and ragwort alongside ribwort plantain and clovers (*Trifolium* spp.), which provided a nectar resource for nectaring bees and other insects. However, the key feature in invertebrate habitat of the field was, again, the scrub edge progression which featured sinuous margin with bramble, grading into uncut hawthorn, blackthorn and standard trees.

A7.25 The more floristically diverse of the remaining open field habitats, was poor semi-improved grassland at TN41. The habitat here varied in quality but was locally more herb-rich than the majority of grasslands within the search area with species more associated with semi-improved swards, such as common cat's-ear, ribwort plantain, thyme-leaved speedwell (*Veronica serpylifolia*), sorrel (*Rumex acetosa*) and sweet vernal grass (*Anthoxanthum odoratum*). The habitat was also enhanced by the presence of fairly floristically diverse pond (see TN42 and wetland section below). However, the flowering

resource was rather diffuse and unlikely to support grassland invertebrates of high conservation value.

A7.26 The verges of the M69 and verge habitat adjacent to the roundabout supported some more herb-rich grassland of greater value as a nectar resource and habitat for grassland and scrub edge invertebrates and these habitats despite being created, provided the greatest continuous resource of more flower-rich grassland in the survey area. This habitat was broadly described under 'Hedgerow, scrub and woodland edge' above (See TNs 50 ,52, 53 and 55).

A7.27 A particularly flower-rich grassland offering an excellent, albeit small, resource for nectaring and warmth-loving invertebrates was recorded on one of the western verges of the M69/B4669 roundabout (TN59). The habitat occupied a south-facing slope with herbs including common knapweed, meadow buttercup, daisy (*Bellis perennis*), ribwort plantain, yarrow (*Achillea millefolium*), red clover (*Trifolium pratense*), common vetch (*Vicia sativa*), hogweed (*Heracleum sphondylium*), dandelion (*Taraxacum officinale* agg.), common cat's-ear (*Hypochaeris radicata*), ox-eye daisy (*Chrysanthemum leucanthemum*), wood avens (*Geum urbanum*), curled dock (*Rumex crispus*) and a range of grasses. Potential to support diverse grassland invertebrate fauna and associated rich flower resource assemblage, but the sward was rather short and likely to be managed by cutting.

A7.28 Other more herb-rich grassland recorded was mainly confined to field edge habitat adjacent to more diverse scrub edges e.g. examples of more herb/flower-rich grassy margins were recorded at TNs 1, 3, 7, 37, 38 and 48.

A7.29 There was a limited resource of bare ground habitat within the Site's grassland and scrub habitat. One small, cliffed area occupied the banks of the M69 footbridge (TN48) supported a colony of ground nesting solitary bees including mining bees of the genera *Andrena* and probably *Lasioglossum* spp. The nest site benefitted from availability of a diverse scrub and ground flora nectar resource.

Wetland

A7.30 Wetland habitat included ditches and stream which crossed various parts of the Site and several farmland ponds were also recorded. Several of the fields supported flora such as marsh foxtail (*Alopecurus geniculatus*), floating sweet grass (*Glyceria fluitans*) and rushes (*Juncus* spp.) associated with drainage impeded damp grassland, such habitat was generally herb-poor and lacking in extent.

A7.31 Ponds were recorded at TNs 11, 42, 621, 64 and 66. (see Photographs 9 to 11 respectively). All ponds surveyed were considered to have potential to support aquatic invertebrate populations of some conservation value and arguably the pond of highest potential value was recorded at TN42. This pond supported a fairly species-rich macrophyte flora which created structural diversity of benefit to aquatic invertebrates. The pond supported habitat of varying depth, including extensive shallow areas favourable to invertebrates.

A7.32 Several of the remaining ponds were also well vegetated and pond at TN66 was the largest pond surveyed and this pond also supported a diverse macrophyte flora. There was

evidence of usage of glyphosate weed killer at the margins of the pond, which may be to the detriment of aquatic invertebrate fauna.

A7.33 Besides the ponds, there were a number of wet ditches within the survey area. Many were linear and trapezoidal channels, poorly vegetated, heavily shaded, eutrophic, lacking in structure and unlikely to support invertebrate assemblages of high conservation value. The drainage ditch running along the western border of the M69 and field network (TN39) again was trapezoidal ditch, but offered slightly more potential to aquatic invertebrates than the majority of other ditches recorded. The channel supported macrophyte and ruderal vegetation including fool's watercress (*Apium nodiflorum*), meadowsweet (*Filipendula ulmaria*), greater willowherb (*Epilobium hirsutum*), greater reedmace (*Typha latifolia*), common nettle (*Urtica dioica*) and wild angelica (*Angelica sylvatica*). More sinuous channels were recorded north of the railway line at TNs 2 and 27. The latter of these offered somewhat greater potential for invertebrates and was a more natural, sinuous channel. However, the streams surveyed would be unlikely to support significant invertebrate assemblages.

A7.34 In addition to the open water habitats, a fairly extensive area of marshy grassland/swamp habitat occupied the northernmost corner of the Site around TN14. The field in which this habitat was recorded was largely arable; however, a fairly extensive headland of tussocky rough grassland in the corner, which supported wet grassland herbs including meadowsweet, cuckoo-flower (*Cardamine pratensis*) and tufted forget-me-not (*Myosotis laxa*) with graminoids such as compact rush (*Juncus conglomeratus*) (TN13), gave way to an area of *Glyceria maxima* and *Carex acutiformis*/riparia swamp (see Photograph 12).

A7.35 This wetter habitat is likely to have formed the periphery of a larger pond occurring in the field immediately northeast, outside of the survey area. The habitat was sheltered and complemented by the uncut hawthorn scrub edge and also supported ruderal vegetation including greater willowherb. This habitat is likely to support invertebrates associated with wet grassland as well as 'Litter-rich fluctuating wetland' and 'mineral marsh and open water' as described in Drake et al (2007). Such wetland mosiac habitat can support specialist invertebrate assemblages and species of conservation value.

Invertebrate Species Recorded in 2018

A7.36 Insects and other invertebrate species recorded incidentally as part of the current survey are listed in Table A7.3. Species recorded included typical generalist species of hedgerow and field margin habitats. Two common species of beetle, the common grammoptera (*Grammoptera ruficornis*) and red-headed cardinal beetle (*Pyrochroa serraticornis*) are associated with wood decay habitat, the larvae of *Grammoptera* developing in branches of deciduous trees infected with fungus whilst the larvae of the red-headed cardinal is a predator beneath bark in decaying wood.

A7.37 A number of bees including ground nesting mining bee species (*Andrena haemorrhoa* and *A. scotica*) and several species of bumblebee *Bombus* spp. were recorded foraging on the abundant resource of hawthorn blossom on Site. Gooden's nomad bee (*Nomada goodeniana*), a common cleptoparasite of mining bees of the *Andrena nigoaenea* group, was recorded around trackside habitat close to hawthorn forage habitat of the host bees.

Several obvious species of two-winged flies diptera associated with scrub edge habitat were recorded including the predatory downlooker snipefly (*Rhagium scolopaceus*) and hoverflies including the distinctive heineken hoverfly (*Rhingia campestre*), *Volucella bombylans* – a bumblebee mimic and *Leucozona leucorum*, a common early summer hoverfly.

A7.38 Butterflies recorded were all common and widespread. The larvae of common blue (*Polyommatus icarus*), in common with various other insect species associated with less improved grassland habitats, feeds on common bird's-foot trefoil. Common damselflies including blue-tailed damselfly (*Ischnura elegans*) and azure damselfly (*Coenagrion puella*) were well distributed on Site, indicating the presence of wetland habitat and broad-bodied chaser (*Libellula depressa*), a dragonfly which commonly colonises newly created waterbodies, was also recorded.

Table A7.2: Invertebrate Scoping Study 2018 – Target Notes.

Target Note (TN)	Grid reference	Feature	Description	Invertebrate Potential/Assemblage
1	SP 45092 94788	Scalloped grassland and wooded railway embankment	Wooded railway embankment on Burbage Common side (north) side of railway. Good structure for invertebrates. Grassland damp with wetland herbs locally including I*ris pseudacorus* and *Glyceria maxima*. Wooded embankment with mature trees including *Crataegus monogyna, Fraxinus excelsior, Quercus robur, Prunus spinosa, Acer campestre* and *Salix caprea*, with *Rubus fruticosus* (agg.) scrub edge and grassland with tall herbs including *Anthriscus sylvestris, Urtica dioica* and abundant *Ranunculus repens* in shorter grassland providing a nectaring resource.	Good potential for scrub edge and arboreal assemblages.
2	SP 45120 94805	Shaded wet ditch	Wet ditch flowing through woodland, silted, unvegetated.	Poor potential for aquatic assemblage only
3	SP 45276 94845	Scalloped grassland and wooded railway embankment	Wooded railway embankment on Burbage Common side (north) side of railway. As TN1 with good structural succession from grassland to scrub edge. Grassland and scrub as TN1, with bare earth provided by ruts.	Good potential for scrub edge and arboreal assemblages.

Target Note (TN)	Grid reference	Feature	Description	Invertebrate Potential/Assemblage
4	SP 45504 95072	Hedge and improved field and railway cutting	As TN1 but woody species included *Acer pseudoplatanus*. Bank immediately north manicured *Crataegus monogyna* with *Fraxinus excelsior* and *Aesculus hippocastnum* standards. Improved verge with *Anthriscus sylvestris* and adjacent arable field.	Relatively low scrub edge and arboreal invertebrate potential due to management and improved field margin.
5	SP 45517 95030	Railway bank scrub (southern section) with tall herb headland	Extensive headland south of railway bank scrub and north of Burbage Common Road open with tall ruderal vegetation including *Urtica dioica, Anthriscus sylvestris* and *Rubus fruticosus* (agg.) low scrub. Uneven scrub edge with *Crataegus monogyna* (flowering at time of survey) with *Prunus spinosa*, *Sambucus nigra* and standards including *Quercus robur, Acer pseudoplatanus* and *Fraxinus excelsior*. Good structure for invertebrates including succession between ruderal, Bramble scrub and Hawthorn, but not exceptional.	Moderate scrub edge and arboreal invertebrate potential.

Target Note (TN)	Grid reference	Feature	Description	Invertebrate Potential/Assemblage
6	SP 45572 95078	Field margin habitat	Margin of arable (Oilseed Rape) crop included grassy headland with tall grasses and ruderal vegetation including *Arrhenatherum elatius, Heracleum sphondylium, Anthriscus sylvestris, Urtica dioica, Cirsium arvense* with line of recently planted woody species including *Fraxinus excelsior, Crataegus monogyna* and *Prunus spinosa.* Other vegetation included *Rubus fruticosus (*agg.), *Galium aparine* and *Ranunculus repens.* Reasonable flowering resource (mainly umbellifers) but relatively low invertebrate value.	Relatively low scrub edge invertebrate potential.

Target Note (TN)	Grid reference	Feature	Description	Invertebrate Potential/Assemblage
7	SP 45812 95243	Improved field and railway embankment	Improved grassland with *Lolium perenne, Alopecurus pratensis, Holcus lanatus.* Slightly more diverse field-margin adjacent to railway with *Juncus inflexus, Ranunculus repens, Epilobium hirsutum, Heracleum sphondylium* and *Rubus fruticosus* (agg.). Also more localised, herb-rich patches with *Vicia sativa, Lathyrus pratensis, Trifolium repens, Plantago major, Senecio jacobaeae, Rumex crispus, Taraxacum officinale* (agg.), *Tragopogon pratensis, Cerastium fontanum, Medicago lupulina, Cirsium vulgare* and species characteristic of damp soils including *Alopecurus geniculatus* and *Filipendula ulmaria*. Bank with scattered, mature *Crataegus monogyna, Rubus fruticosus* (agg.), *Rosa canina* and *Sambucus nigra*. Some potential wood decay habitat in standing *Crataegus monogyna.*	Moderate potential value for scrub edge and shaded grassland assemblages and also wood decay species.
8	SP 45966 95199	Improved pasture/meadow	Fairly flower-rich improved sward with P*oa trivialis, Dactylis glomerata, Ranunculus repens, R. acris, Trifolium pratense, Cerastium fontanum, Taraxacum officinale* (agg.), hedgerows manicured and rather species-poor *Crataegus monogyna* dominant, but lacking structural succession at field margin.	Relatively low potential for tall sward grassland, rich-flower resource and scrub edge assemblages.

Target Note (TN)	Grid reference	Feature	Description	Invertebrate Potential/Assemblage
9	SP 46037 95274	Improved pasture/meadow	As TN8 but with some suckering *Prunus spinosa* at field margin, hedgerow otherwise manicured and species-poor.	Relatively low potential for tall sward grassland, rich-flower resource and scrub edge assemblages.
10	SP 46067 95430	Heavily shaded, eutrophic ditch	Rather heavily shaded and eutrophic ditch at field margin/hedgerow interface. Little aquatic vegetation in ditch besides *Epilobium hirsutum*. Grassland lay in adjacent field of very low conservation value, with narrow field margin supporting herbs including *Alliaria petiolata* and *Geranium dissectum*. Adjacent railway bank with some mature and uncut *Crataegus monogyna* providing some invertebrate potential.	Ditch and infield grassland of low invertebrate potential. Hawthorn scrub of some potential for arboreal and wood decay species.

Target Note (TN)	Grid reference	Feature	Description	Invertebrate Potential/Assemblage
11	SP 46297 95369	Pond with mature trees	Partially shaded pond within predominately arable landscape. Pond approximately 25m x 15m of varying depth and with areas of both vegetated and open water habitat. Vegetated habitat with marginal/emergent *Glyceria fluitans, G. maxima, Solanum dulcamara* and blanket weed (algae). Tall ruderal vegetation on banks including *Urtica dioica, Heracleum sphondylium* with *Rubus fruticosus* (agg.) and *Rosa canina*, with trees including mature *Salix fragilis, Acer pseudoplatanus* and understorey species including *Crataegus monogyna, Prunus spinosa, Salix cinerea and Acer campestre*. Pond with some vegetation with some potential to support aquatic invertebrate assemblages, if not of high conservation value.	Pond potentially supports aquatic invertebrate assemblages of moderate conservation value and woody species with potential to support moderate arboreal and scrub edge assemblages

Target Note (TN)	Grid reference	Feature	Description	Invertebrate Potential/Assemblage
12	SP 46553 95680	Mature Pedunculate Oak, Hawthorn and Crab Apple	Mature *Quercus robur* at field margin, field planted as fodder ley. Railway margin with mature *Crataegus monogyna* and *Malus sylvestris.* Also *Ulmus procera* and *Sambucus nigra*. Dry ditch along field margin with tall ruderal vegetation including *Epilobium hirsutum, E. angustifolium, Urtica dioica.* Woody species with some invertebrate potential. Possible *Satyrium w-album* potential.	Some potential arboreal and scrub edge invertebrate value. Presence of *Ulmus procera* with possible potential to provide foodplant for White-letter Hairstreak *Satyrium w-album.*
13	SP 46780 95757	Ruderal habitat and wet grassland habitat in field corner	Rough, wet grassland and tall ruderal habitat in corner of arable field, with range of graminoids and tall ruderal vegetation. Grassland with abundant *Juncus conglomeratus, Holcus lanatus, Poa trivialis, Epilobium hirsutum, Senecio jacobaeae, Rumex crispus, Urtica dioica, Myosotis laxa, Cirsium arvense, Ranunculus repens* and *Cardamine pratensis.* Patches of bare earth and brash in field and ditch at margin with Iris pseudacorus. Habitat sheltered to north from mature *Crataegus monogyna, Rubus fruticosus* (agg.) and *Rosa canina* scrub. Quite structurally diverse and with potential value for invertebrates.	Some potential to support scrub edge, tall grassland and wetland invertebrates.

Target Note (TN)	Grid reference	Feature	Description	Invertebrate Potential/Assemblage
14	SP 46814 95786	Glyceria maxima and Carex acutiformis swamp	Area in extreme corner of field with area of *Glyceria maxima* and *Carex acutiformis* swamp habitat. Soil increasingly waterlogged towards scrub edge at corner of field. Herbs including *Solanum dulcamara, Filipendula ulmaria, Epilobium hirsutum, Rumex crispus* present and *Juncus inflexus* present at periphery. The scrub at edge of field providing shelter and habitat variation, mainly *Crataegus monogyna*, with *Salix cinerea, Alnus glutinosa, Prunus avium, Rosa canina* and *Rubus fruticosus* (agg.). Log pile at edge of habitat suggesting somer conservation management. Habitat with potential to support wet grassland and scrub edge invertebrates.	Good potential for wet grassland and scrub edge invertebrate assemblages. Also, some potential for wood decay species.
15	SP 46803 95701	Hedge and dried out ditch	Wet ditch adjacent to mature hedgerow. Ditch with *Agrostis stolonifera, Glyceria fluitans, Phalaris arundinacea* and *Juncus articulatus.* With *Epilobium hirsutum, Filipendula ulmaria* and *Rumex crispus.* More open and floristically diverse than most ditches on Site. Adjacent hedge manicured, with *Crataegus monogyna, Prunus spinosa, Quercus robur, Fraxinus excelsior, Acer campestre* and *Ulmus procera.*	Some potential for supporting aquatic invertebrate assemblages, but unlikely to support assemblages of high conservation value.

Target Note (TN)	Grid reference	Feature	Description	Invertebrate Potential/Assemblage
16	SP 46736 95367	Hedgerow and arable field	Hedge manicured with *Crataegus monogyna* and *Ulmus procera.* Some mature standards in field boundary.	Generally low invertebrate potential, but presence of *U. procera* adds to potential resource for White-letter Hairstreak
17	SP 46837 95323	Narrow strip of habitat on field/roadside boundary	Grassy bank between equestrian fields and road. Grassland species-poor with coarse grasses. Bank recently planted with saplings including *Salix alba, Alnus glutinosa, Sorbus aucuparia, Fagus sylvatica, Prunus avium*. Road verge with narrow tall herb vegetation including *Anthriscus sylvestris, Arrhenatherum elatius, Carex hirta, Vicia sativa.* Other scrub species including *Sambucus nigra, Rubus fruticosus* (agg.) and *Ulmus procera*. Generally low invertebrate potential.	Generally low invertebrate potential, but presence of *U. procera* adds to potential resource for White-letter Hairstreak
18	SP 46837 95323	Hedge (manicure)	Manicured hedgerow alongside road/field interface. Hedge with *Crataegus monogyna, Malus domestica, Prunus spinosa, Rosa canina, Ligustrum vulgare.* Fairly low invertebrate potential due to lack of structural diversity.	Generally low invertebrate potential, for species associated with arboreal and scrub edge habitats

Target Note (TN)	Grid reference	Feature	Description	Invertebrate Potential/Assemblage
19	SP 47175 95755	Mature hedgerow and adjacent meadow	Mature, uncut hedgerow with standards adjacent meadowland and road. Favourable structural scrub-edge succession with grassland meadow (poor SI) fairly flower-rich with abundant *Ranunculus repens.* Hedgerow with *Crataegus monogyna, Salix babylonica, Sambucus nigra, Acer pseudoplatanus, Acer campestre, Aesculus hippocastanum* and *Prunus avium.* Hedgerow/grassland interface with potential to support invertebrates of moderate conservation value.	Potential to support scrub edge and arboreal invertebrate assemblages of moderate conservation value.
20	SP 46734 95238	Unhedged field boundary	Open field margin (approximately 4m wide) north of road. With mainly tall ruderal vegetation including *Anthriscus sylvestris, Urtica dioica, Epilobium hirsutum, Heracleum sphondylium, Galine aparine* and *Arrhenatherum elatius*. Habitat providing a valuable nectar resource for invertebrates, but unlikely to support assemblages of high conservation value.	Habitat with potential to provide a nectare resource and supplementary habitat for a range of insects and other arthropods, but of high conservation value

Target Note (TN)	Grid reference	Feature	Description	Invertebrate Potential/Assemblage
21	SP 46734 95238	Mature standards in hedgerow	Some mature *Fraxinus excelsior and Quercus robur* standards in field boundary to south of road. Associated hedgerow manicured with *Prunus spinosa, Crataegus monogyna* and *Tamus communis*.	Standards with potential to support arboreal and wood decay invertebrate assemblages of some conservation value.
22	SP 46266 95131	Poor SI pasture (cattle grazed)	Cattle-grazed poor semi-improved permanent pasture, with possible ridge and furrow. Generally rather species-poor with *Alopecurus pratensis, Ranunculus repens, R. acris, Rumex crispus, R. obtusifolius* and *Taraxacum officinale* (agg.). Some bare ground from cattle poaching in furrows which were damper than ridges and supported wet grassland species including *Alopecurus geniculatus*. Habitat very herb-poor for ridge and furrow and generally lacking in abundant flowering herbs. Therefore, habitat unlikely to support invertebrate assemblages of high conservation value.	Potential to support grassland invertebrates of generally low conservation value.
23	SP 46312 95007	Dead standard in field	Standing wood decay resource in field. No extensive signs of wood decay invertebrate assemblages, but with potential to support some decay associated species.	Moderate potential value for wood decay invertebrates, but unlikely to support assemblages of high conservation value

Target Note (TN)	Grid reference	Feature	Description	Invertebrate Potential/Assemblage
24	SP 46151 94981	Pony paddock with poor SI grassland and tall ruderal vegetation	Paddock with pony grazed sward. Poor SI grassland, rather lacking diversity with flowering *Ranunculus repens, Rumex obtusifolius* and also patches of tall herb vegetation, predominately comprising *Anthriscus sylvestris*. Hedgerow, structurally varied with *Crataegus monogyna, Rubus fruticosus* (agg.) and *Fraxinus excelsior* standards	Structurally varied, with potential to support grassland and scrub edge invertebrate assemblages of at most moderate conservation value
25	SP 46049 95158	Pony paddocks with manicured hedges and improved sward	Small pony paddocks with clipped hedges, improved grassland with little structural variation at margins. Generally low invertebrate potential.	Lacking structural and compositional variation, potential to support grassland and scrub edge invertebrates of low conservation value

Target Note (TN)	Grid reference	Feature	Description	Invertebrate Potential/Assemblage
26	SP 46054 95477	Broadleaved woodland edge habitat	Area of broadleaved woodland north of railway. With a range of broadleaved trees including *Fraxinus excelsior* and *Quercus robur* (canopy) and *Acer campestre, Prunus spinosa, Ulmus procera* and *Ligustrum vulgare* scrub/understorey layer. Generally rather shaded under canopy, but field edge well lit, supporting numerous scrub/woodland edge invertebrates at time of survey. Edge habitat with tall herbs including *Anthriscus sylvestris, Arrhenatherum elatius* and *Rubus fruticosus* agg. scrub.	Potential to support arboreal and scrub edge assemblages of some conservation value
27	SP 46060 95597	Ditch at field/woodland margin	Wet ditch, channel approximately 1.5 metres wide and 30cm deep at time of survey. Little macrophyte vegetation in ditch, but with marginal *Juncus effusus, Filipendula ulmaria* and *Urtica dioica.* Channel generally open, but overshaded locally. Potential to support aquatic invertebrate assemblages of at most moderate conservation value.	Potential to support aquatic invertebrate assemblages of at most moderate conservation value.
28	SP 46095 94898	Pond west of Woodhouse Farm	Large created pond adjacent to woodhouse Farm. Pond with islands and some scrub habitat at margin, pond missed during survey. Grid reference retrofitted)	Outside survey area

Target Note (TN)	Grid reference	Feature	Description	Invertebrate Potential/Assemblage
28	SP 45944 95380	Mature Hawthorn	Line of mature Crataegus monogyna between field margin and northern railway bank. Adjacent field planted with arable (Oilseed Rape). Some mature *Quercus robur* standards along boundary, also *Prunus spinosa*. Some *Rubus fruticosus* (agg.) scrub and shade-tolerant herbs including *Heracleum sphondylium, Alliaria petiolata, Galium aparine, Urtica dioica* and *Geranium robertianum.* Some potential for scrub edge, shaded and arobreal invertebrate assemblages.	Some potential for scrub edge, shaded and arobreal invertebrate assemblages.
29	SP45783 94876	Mature Pedunculate Oak and English Elm	Mature *Quercus robur* standard in hedgerow, with associated *Ulmus procera.* Uncut; possible White-letter Hairstreak *Satyrium w-album* habitat?	Potential to support arboreal assemblages, also habitat structure potentially suitable for White-letter Hairstreak *Satyrium w-album*
30	SP 45711 94972	Group of mature broadleaves in corner of field	Group of mature broadleaves including *Fraxinus excelsior* and *Crataegus monogyna* at corner of field. Some potential to support arboreal invertebrate assemblages	Some potential to support arboreal invertebrate assemblages

Target Note (TN)	Grid reference	Feature	Description	Invertebrate Potential/Assemblage
31	SP 45739 94579	Mature Pedunculate Oak and Ash standards at field margin	Mature *Quercus robur* and some *Fraxinus excelsior* in hedgerow. Hedgerow species-rich and not recently clipped with *Prunus spinosa, Corylus avellana, Cornus sanguinea. Crataegus monogyna, Acer campestre* and *Rubus fruticosus* (agg.). But lacking structural succession into field margin which was narrow with some *Anthriscus sylvestris* and *Heracleum sphondylium*. Some potential for arboreal, wood decay and scrub edge species.	Some potential to support arboreal, wood decay and scrub edge invertebrate assemblages
32	SP45571 94344	Mature Pedunculate Oak and Ash standards at field margin	Mature *Quercus robur* and *Fraxinus excelsior* standards in hedgerow leading up to woodland edge, with wood decay habitat. Also unclipped hedge with *Corylus avellana, Crataegus monogyna* and *Prunus spinosa.*	Some potential to support arboreal, wood decay and scrub edge invertebrate assemblages

Target Note (TN)	Grid reference	Feature	Description	Invertebrate Potential/Assemblage
33	SP 45451 94412	Broadleaved woodland edge habitat at edge of Bubage Common and Woods	Woodland margin with field margin somewhat wider than usual for Site (approx. 6 to 7m). Margin with ground vegetation including *Ranunculus repens, Holcus lanatus, Rumex crispus, Epilobium hirsutum, Cardamine flexuosa, Carex pendula* and *Juncus inflexus,* indicating localised waterlogging. Scrub edge of wood with varied structure and succession from grassland, to *Rubus fruticosus* (agg.), *Prunus spinosa, Crataegus monogyna* etc. scrub and canopy trees including mature *Quercus robur, Fraxinus excelsior* and *Ulmus glabra* (the latter providing potential habitat for White-letter Hairstreak *Satyrium w-album*). Habitat with potential to support woodland, scrub edge and wood decay assemblages of conservation value.	Habitat with potential to support woodland, scrub edge and wood decay assemblages of conservation value.
34	SP 45247 94858	Mainly mature Hawthorn along field margin, south of railway bank	Mainly mature *Crataegus monogyna* along field margin, south of railway bank. Habitat of potential value to nectaring hedgerow, scrub edge and arboreal assemblages.	Habitat of potential value to nectaring hedgerow, scrub edge and arboreal assemblages.

Target Note (TN)	Grid reference	Feature	Description	Invertebrate Potential/Assemblage
35	SP 45100 94705	Woodland edge with field with wider than typical field margin.	Woodland edge with field with wider than typical field margin. Margin with Graminoids and herbs including *Ranunculus repens*, *Rumex crispus, Rubus fruticosus* (agg.), *Anthriscus sylvestris, Angelica sylvatica, Epilobium hirsutum, Urtica dioica*. Some good wood edge structure at boundary of predominately arable field. Wood edge species including *Prunus spinosa, Crataegus monogyna, Acer campestre, Fraxinus excelsior, Quercus robur, Rubus fruticosus* (agg.) and *Rosa canina*. Some invertebrate potential, for scrub edge, shade and arboreal assemblages.	Some invertebrate potential, for scrub edge, shade and arboreal assemblages. But likely to be of moderate conservation value
36	SP 46222 94971	Poor SI verges adjacent to Woodhouse Farm	Poor semi-improved grassland verges with *Plantago lanceolata*, *Rumex acetosa, Ranunculus repens* and *R. acris*. Some value as habitat fro grassland assemblages, but not of high conservation potential	Some potential for grassland invertebrate assemblages, but not likely to support assemblages of high conservation value

Target Note (TN)	Grid reference	Feature	Description	Invertebrate Potential/Assemblage
37	SP 47044 95171	Field margin and hedgerow	Field corner with remnant field margin vegetation. Succession from grassland, through *Rubus fruticosus* (agg.) scrub, to understorey species including uncut *Crataegus monogyna*, *Prunus spinosa, Ulmus procera* growing above otherwise cut hedge. Small grassland and agri-weed habitat with *Poa trivialis, Bromus hordeaceus, Alopecurus pratensis, Ranunculus repens, Rumex obtusifolius, Galium aparine, Geranium dissectum, Aphanes arvensis, Epilobium hirsutum, Anagallis arvensis, Urtica dioica, Festuca arundinacea* and *Rubus fruticosus* (agg.). Good habitat structure for scrub edge invertebrate assemblages. Also potential for White-letter Hairtstreak *Satyrium w-album.*	Good habitat structure for scrub edge invertebrate assemblages. Also potential for White-letter Hairtstreak *Satyrium w-album*

Target Note (TN)	Grid reference	Feature	Description	Invertebrate Potential/Assemblage
38	SP 47062 95049	Herb-rich headland to scrub	As TN37, wide field margin at corner of field. C10m wide margin, fairly herb-rich with good structural succession from grassland through *Rubus fruticosus* (agg.) scrub as well as *Prunus spinosa* and *Cornus sanguniea* suckers persisting into field from uncut hedgerow. Hedgerow *P. spinosa, Crataegus monogyna, Ulmus procera*. Grassland as TN37 but more diverse with *Vicia sativa, V. cracca, Lathyrus pratensis, Senecio jacobaeae, Taraxacum officinale* (agg.), *Dipsacus fullonum, Filipendula ulmaria, Heracleum sphondylium, Trifolium repens, T. pratense.* Of potential to support scrub edge invertebrate assemblage of conservation value. Also, some potential for White-letter Hairstreak *Satyrium w-album.*	Of potential to support scrub edge invertebrate assemblage of conservation value. Also, some potential for White-letter Hairstreak *Satyrium w-album.*

Target Note (TN)	Grid reference	Feature	Description	Invertebrate Potential/Assemblage
39	SP 47032 94997	Road edge habitat and wet ditch	Wet ditch spanning the entire road edge margin of field. Trapezoidal ditch, channel width C1m, depth approximately 5 to 10cm. Partially vegetated with *Apium nodiflorum, Filipendula ulmaria, Epilobium hirsutum, Typha latifolia, Urtica dioica, Angelica sylvatica.* Adjacent grassland and scrub band leading to road edge from edge of arable (Oilseed Rape) crop, C35m wide with some microtopographic variation, sloping from roadside with scattered scrub, mainly *Crataegus monogyna,* banks of *Rubus fruticosus* (agg.) and some flowering herbs. Not exceptional botanically, but with good structure and potential to support grassland and scrub edge assemblages and aquatic macroinvertebrates of moderate conservation value.	Not exceptional botanically, but with good structure and potential to support grassland and scrub edge assemblages and aquatic macroinvertebrates of moderate conservation value

Target Note (TN)	Grid reference	Feature	Description	Invertebrate Potential/Assemblage
40	SP 46743 94970	Hedgerow Pedunculate Oak and Ash standards	Abundant, mature *Quercus robur, Fraxinus excelsior* and *Acer campestre* standards in hedgerow. Hedgerow itself manicured, with *Prunus spinosa, Crataegus monogyna*, *Ulmus procera* and *A. campestre*. Field margin generally <3m wide with *Anthriscus sylvestris* and *Galium aparine.* Mature standards of potential value for arboreal and wood decay assemblages, hedgerow less so, though *U. procera* in hedge of lower potential value to White-letter Hairstreak Satyrium w-album, due to management.	Mature standards of potential value for arboreal and wood decay assemblages, hedgerow less so, though *U. procera* in hedge of lower potential value to White-letter Hairstreak Satyrium w-album, due to management.

Target Note (TN)	Grid reference	Feature	Description	Invertebrate Potential/Assemblage
41	SP 46645 94958	Poor SI grassland	Meadow with graminoids including *Poa pratensis, Holcus lanatus, Alopecurus pratensis, Lolium perenne*, *Dactylis glomerata* and locally, *Anthoxanthum odoratum* and *Alopecurus geniculatus*. Herbs included *Trifolium repens, T. pratense, Rumex acetosa, Taraxacum officinale* (agg.) *Trifolium dubium, Plantago lanceolata, Rumex crispus, Ranunculus acris, R. repens, Hypochaeris radicata, Bellis perennis* and *Veronica serpyllifolia*. Fairly herb-rich flower resource locally, but generally rather improved. Sward height C5-30cm with some bare earth patches. Habitat with potential to support grassland and rich-flower resource invertebrate assemblages of moderate conservation value.	Habitat with potential to support grassland and rich-flower resource invertebrate assemblages of moderate conservation value.

Target Note (TN)	Grid reference	Feature	Description	Invertebrate Potential/Assemblage
42	SP46629 94922	Pond	Well vegetated pond C20m x 15m, with good vegetation structure. Pond with emergent *Typha latifolia, Alisma plantago-aquatica, Sparganium erectum* and floating rafts of *Ranunculus peltata* with *Persicaria amphibia* and marginal vegetation including *Iris pseudacorus, Epilobium hirsutum, Myosotis scorpioides, Solanum dulcamara, Juncus effusus, Persicaria maculosa*. Some areas of blanket-weed (alga) suggesting nutrient input, but also significant open water areas. Some debris in pond, but may have been created owing to diversity and species of macrophytes present. Potential to support significant aquatic macroinvertebrate fauna.	Potential to support significant aquatic macroinvertebrate fauna.

Target Note (TN)	Grid reference	Feature	Description	Invertebrate Potential/Assemblage
43	SP46717 94693	Hedgerow and grassland	Hedge mature but manicured and cut flush with field margin. Grassland edge lacking successional progression. Hedge with *Crataegus monogyna, Prunus spinosa, Fraxinus excelsior, Rubus fruticosus* (agg.). Marginal zone very narrow with shade tolerant *Geum urbanum* and *Silene dioica*, but continuous with grassland. Some *Juncus conglomeratus* and *Alopecurus geniculatus* in field suggesting waterlogging. Invertebrate potential for scrub edge and arboreal species, but management and lack of succession diminishes potential.	Invertebrate potential for scrub edge and arboreal species, but management and lack of succession diminishes potential.

Target Note (TN)	Grid reference	Feature	Description	Invertebrate Potential/Assemblage
44	SP 46651 94678	Mature hedgerow	Mature hedgerow with standards bordered by poor semi-improved grassland. Hedge cut flat in profile, so structural poor, though some *Prunus spinosa* suckers persisting into field, but cut back. Hedgerow with *Crataegus monogyna, P. spinosa, Ulmus procera* and *Fraxinus excelsior* standards. Woody species and juxtaposition with more herb-rich grassland provides some potential for grassland and scrub edge invertebrates, but management reduces overall value. Management of *Ulmus procera* unlikely to be favourable for White-letter Hairstreak *Satyrium w-album,* but adds to overall resource.	Woody species and juxtaposition with more herb-rich grassland provides some potential for grassland and scrub edge invertebrates, but management reduces overall value. Management of *Ulmus procera* unlikely to be favourable for White-letter Hairstreak *Satyrium w-album*, but adds to overall resource of foodplant on Site.
45	SP 46326 94808	Scrape/disturbed ground	Sparsely vegetated, disturbed area in corner of field adjacent to farm buildings. Very nutrient enriched. Very shallow, eutrophic pond unvegetated apart from algae. Surrounding ground with signs of seasonal inundation, but dried out. With scattered agri-weeds including *Matricaria discoidea, Polygonum aviculare* and *Alopecurus geniculatus.* Poor habitat with little invertebrate potential due to agricultural improvement	Poor habitat with little invertebrate potential due to agricultural improvement

Target Note (TN)	Grid reference	Feature	Description	Invertebrate Potential/Assemblage
46	SP 46282 94829	Vegetated spoil heap in farmyard	Vegetated spoil-heap in farmyard, with extensive *Rubus fruticosus* (agg.) scrub and tall ruderal vegetation with *Urtica dioica, Epilobium hirsutum* and *Symphytum officinale*. Varied microtopography. Eutrophic, nutrient enriched habitat, but providing some potential flowering and foodplant resource for invertebrates, but generally low value.	Providing some potential flowering and foodplant resource for invertebrates, but generally low value.
47	SP 46714 94681	Uncut hedgerow	Sinuous, uncut hedgerow with mature *Prunus spinosa* and *Crataegus monogyna.* Adjacent ditch vegetated with *Apium nodiflorum* and *Solanum dulcamara* with *Epilobium hirsutum* and bankside *Urtica dioica, Anthriscus sylvestris, Silene dioica*. Some wood decay habitat potential in hedge.	Potential for scrub edge and wood decay invertebrate assemblages.

Target Note (TN)	Grid reference	Feature	Description	Invertebrate Potential/Assemblage
48	SP 46762 94617	Southwest facing exposed bank with Hawthorn scrub	Steepish bank bordering motorway crossing, with exposed, bare earth cliff. Numerous aculeate burrows in cliff and extensive, mature *Crataegus monogyna, Rosa canina and Rubus fruticosus* (agg.) scrub providing nectar resource. Grassland in field generally improved, but top of bank crossing with herbs including *Lotus corniculatus, Geranium dissectum, Myosotis* sp., *Cerastium fontanum, Senecio jacobaeae, Vicia hirsuta, Medicago lupulina, Chrysanthemum leucanthemum* and *Bellis perennis* with bare earth exposures, providing good albeit small nectar resource.	Bare earth habitat value for aculeate Hymenoptera as nesting resource, also potential for other scrub edge species. Habitat rather localised.

Target Note (TN)	Grid reference	Feature	Description	Invertebrate Potential/Assemblage
49	SP 46874 94555	Wooded planting south of motorway crossing	Trees planted as shelter belt immediately south of motorway footbridge. With a range of deciduous trees including *Acer campestre, Crataegus monogyna, Salix caprea, Corylus avellana*. Heavily shaded at ground layer, some large *Rubus fruticosus* (agg.) scrub patches at periphery of wooded area. providing limited habitat of value to scrub edge invertebrates. South-west facing margin of woodland with sheltered *Crataegus monogyna* and *Acer campestre* habitat adjacent to the field margin. Some invertebrate potential in scrub edge, but localised and limited.	Some invertebrate potential in scrub edge, but localised and limited.

Target Note (TN)	Grid reference	Feature	Description	Invertebrate Potential/Assemblage
50	SP 46792 94453	Motorway edge grassland and scrub	Created grassland at motorway margin, with *Plantago lanceolata. Chrysanthemum leucanthemum, Vicia sativa, Tragopogon pratensis, Senecio jacobaeae, Anthriscus sylvestris* in mosaic with well-developed scrub scrub layer including *Crataegus monogyna, Rosa canina, Quercus robur, Fraxinus excelsior* and some large *Rubus fruticosus* (agg.) patches. South-east facing microtopography, sloping down from motorway providing sheltered invertebrate habitat suitable for grassland and scrub edge invertebrate assemblages of some potential value.	Habitat suitable for grassland and scrub edge invertebrate assemblages of some potential value.
51	SP 46459 93811	Wooded roundabout	Surveyed at distance. Roundabout at motorway junction with a range of well-developed broadleaves including *Fraxinus excelsior, Populus* sp., *Ulmus procera, Crataegus monogyna*. Some *Rubus fruticosus* agg. at edge of wooded habitat and groundflora species including *Geranium robertianum, Hyacinthioides hispanica, Geum urbanum, Anthriscus sylvestris* in ground layer but heavily shaded.	Habitat of moderate value for arboreal and scrub edge invertebrate assemblages, but not particularly mature. Presence of *Ulmus procera* adds to overall foodplant resource of White-letter Hairstreak *Satyrium w-album.*

Target Note (TN)	Grid reference	Feature	Description	Invertebrate Potential/Assemblage
52	SP 46433 93721	Field margin and scrub habitat south of motorway	Field edge adjacent to roundabout, with mature *Crataegus monogyna, Prunus spinosa, Acer campestre,* scrub edge and fairly herb-rich grassland with *Chrysanthemum leucanthemum, Centaurea nigra*, and *Silene dioica.* Field itself planted with arable wheat. Also patches of *Rubus fruticosus* (agg.) scrub. Habitat of potential value for grassland and scrub edge invertebrates.	Habitat of potential value for grassland and scrub edge invertebrates. But unlikely to support assemblages of high conservation value.
53	SP 46260 93405	Grassland and scrub headland	Small patch of grassland and *Rubus fruticosus* (agg.) scrub, beneath pylon footprint. Good scrub-edge succession and fairly flower-rich with *Ranunculus repens*, and *Vicia sativa,* succeeding to *Crataegus monogyna* and *Prunus spinosa* scrub. Of some potential value for grassland and scrub edge habitats, but small fragment in more improved landscape.	Of some potential value for grassland and scrub edge habitats, but small fragment in more improved landscape.

Target Note (TN)	Grid reference	Feature	Description	Invertebrate Potential/Assemblage
54	SP 46121 93188	Grassland and scrub habitat	Rank *Arrhenatherum elatius* and *Poa trivialis* grassland with tall ruderal vegetation developing including *Urtica dioica, Epilobium hirsutum, Anthriscus sylvestris* and *Heracleum sphondylium* with *Rubus fruticosus* (agg.) scrub succeeding to sinuous, uncut wood edge/scrub habitat comprising mature *Fraxinus excelsior, Crataegus monogyna, Quercus robur, Prunus spinosa, Sambucus nigra* and *Salix fragilis.*	Some potential habitat for tall grassland and scrub/arboreal invertebrates
55	SP 46110 93143	Grassland and scrub marginal habitat	Grassland with scrub edge habitat with *Crataegus monogyna, Salix caprea, Prunus spinosa, Quercus robur, Fraxinus excelsior. Rubus fruticosus* (agg.) scrub patches in mosaic with *Holcus lanatus* and *Poa trivialis* grassland, but not herb-rich. Habitat structure of value to scrub edge and grassland invertebrates, but not very herb-rich.	Habitat structure of value to scrub edge and grassland invertebrates, but not very herb-rich.
56	SP 45988 92944	Broadleaved trees / shelter belt	Planted broadleaves including *Acer pseudoplatanus, Acer campestre, Crataegus monogyna, Fraxinus excelsior* etc. Trees leggy and habitat shaded at ground level, lacking structure but standards providing some habitat for arboreal invertebrates.	Trees leggy and habitat shaded at ground level, lacking structure but standards providing some habitat for arboreal invertebrates. Unlikely to support assemblages of high conservation value.

Target Note (TN)	Grid reference	Feature	Description	Invertebrate Potential/Assemblage
57	SP 46077 93243	Broadleaved woodland	Dense broadleaved woodland with diverse scrub edge comprising *Crataegus monogyna, Prunus spinosa, Betula pendula, Acer campestre, Ulmus procera.* Some cutting at margin with arable field (Oilseed Rape), but with wide field margin supporting *Anthriscus sylvestris* and other ruderal herbs. Woodland interior very dense with little light reaching ground layer.	Habitat of value to scrub edge and arboreal invertebrates, but interior dense and suitable for supporting only shade tolerant species. Presence of *Ulmus procera* adds to potential habitat resource for White-letter Hairstreak *Satyrium w-album.*
58	SP 46264 93791	Field edge scrub	Scrub edge at field margin (field sown with Oilseed Rape crop). Habitat with extensive *Rubus fruticosus* (agg.) scrub at edge of woody margin with *Prunus spinosa, Crataegus monogyna, Quercus robur, Populus tremula* etc.	Hedges cut, but with wide scrub edge vegetation with *Anthriscus sylvestris, Geranium dissectum* etc. providing some potential for scrub edge invertebrates.

Target Note (TN)	Grid reference	Feature	Description	Invertebrate Potential/Assemblage
59	SP 46201 93838	Flower-rich verge	Flower-rich verge grassland strip adjacent roundabout junction. Occupies south-facing slope, flower-rich with herbs including *Centaurea nigra, Ranunculus acris, Bellis perennis, Plantago lanceolata, Achillea millefolium, Trifolium pratense, Vicia sativa, Heracleum sphondylium, Taraxacum officinale* (agg.), *Hypochaeris radicata, Chrysanthemum leucanthemum, Geum urbanum, Rumex crispus, Poa pratensis, Festuca rubra, Arrhenatherum elatius, Dactylis glomerata.* Potential to support diverse grassland invertebrate fauna and associated rich flower resource assemblage, but habitat rather short and likely to be managed by cutting.	Potential to support diverse grassland invertebrate fauna and associated rich flower resource assemblage, but habitat rather short and likely to be managed by cutting.
60	SP 46077 93870	Broadleaved woodland	Rather dense broadleaved woodland with mature *Quercus robur, Fraxinus excelsior, Crataegus monogyna, Aesculus hippocastanum*. Habitat subject to fly-tipping and heavily shaded at ground layer and unlikely to be ancient woodland, but some potential for generalist arboreal invertebrate species.	Some potential for generalist arboreal invertebrate species.

Target Note (TN)	Grid reference	Feature	Description	Invertebrate Potential/Assemblage
61	SP 46257 93884	SI grassland and scrub edge	Fairly herb-rich and flower-rich, pony grazed semi-improved pasture. Grassland with *Anthoxanthum odoratum, Ranunculus repens, R. acris, Trifolium repens, T. pratense, Plantago lanceolata, Hypochaeris radicata, Senecio jacobaeae* etc. Excellent sinuous and structurally varied grassland/scrub edge, with broad *Rubus fruticosus* (agg.) scrub belt adjacent to uncut woody margin with *Crataegus monogyna, Clematis vitalba, Fraxinus excelsior, Prunus spinosa* and mature *Quercus robur* standard in field. Grasssland generally short sward (<5cm), but patchy. Some wood decay habitat and evidence of bark beetles (Scolytinae).	Habitat of potential value for scrub edge, grassland and arboreal assemblages including wood decay species. Fairly high conservation potential.
62	SP 46095 94898	Pond west of Woodhouse Farm	Large, created pond adjacent to woodhouse Farm. Pond with islands and some scrub habitat at margin, pond missed during survey.	Uncertain, but worth investigation in the event of further surveys

Target Note (TN)	Grid reference	Feature	Description	Invertebrate Potential/Assemblage
63	SP 46039 94302	Wooded field margin	Field margin adjacent to ancient woodland. Field margin narrow, woodland edge with mature *Quercus robur, Fraxinus excelsior, Corylus avellana, Crataegus monogyna* and *Acer campestre*. Relatively few flowering plants at margin, but ancient woodland edge habitat with potential to support important arboreal and scrub edge assemblages.	Relatively few flowering plants at margin, but ancient woodland edge habitat with potential to support important arboreal and scrub edge assemblages.
64	SP 45800 94494	Pond	Pond in corner of field planted with ley. Approximately 30m x 20m and depth up to 50cm (approx.) with shallower marginal areas. Emergent vegetation including mainly *Typha latifolia* and a horsetail *Equisetum* sp., with *Glyceria maxima, G. fluitans* and *Solanum dulcamara*. With patches of open water. Habitat of some potential to support aquatic macroinvertebrates of moderate conservation value.	Potential to support aquatic macroinvertebrates of moderate conservation value
65	SP 45979 94781	Field margin habitat	Relatively broad field margin/track running parallel to field boundary. With *Anthriscus sylvestris, Urtica dioica.* Hedge cut but regenerating, some value for scrub edge invertebrate assemblages, but not of high value.	Some value for scrub edge invertebrate assemblages, but not of high value

Target Note (TN)	Grid reference	Feature	Description	Invertebrate Potential/Assemblage
66	SP46084 94673	Pond and mature Pedunculate Oak with wood decay habitat	Pond C35 x 20 narrowing to 10m, with adjacent mature *Quercus robur* standing wood decay habitat. Bank above pond with evidence of glyphosate spraying. Pond margin with *Carex acutiformis/riparia*, with a range of macrophytes including emergent *Sparganium erectum* and *Glyceria maxima* and marginal *Juncus inflexus, J effusus, Solanum dulcamara, Epilobium hirsutum, Carex otrubae, Iris pseudacorus.* Some *Salix* scrub and *Crataegus monogyna* scrub at margins, but generally open. Blanket-weed alga patchily distributed over open water. Camouflaged hide at one end (duck shooting?), some potential value for aquatic invertebrate assemblages of moderate conservation value, use of glyphosate not ideal adjacent to water courses.	Some potential value for aquatic invertebrate assemblages of moderate conservation value, use of glyphosate not ideal adjacent to water courses.
67	SP 46251 94755	Bramble scrub at corner of field	Area of *Rubus fruticosus* (agg.) scrub and tall ruderal habitat including *Urtica dioica* and *Anthriscus sylvestris* at corner of field. Also, *Prunus spinosa* and *Fraxinus excelsior*. Habitat of value to invertebrates, but not of high conservation value.	Habitat of value to invertebrates, but not of high conservation value.

Target Note (TN)	Grid reference	Feature	Description	Invertebrate Potential/Assemblage
68	SP 46474 94623	Uncut hedgerow with standard	Good structure from grassland to scrub/hedgerow edge. Grassland improved, but with flowering resource of *Trifolium repens, Ranunculus repens, R. acris, Cerastium fontanum.* Tall herb field margin rather narrow, with *Anthriscus sylvestris* and *Heracleum sphondylium.* Hedgerow species-rich with *Acer campestre, Crataegus monogyna, Prunus spinosa, Salix cinerea, Corylus avellana* and *Rubus fruticosus* (agg.) with *Quercus robur* and *Fraxinus excelsior* standards. Good structural habitat for scrub edge assemblages, but tall herb margin rather narrow.	Good structural habitat for scrub edge assemblages, but tall herb margin rather narrow.
69	SP 46636 94380	Mature Hawthorn	Row of mature *Crataegus monogyna* with some potential to support arboreal, saproxylic and scrub edge invertebrates. Adjacent habitat of limited value.	Some potential to support arboreal, saproxylic and scrub edge invertebrates. Adjacent habitat of limited value.

Target Note (TN)	Grid reference	Feature	Description	Invertebrate Potential/Assemblage
70	SP 46444 94143	Compound adjacent to farm buildings with extensive scrub and tall ruderal habitat	Compound with dense *Rubus fruticosus* (agg.) scrub and range of scrub species including C*rataegus monogyna, Prunus spinosa, Acer campestre* and *Fraxinus excelsior* (including mature standard). Habitat of value to arboreal and scrub edge and arboreal invertebrate assemblages, but scrub dense and adjacent improved agricultural landscape of low value.	Habitat of value to arboreal and scrub edge and arboreal invertebrate assemblages, but scrub dense and adjacent improved agricultural landscape of low value.
71	SP 46474 94623	Improved grassland	Improved pasture, short sheep-grazed sward and manicured hedgerow	Of relatively low invertebrate conservation potential.

Figure A7.1: Target Note Map Part 1.

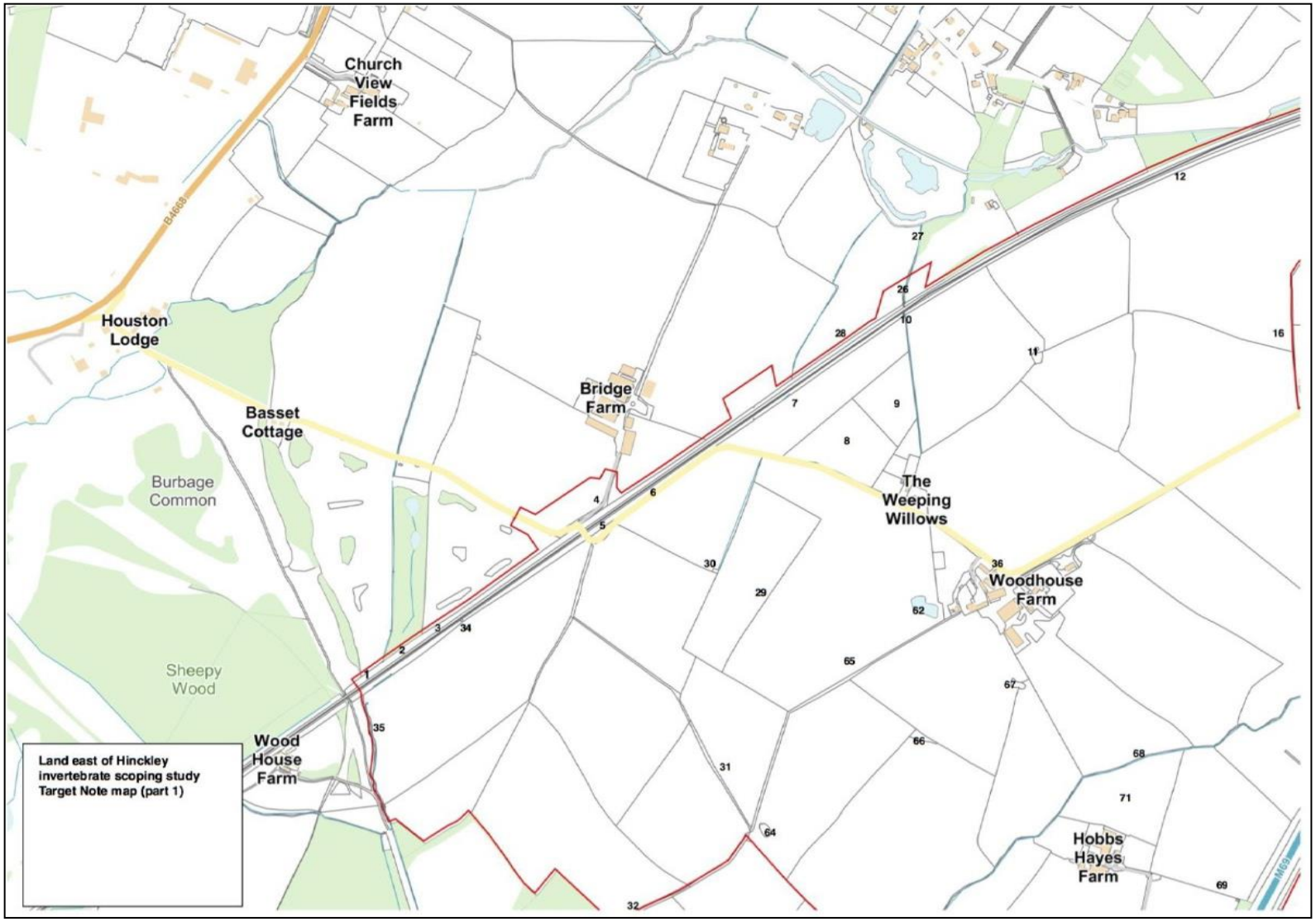

Figure A7.2: Target Note Map Part 2.

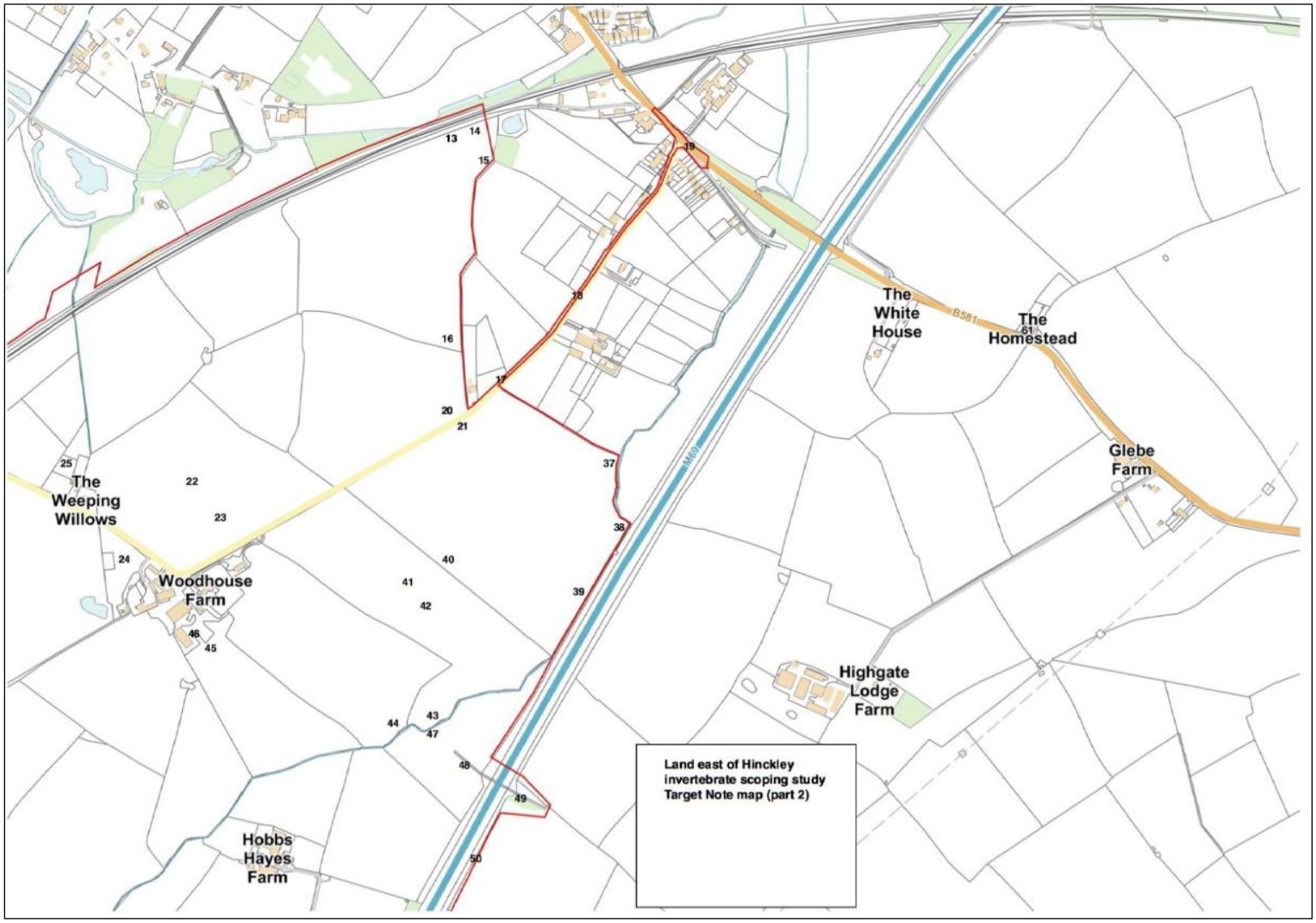

Figure A7.3: Target Note Map Part 3.

Figure A7.4: Invertebrate Scoping Study 2018 – Photographs.

Photograph 1 – Mature/veteran Pedunculate Oak standard.

Photograph 2 – Scrub edge habitat (TN37).

Photograph 3– Scrub north-west railway embankment (TN27).

Photograph 4 – scrub edge habitat east of M69 corridor (TN55).

Photograph 5 – Hawthorn north of Burbage Common Road (TN5).

Photograph 6 – Woodland margin (TN32).

Photograph 7 – Herb-rich grassland and scrub (TN61)

Photograph 8 – TN6 – Herb-rich grassland and scrub (TN61)

Photograph 9 – Partially shaded pond (TN11)

Photograph 10 – Macrophyte-rich pond (TN 11)

Photograph 11 – Vegetated pond (TN64)

Photograph 12 – Swamp habitat (TN13)

Table A7.3: Invertebrate Scoping Study 2018 – Species Incidentally Recorded During Field Survey

Common Name	Scientific Name	Family	Order	UK status
A soldier beetle	*Cantharis nigricans*	Cantharidae	Coleoptera	Widespread
A soldier beetle	*Cantharis rustica*	Cantharidae	Coleoptera	Widespread
A soldier beetle	*Rhagonycha limbata*	Cantharidae	Coleoptera	Widespread
Common grammoptera	*Grammoptera ruficornis*	Cerambycidae	Coleoptera	Widespread
Harlequin ladybird	*Hamonia axyridis*	Coccinellidae	Coleoptera	Widespread
A malachite beetle	*Malachius bipustulatus*	Melyridae	Coleoptera	Widespread
Lurid flower beetle	*Oedemera lurida*	Oedemeridae	Coleoptera	Widespread
Thick-kneed flower beetle	*Oedemera nobilis*	Oedemeridae	Coleoptera	Widespread
Red-headed cardinal beetle	*Pyrochroa serraticornis*	Pyrochroidae	Coleoptera	Widespread
A robberfly	*Asilus sp.*	Asilidae	Diptera	Unknown
Downlooker snipefly	*Rhagium scolopaceus*	Rhagionidae	Diptera	Widespread
A hoverfly	*Helophilus pendulus*	Syrphidae	Diptera	Widespread
A hoverfly	*Leucozona lucorum*	Syrphidae	Diptera	Widespread

Common Name	Scientific Name	Family	Order	UK status
Heineken hoverfly	*Rhingia campestre*	Syrphidae	Diptera	Widespread
A hoverfly	*Volucella bombylans*	Syrphidae	Diptera	Widespread
Red-and-black froghopper	*Cercopis vulnerata*	Cercopidae	Hemiptera	Widespread
A mirid bug	*Dryophilocoris flavoquadrimaculatus*	Miridae	Hemiptera	Widespread
Orange-tailed mining bee	*Andrena haemorrhoa*	Andrenidae	Hymenoptera	Widespread
Chocolate mining bee	*Andrena scotica*	Andrenidae	Hymenoptera	Widespread
Honey bee	*Apis mellifera*	Apidae	Hymenoptera	Widespread
Large red-tailed bumblebee	*Bombus lapidarius*	Apidae	Hymenoptera	Widespread
Common carder bee	*Bombus pascuorum*	Apidae	Hymenoptera	Widespread
Early bumblebee	*Bombus pratorum*	Apidae	Hymenoptera	Widespread
Buff-tailed bumblebee	*Bombus terrestris*	Apidae	Hymenoptera	Widespread
Vestal cuckoo bee	*Bombus vestalis*	Apidae	Hymenoptera	Widespread
Gooden's nomad bee	*Nomada goodeniana*	Apidae	Hymenoptera	Widespread

Common Name	Scientific Name	Family	Order	UK status
Small blue	*Polyommatus icarus*	Lycaenidae	Lepidoptera	Widespread
Silver y	*Autographa gamma*	Noctuidae	Lepidoptera	Widespread/ migrant
Small tortoiseshell	*Aglais urticae*	Nymphalidae	Lepidoptera	Widespread
Peacock butterfly	*Inachis io*	Nymphalidae	Lepidoptera	Widespread
Speckled wood	*Pararge aegeria*	Nymphalidae	Lepidoptera	Widespread
Orange tip	*Anthocharis cadamines*	Pieridae	Lepidoptera	Widespread
Brimstone	*Gonepteryx rhamni*	Pieridae	Lepidoptera	Widespread
Large white	*Pieris brassicae*	Pieridae	Lepidoptera	Widespread
Green-veined white	*Pieris napi*	Pieridae	Lepidoptera	Widespread
Small white	*Pieris rapae*	Pieridae	Lepidoptera	Widespread
Azure damselfly	*Coenagrion puella*	Coenagridae	Odonata	Widespread
Common blue-tailed damselfly	*Ischnura elegans*	Coenagridae	Odonata	Widespread

EVALUATION

A7.39 Much of the open habitat within the main survey area was agriculturally improved, comprising a network of arable and improved pasture, with relatively low potential to support invertebrate assemblages of higher conservation value.

A7.40 A number of the hedgerows were evidently maintained by cutting/flaying and often, the corresponding field margins lacked the structural and compositional variation characteristic of higher potential for scrub edge invertebrate assemblages.

Hedgerow, Scrub and Woodland Edge

A7.41 However, throughout the Site as a whole, there was also a considerable resource of more structurally diverse hedgerow, scrub and woodland habitat. Such habitat was of much higher potential value for invertebrates in instances where there was a succession from relatively herb-rich field margin grassland and ruderal vegetation, grading through Bramble scrub to uncut hedgerow featuring mature and, in some cases, veteran pedunculate oak and ash standards.

A7.42 The potential value of this hedge, scrub and woodland edge habitat was enhanced in a landscape context due to the survey area being contiguous with ancient woodland and grassland/scrub mosaic habitat characteristic of the Burbage Wood and Aston Firs SSSI and Burbage Common and Woods LNR around towards the southwest of the survey area.

A7.43 In terms of value, the combined hedgerow, scrub and woodland edge resource together with its associated herb-rich grassland edge habitat has potential to support grassland and scrub mosaic, scrub edge, arboreal and wood decay assemblages of conservation value.

A7.44 One species listed within the LRERC data-search recorded within close proximity of the Site was the 'Endangered' white-letter hairstreak, listed under Section 41 of the NERC Act (2006) as a 'Species of principal importance' in England. This butterfly is associated with elms including English elm and wych elm, both of which were recorded within the hedgerow and scrub resource of the Site. English elm was a regularly recorded and abundant hedgerow species on Site and there was potentially suitable habitat for White-letter Hairstreak particularly where this species occurred in uncut hedgerow situations, particularly in combination with bramble and standard trees such as ash and/or field maple.

Grassland

A7.45 Of the other main habitats recorded during the survey, the grassland of highest potential value for invertebrates was, for the most part, confined to field margins and linear habitat corridors. The most extensive, continuous tract of more herb-rich grassland was confined to the M69 Motorway verges, particularly along the eastern verge, where it occurred in mosaic with scrub.

A7.46 Open field grassland such as that described in TN61, was of some potential value to invertebrates, not least due to an apparent history of extensive management, but also due to supporting a somewhat more diverse and herb-rich resource than the more improved sward which characterised the Site as a whole. However, arguably the invertebrate potential of this habitat was greatly increased by the juxtaposition of this habitat with sinuous field edge habitat with uncut bramble and scrub. This is also the case in areas such as the shallow scallops with less improved grassland at the margins of the Burbage Common and Woods LNR immediately to the west of the railway. The grassland here

supported a relatively flower-rich sward, but the value was greatly enhanced by its gradation to scrub edge habitat.

Wetland

A7.47 Of the wetland habitats recorded during the survey, resources of higher potential for supporting specialist invertebrate assemblages included the wet grassland and swamp habitat around TNs 13 and 14 and the ponds located at TNs TNs 11, 42, 64 and 66. The presence of a network of ponds and ditches within the Site and immediate wider landscape increases the value of individual waterbodies. Furthermore, the composition of the majority of ponds surveyed suggested some potential to support aquatic and wetland associated invertebrate assemblages of conservation value.

CONCLUSIONS

A7.48 Following completion of the scoping project, the following features were identified as being of potential value for invertebrates on a Site level:

- Uncut hedgerow, scrub and woodland edge habitat, including hedgerow with mature and veteran pedunculate oak and ash standards with potential to support scrub edge, arboreal and wood-decay invertebrate assemblages and species (TNs: 19, 31, 32, 33, 37, 40, 47, 61 and 68 in particular);

- Uncut hedgerow, scrub and woodland edge habitat, including habitat suitable for supporting white-letter hairstreak. Including English elm and/or wych elm and associated habitat including mature ash and field maple standards (TNs 12, 26, 29, 33, 37, 38, 51 and 57);

- Herb-rich grassland in association with scrub edge habitat with potential to support scrub edge and grassland/scrub mosaic invertebrate assemblages; TNs 1, 3, 7, 37, 38, 48, 50, 61 (and along M69 verges described in TN50 as appropriate); and

- Wetland habitat including ponds (TNs 11, 42, 62, 64 and 66) and swamp/wet grassland, supporting structurally and botanically diverse habitat with potential to support significant aquatic and wetland associated invertebrate assemblages/species (TNs 13 and 14).

White-letter Hairstreak Surveys

Methodology

A7.49 Following the invertebrate habitat scoping study described above, it was deemed appropriate to undertake a targeted survey to establish the presence or likely absence of white-letter hairstreak butterfly within the Site.

A7.50 White-letter hairstreak butterflies lay their eggs on elm trees and as such the survey covered all of the elm present within the hedgerow network. The surveyor walked to

southern or eastern side of each hedgerow, pulling down the more robust growth at the top of the hedgerow and inspecting the branch for eggs.

A7.51 The white-letter eggs are typically located on:

- The underside of the girdle scar, where the most recent growth meets the older wood (often on older side-shoots rather than the leading stem);
- At the base of side shoots;
- On old leaf scars; and/or
- At the base of buds.

A7.52 An egg search was first completed across the Site on 01 March 2018 and this was updated on 25 February 2021. During the survey all accessible elm was searched by hand to search for eggs laid on the branches.

A7.53 With reference to the Hedgerow Survey plan (Figure 12.4, document reference 6.3.12.4), the following hedgerows containing elm were searched: H1, H2, H8, H13, H20, H25, H30, H31, H32, H35, H38, H45, H46, H47, H48, H50, H51, H54, H55, H57, H58, H59, H62, H64, H65, H67, H69, H71, H72, H74, H75, H76, H77, H80, H82, H83, H90, and H91.

Limitations

A7.54 Land to the north-west of the railway line was not included in the surveys owing to changes to the redline boundary and/or access permission.

A7.55 Not all egg-laying habitat is accessible using the survey methods employed, such that the absence of recorded eggs is not definitive evidence of the absence of these species.

Results

A7.56 No white-letter hairstreak eggs were recorded during the surveys in 2019 or in 2021. The presence of a small population of this species within the Study Area cannot be entirely ruled out, however.

Annex 8 ◆ Aquatic Invertebrate Survey

Hinckley National Rail Interchange

Aquatic Macroinvertebrate Survey Report 2022

Carried out for:

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Issue/revision	1
Remarks	
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Date	03/08/2022
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Table of Contents

1 Summary

Abrehart Ecology Ltd was commissioned by EDP, to undertake an aquatic macroinvertebrate survey of six ponds across Woodhouse Farm, Elmesthorpe for the Hinckley National Rail Interchange.

The study aimed to produce a baseline data set and status of macroinvertebrates at six ponds of the site. Additionally, the survey was used to evaluate the conservation value of each site and the overall condition of the site.

Samples were taken from three ponds that held water in July 2022.

Summary of overall biodiversity value:

1. Of the six waterbodies visited, only three held water and were suitable for survey/assessment. Two of these ponds appeared to be rapidly evaporating; however, the third pond was full and showed no signs of desiccation – possibly due to the steep sided banks and deeper profile.

2. In total, 34 taxa of aquatic invertebrate were recorded, of which 26 were identified to species, from a total of 6501 specimens. The often-large numbers of taxon that were not to be identified to species, Chironomidae larvae, were not specifically counted. Seven species of aquatic beetle were recorded, thirteen species of Hemiptera, two species of Odonata larvae, one Ephemeroptera, and two aquatic molluscs. One vertebrate species was recorded within samples, the smooth newt (*Lissotriton vulgaris*).

   Table I -Summary of rare species diversity and abundance

Status	Notable r	Notable b	Local
Number of species	1	3	4

3. Only one invasive species was found across the survey areas, the common freshwater shrimp *Crangonyx pseudogracilis*.

2 Methods

2.1 Sample point locations

Sampling points were chosen once on site to allow the most diverse habitats to be sampled rather than be restricted to previous sample locations. Data and sample collection were undertaken by two surveyors, including an experienced on-site surveyor (Toby Abrehart FLS MCIEEM) and a second team member responsible for recording abiotics, health and safety, and assisting with sample collection (Daniel Anderson BSc (Hons)). All of the sampling was undertaken during summer 2022 (July). The study area encompassed the waterbodies within the proposed National Rail Interchange area (Figure 1). The sample sites were identified by Toby Abrehart as suitable to survey and verified in the field.

Table 2 – Locations of the survey sites

Sample site	NGR - Location
2	SP46309536
3	SP45809449
5	SP46089466
6	SP46289476
23	SP46119489
62	SP46619491

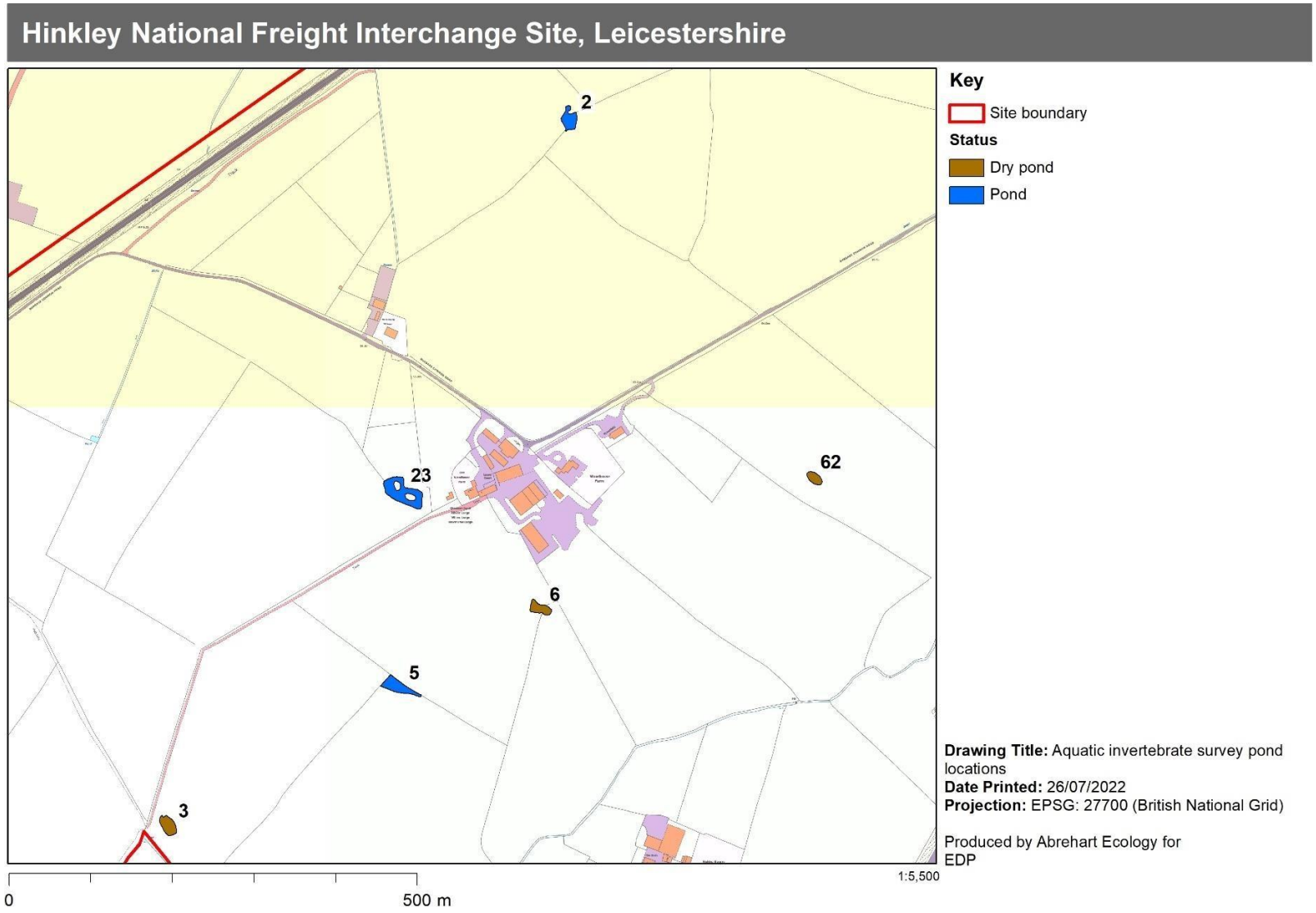

Figure 1. Sample point locations.

2.2 Aquatic invertebrate sampling

Samples were collected using ten-second sweeps with a net with 0.5mm mesh. Sweeps were repeated three times in different sections of the waterbody profile, that is, floating vegetation (where present), the benthic layer, and the submerged edge of the nearside bank. Once collected each sample was placed into a 5-litre bucket and preserved in 10% Formaldehyde for storage prior to identification. Once identified the picked-out specimens will be stored in 99% Iso-propyl alcohol.

For identification, all invertebrates were separated from the retained sediment, detritus, and vegetation under 40 - 80x stereo binocular microscopes. All specimens were then separated into major taxonomic groups, preserved in fresh 99.9% ethanol, and referred to an appropriate taxonomist for identification. Where possible, all specimens were identified to species level. Exceptions to this are groups that require specialist, time-consuming preparatory techniques such as head capsule dissection for chironomid larvae and prolonged clearing procedures for oligochaetes species. Any terrestrial beetles found within the samples were separated and sent away for identification by Dr Ross Piper. Caddisfly and mayfly larvae were similarly separated and identified by Sharon Flint.

2.3 Water chemistry sampling

At each sample location, waterbody characteristics and a range of other environmental features were recorded. These included exposed and submerged bank profiles, channel width and depth, and levels of grazing, poaching, and shelving. Abiotic parameters were recorded in the surface 10cm of water including pH, conductivity, total dissolved solids, temperature (all measured using a Hanna HI83303 Aquaculture Photometer). Each sample point was recorded on an Archer2 sub-metre DGPS unit.

Water samples were taken using a five-litre bucket within the surface 15cm of water. These were generally taken from banksides, as these areas were most accessible during survey visits and prevented excessive disturbance which would have been caused through entering the waterbodies.

2.4 Biocontrol

As sampling comprised moving from one system to another, the check, clean, and dry methods were employed as standard. However, protocol also included changing of nets and trays from one site to another. Prior to entering a new waterbody, the net, and trays from one site were washed in a solution of Virkon and left to dry. A clean and dry set was then used in the new waterbody. This prevented species or pathogens being transmitted from one area to another. On return to the laboratory the nets were washed again in Virkon solution and left to dry for at least one day before being taken into the field.

On site, in addition to the nets, only waterproof boots enter the waterbody, and these too are washed in Virkon at the end of sampling effort within a marsh system.

2.5 Laboratory methods

Samples were treated as recommended by the Environment Agency (Murray-Bligh, 1999). Each sample was sorted a little at a time in a white tray. Most samples required at least 10 trays' worth of detritus to be sorted. All beetles, bugs and fly larvae were removed as well as representative specimens of other macroinvertebrate groups (for example, gammarids, mayflies). The abundance of groups not removed from the tray was estimated on a three-point scale. Most molluscs sank during the washing procedure and were recovered at the end. Usually there were vast numbers of snails, so a subsample was taken of between one twelfth and a half (but usually a third to a quarter) of the mollusc sample collected. The subsample was dried and the whole subsample identified under a microscope at low magnification. Many Succineids were kept in spirit rather than dried since they needed to be dissected for accurate identification. Dissected vouchers were sent to an independent authority (Sharon Flint) for verification.

All adult water beetles and molluscs were identified to species. Water beetles in the samples comprised the families Gyrinidae (whirligigs), Haliplidae, Hygrobiidae (screech beetles), Noteridae, Dytiscidae (diving beetles), Hydraenidae, Helophoridae, Hydrochidae, Hydrophilidae (crawling water beetles), Scirtidae, Elmidae (riffle beetles), and Dryopidae. Several groups within other families were also identified - Donacinae (reed beetles) in Chrysomelidae, Stenus within Staphylinidae (rove beetles), and Coccinellidae (ladybirds).

Abundances were estimated or converted from actual counts to an approximately geometric scale:

- A - 1-9, B - 10-99, C - 100-999 and D - >1000.

2.6 SAFIS analysis

Data collected during the surveys were processed using SAFIS analysis (Site Analysis for Freshwater Invertebrate Surveys v.30.0, (Adrian Chalkley)). The SAFIS routine uses an inbuilt species dictionary to automate the calculation of metrics relating to conservation values and water quality, outlined below. The SAFIS analysis allowed an assessment of conservation value and water quality and highlighted any species of conservation interest present. For each of the four sample sites, six standard measurements or metrics have been calculated allowing an assessment of the condition of the watercourse as revealed by the invertebrate community it supports. These metrics are:

- The Biological Monitoring Working Party Score (BMWP) (Hawkes, H.A (1998))
- The Average Score Per Taxon (ASPT) (Hawkes, H.A (1998))
- The Community Conservation Index (CCI) (Chad, R. (2004)

For a full explanation of these methods the original research papers should be consulted. However, to interpret the results shown within the current analysis, the following may be a useful summary:

BMWP is a measure of the water quality (oxygenation and cleanliness). BMWP scores are industry standard and reflect the sensitivity of the aquatic invertebrate families to pollution. The higher the family score, the more sensitive to oxygen depletion the family is and therefore their presence indicates a cleaner or less impacted site. The effects of pollution generally are to impose a Biological Oxygen Demand upon the receiving waters and so sensitive families are progressively excluded as the BOD increases. The revised BMWP system (2007) was used for this survey and the following classification may be used as a guide:

BMWP score	
< 25	poor water conditions
26-50	moderate
51-100	good
101-150	very good
more than 150	exceptional

ASPT is based on the BMWP score and so is also a measure of water quality. The BMWP score for each family present is totalled to give a site score. A high score can be achieved through a large number of low scoring families as well as a small number of high scoring families. Therefore, an Average Score Per Taxa (ASPT) is also calculated which allows further interpretation of the results. The higher the ASPT, the greater the proportion of more sensitive families in the sample and therefore the better the site condition. It is a useful criterion for showing year to year changes and trends in the invertebrate population supported by the water body. Being an average score, the higher its value, the more ecologically valuable the population should be. Any value greater than four generally indicates good water quality but productive water bodies with large and varied populations will usually have an ASPT value between 4.5 and 5.0.

ASPT value	
<4	poor water quality
>4	moderate quality
>5	good quality
>6	very good.

CCI is based on the rarity of the individual invertebrates living in the water. It gives a numerical value to the conservation importance of the aquatic community. The higher the CCI value the greater the conservation interest.

CCI values can range from less than five for a site with little or no conservation value to a score greater than 20 for sites with very high conservation interest. This group of highest CCI values often indicate a site that is of national importance and of potential SSSI status.

CCI	Conservation value	
0 to 5	Low	Site supporting only common species and/or low taxon richness
5 – 10	Moderate	At least one species of restricted distribution and/or moderate taxon richness.
10 to 15	Fairly high	At least one uncommon species, or several of restricted distribution, and/or high taxon richness.
15 – 20	High	Several uncommon species, at least one may be nationally rare, and/or high taxon richness
>20	Very high	Several rarities, including species of national importance or at least one RDB /Threatened species, and/or very high taxon richness.

2.7 Legal compliance the conservation of habitats and species regulations 2017

The Conservation of Habitats and Species Regulations 2017 (HMSO, 2017a) transpose Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (EC Habitats Directive) (EU Habitats Directive European Commission, 1992) into UK law. These regulations remain in force following the United Kingdom's exit from the European Union (EU) (HMSO, 2019a).

2.8 Natural environment and rural communities act 2006

The Natural Environment and Rural Communities (NERC) Act 2006 (HMSO, 2006) reinforces the duty upon all public authorities, including planning authorities, to have regard for the conservation of biodiversity when discharging their duties. The Act refines the definition of biodiversity conservation, stating that it includes restoring or enhancing a population or habitat.

Section 41 of the NERC Act requires the Secretary of State to list habitats and species of principal importance (HPIs and SPIs) for the conservation of biodiversity in England.

2.9 The water environment (water framework directive) (England and Wales) regulations 2017

The Water Framework Directive (WFD) Regulations 2017 (HMSO, 2017b) establish a framework for the protection of inland surface waters (rivers and lakes), transitional waters (estuaries), coastal waters and groundwater and for water all waterbodies (unless artificial or heavily modified) to achieve "good" ecological status. This is a retained EU law following United Kingdom's exit from the EU, as managed by The Floods and Water (Amendment etc.) (EU Exit) Regulations 2019 (HMSO, 2019b).

Ecological Status is expressed in terms of five classes (High, Good, Moderate, Poor, or Bad). These classes are established based on specific criteria and boundaries defined against biological, physico-chemical and hydromorphological elements. Biological assessment uses numeric measures of communities of plants and animals (for example, fish, aquatic macroinvertebrates and macrophytes). Physico-chemical assessment looks at elements such as temperature and the level of nutrients, which support the biology. Hydromorphological quality looks at water flow, sediment composition and movement, continuity (in rivers) and the structure of physical habitat.

The overall Ecological Status of a water body is determined by whichever of these assessments is the poorer. For example, a water body might pass 'Good Status' for chemical and physico-chemical assessments but be classed as 'Moderate Status' for the biological assessment: In this case it would be classed overall as 'Moderate Ecological Status'. To achieve the overall aim of good surface water status, the Directive requires that surface waters be of at least Good Ecological Status and Good Chemical Status. To achieve High Status, the Directive requires that the hydromorphological Quality Elements are also in place.

When considering the effect of a development or activity on a waterbody it is a regulatory requirement under the WFD to assess if it will cause or contribute to a deterioration in status or jeopardise the waterbody achieving good status in the future.

Where a scheme is considered to cause deterioration, or where it may contribute to the failure of the water body to meet Good Ecological Status or Good Ecological Potential, then an Article 4.7 assessment would be required which makes provision for deterioration of status provided that certain stringent conditions are met.

2.10 Limitations

Species within the orders Hirundinea (leeches) and Tricladida (flatworms) can be affected by preservation in ethanol (damage to eyes and genital pores – often key features of identification). During the survey these species were found and identified in the field and released. The remainder of the specimens were preserved as normal in isopropanol alcohol as above.

Some of the surveys were carried out in non-optimal conditions due to access issues, meaning that the surveys were carried out on predetermined days rather than optimal ones. This may have reduced the diversity recorded as some sampling was carried out on dull days.

Some of the habitats were ephemeral and in the first surveys in May 2022, the water of several of the ponds was receding rapidly.

The current survey draws its conclusions from extrapolating findings from a representative selection of the waterbodies within the area; sampling alternative waterbodies or sections of waterbody would inevitably yield subtly different findings.

3 Results

The waterbodies and wetland habitats were located mainly within the Hinckley National Rail Interchange site.

Table 3 – basic water chemistry results.

Sample site	NGR - Location	% Shade	% Submerged macrophytes	% Emergent cover	% Cover of substrate	pH	µS	Ppm	Temp C
2	SP46309536	40	10	20	Soft muds	8.8	0.43	456	21.6
3	SP45809449	10	0	50	Soft muds	0	0	0	0
5	SP46089466	10	0	20	Soft muds	8.9	0.37	555	26
6	SP46289476	15	0	50	Soft muds	0	0	0	0
23	SP46119489	20	50	70	Mud and stone	8.9	0.48	337	19.7
62	SP46619491	0	0	80	Soft muds	0	0	0	0

3.1 Hinckley Ponds

The sampling sites were ponds scattered across a mix of arable and pasture farmland. The ponds were scattered across the site, and all variously had trees along at least one side with open areas on other sides.

3.1.1 Ponds 3, 6 and 62.

These three ponds were dry at the time of the survey with no areas suitable to collect samples.

Pond 3 was a small pond with dominant *Typha latifolia*, *Equisetum arvensis*, and *Chenopodium album*.

Pond 6 was a dry field pond with dense stands of *Sparganium erectum* and *Chenopodium album*.

3.1.2 Pond 2.

This large pond had several *Fraxinus excelsior* and *Salix fragilis* trees on all sides with a noticeable gap on the southern shoreline of the pond. This pond was rapidly evaporating with only a residual water in the centre. The pond had no emergents in the water but there were stands of *Epilobium hirsutum* in several areas around the edge of the dry section of the pond. Within the water there were aquatic macrophytes, with *Ranunculus aquatilis* and a small amount of algae recorded. On the drying muds was a single plant of *Alopecurus aequalis*. The open water covered an area of approximately 11m x 7m with a depth of approximately 60cm.

A total of 2358 specimens were identified of 17 taxa (10 identified to species). The majority of specimens within the sample were Chiromidae sp. larvae (over 1000 animals), Ostracod sp. (over 1000 animals), and Chaoboridae sp. larvae (135). Other species within the sample were mostly beetles and bugs of the order Hemiptera, including the 'Notable' species *Hesperocorixa moesta*. Only one mollusc was recorded within the sample, one of only two molluscs recorded across the total survey area, and one mayfly species, the common and widespread pond olive (*Cloeon dipterum*).

3.1.3 Pond 5.

This small pond, with an oak in the north-east, was also rapidly evaporating and was reduced to an area of water approximately 10cm deep, at the deepest point, with a total surface area of 2m wide and 7m long. The dominant emergent flora was a single stand of *Typha latifolia* with some *Solanum dulcramara* in the centre and *Persicaria maculata*. There were no submerged or floating macrophytes present in the remaining water body.

Although this had the fewest total specimens of the three samples (1571), it had the greatest taxa diversity and number of species of interest – seen in the table below. These are four beetle (Coleoptera) species and two true bug (Hemiptera) species, which were all recorded in low numbers. It was only sample to contain a final instar dragonfly species, the common darter *Sympetrum striolatum* and there were no molluscs found. Despite the increase diversity the sample was again dominated by large numbers of Chironomid sp. larvae (over 1000) and Ostracod sp. (500).

Species	**Status**
Aphelocheirus aestivalis	Notable r
Hydroglyphus geminus	Notable b
Hygrotus impressopunctatus	Local
Noterus clavicornis	Local
Rhantus grapii	Notable b
Sigara limitata	Local

3.1.4 Pond 23.

This large farm pond in the centre of the site was full of water with little signs of drying out. The emergents were limited to *Typha latifolia* and *Elodea nutalii* within the water. There was a steep drop off into the pond and the water depth was not fully obtained but within 1m of the edge of the pond there was over 50cm of water present. The pond was approximately 52m x 22m.

In contrast to Pond 5, Pond 23 contained the largest specimen count (2572) but supported the lowest taxa diversity – only 11 taxa recorded, with 6 identified to species. Chironomidae sp. larvae were again prevalent; however, the most abundant species within the sample was *Gyraulus laevis* (1245), which is a 'Local' species. The 'Notable' *Aphelocheirus aestivalis* was recorded in greater numbers (19 animals) and it was the only sample to support *Cymatia coleoptrata* and an early instar *Aeshna sp.* This was the only sample to contain a non-native species, the amphipod *Crangonyx pseudogracilis*.

4 Discussion

4.1 Nature conservation evaluation

In total, 34 taxa of aquatic invertebrate were recorded, of which 26 were identified to species, from a total of 6501 specimens. The often-large numbers of taxon that were not to be identified to species, Chironomidae larvae, were not specifically counted. Seven species of aquatic beetle were recorded, thirteen species of Hemiptera, two species of Odonata larvae, one Ephemeroptera, and two aquatic molluscs. One vertebrate (amphibian) species was recorded within samples, the smooth newt (*Lissotriton vulgaris*).

Overview

A single Notable r species, *Aphelocheirus aestivalis*, was identified in Ponds 5 and 23. A species whose records are predominantly from central and southern England and Wales, this can be found on a wide range of substrates from sand and silt to stony or gravelly. Often there is vegetation present, either overhanging marginals or moss-covered rocks.

Two Notable b beetle species and one true hug (Hemiptera) were found in the samples; these were *Hydroglyphus geminus*, *Rhantus grapii*, and *Hesperocorixa moesta*. These were only recorded in low numbers. The presence of the beetles in Pond 5 coincided with the highest conservation value recorded (Very High).

Four species found were considered of local status. One was the mollusc *Gyraulus laevis*, which was found in the very high numbers (1245) in Pond 23 and was the only mollusc recorded within the sample. A further two beetles and the hemipteran *Sigara limitata* were also identified, all from the sample taken from Pond 5.

Only one species of mayfly was found within the samples, this was the pond olive *Cloeon dipterum*, a common and widespread species. They can be found in a wide range of habitats, from river margins to eutrophic ponds.

There were no caddisflies (Trichoptera) in the sample, either cased or caseless species.

SAFIS Analysis

The analysis showed that Pond 5 had the greatest conservation value of the sample waterbodies and was found to be of 'Very High' value (CCI score of 21.47). This was due to the presence of three species of interest (classified as 'Notable' or above) and a further three 'Local' species. Despite this, SAFIS analysis recorded the pond as having moderate water quality.

All three sites supported at least one species of interest; therefore, although they were not classified as highly as Pond 5, Ponds 2 and 23 were classified as 'High' and 'Fairly High' conservation value respectively. As with Pond 5, they both also had moderate water quality despite the disparity in species richness, specimen count, and Revised BMWP scores. Values for LIFE and PSI were not included within the analysis as these factors are used for flowing water only and so were not relevant to this study.

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Appendix A– Full SAFIS Results

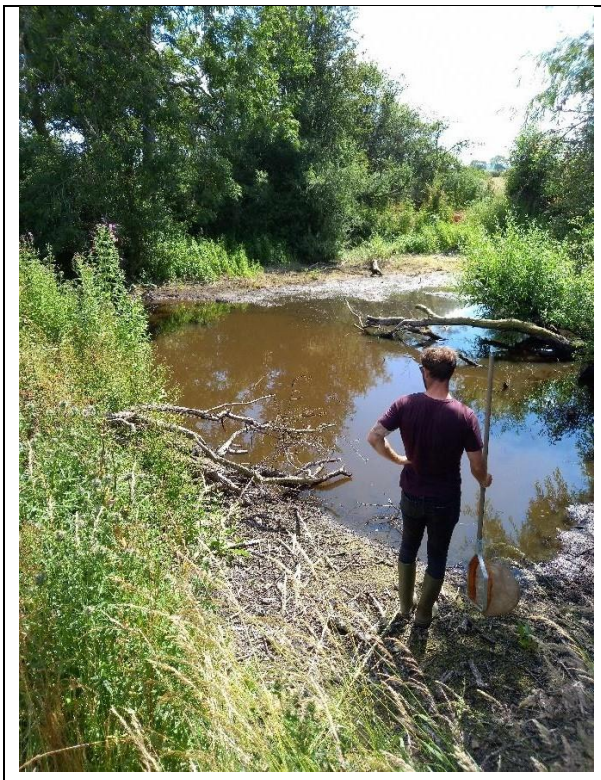
Sample ID	Grid Reference	Taxa	Species Contributing to SAFIS	Specimen Count	Revised BMWP	ASPT	Families Contributing to BMWP	Water Quality	LQI	LIFE	PSI	CCI	Conservation Value	Species of Interest
2	SP46309536	17	14	2358	26.9	3.84	7	Moderate	D	N/A	N/A	16.10	High	1
5	SP46089466	20	18	1571	44.9	4.49	10	Moderate	C	N/A	N/A	21.47	Very High	3
23	SP46119489	11	10	2572	31.9	4.56	7	Moderate	B	N/A	N/A	14.17	Fairly High	1

Appendix B– Sample data

Taxonomic group	Species/Taxa	2	5	23
Hirudinea (Phylum Annelida)	*Glossiphonia complanata*		*1*	
	Helobdella stagnalis		*3*	
Gastropoda (Phylum Mollusca)	*Gyraulus crista*	*65*		
	Gyraulus laevis			*1245*
Ostracoda (Phylum Arthropoda)	*Ostracoda sp.*	*1000+*	*500+*	
Amphipoda (Phylum Arthropoda)	*Asellus aquaticus*		*6*	*21*
	Crangonyx pseudogracilis			*257*
Coleoptera (Phylum Arthropoda)	*Agabus nebulosa*		*2*	
	Coleoptera sp. larvae	*17*		
	Haliplus ruficollis	*2*		
	Helophorus brevipalpis	*6*	*2*	
	Hydroglyphys geminus		*1*	
	Hygrotus impressopunctatus		*2*	
	Rhantus grapii		*1*	
Diptera (Phylum Arthropoda)	*Chaoboridae sp.*	*135*		*19*
	Chironomidae sp.	*1000+*	*1000+*	*1000+*
Ephemeroptera (Phylum Arthropoda)	*Cloeon dipterum*	*75*	*20*	
Oligachaeta (Phylum Annelida)	*Oligochaeta sp.*	*45*	*8*	
Hemiptera (Phylum Arthropoda)	*Aphelocheirus aestivalis*		*3*	*19*
	Callicorixa praeusta	*3*	*2*	
	Corixa punctata		*1*	
	Corixidae sp. nymphs	*16*	*10*	*3*
	Cymatia coleoptrata			*2*
	Hesperocorixa linnaei	*6*		
	Hesperocorixa moesta	*1*		
	Notonecta glauca	*1*		

Hemiptera (Phylum Arthropoda)	*Notonecta sp. nymphs*	*12*	*5*	*4*
	Sigara dorsalis	*1*		
	Sigara falleni			*1*
	Sigara limitata		*2*	
	Sigara nigrolineata	*1*		
Odonata (Phylum Arthropoda)	*Aeshna sp.*			*1*
	Sympetrum striolatum		*1*	
Salamandridae (Phylum Chordata)	*Lissotriton vulgaris*	*1*	*1*	

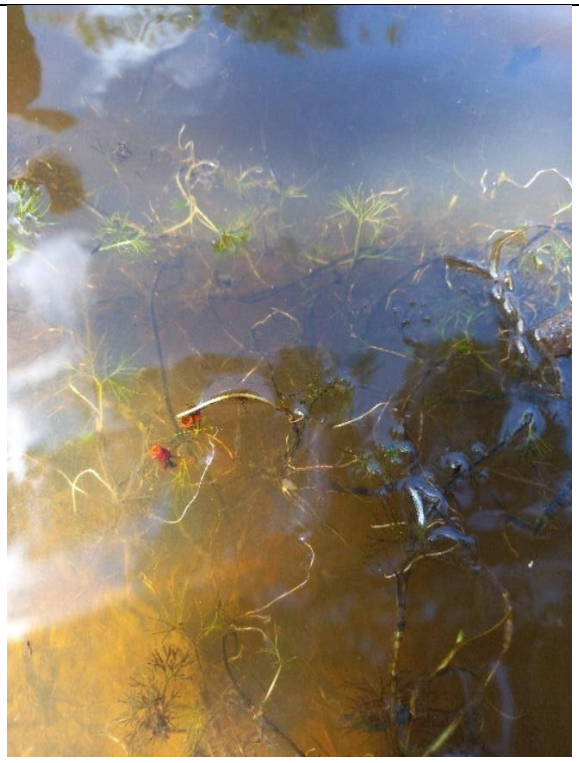
Appendix C– Site photos



Pond 2

Pond 2

Pond 2 - Orange Foxtail – Alopecurus aequalis



Pond 2 - Ranunculus aquatilis

Pond 3

Pond 5

Pond 6

Pond 23

Pond 23 – western end

Pond 62