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APPENDIX ES13.1
ECOLOGICAL IMPACT ASSESSMENT

**ECOLOGICAL IMPACT
ASSESSMENT:**

**EAST NORTHANTS RESOURCE
MANAGEMENT FACILITY PROPOSED
WESTERN EXTENSION,
NORTHAMPTONSHIRE**

**Final
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EXECUTIVE SUMMARY

1 INTRODUCTION.

- 1.1 This report provides the baseline ecological conditions of the East Northants Resource Management Facility (ENRMF) including both the existing ENRMF and the proposed Western Extension (hereafter referred to as the Site), identifies potentially significant ecological effects of the proposed development, describes the methods available to avoid or mitigate such effects, in compliance with legislation and planning policy, sets out enhancement measures that the scheme can provide, advises on monitoring, to ensure that the recommended measures are effective and assesses the significance of any residual effects.
- 1.2 The proposed western extension is here described as the area to the west of the existing ENRMF within the line of the boundary ditches marking the adjacent woodlands or hedgerows, whether still open or now infilled, except for the southern boundary, currently unmarked on the ground and the south-west boundary, which is given by the western edge of the farm track. The extent of the western extension and existing ENRMF is shown on Figure 1.
- 1.3 The report has three appendices. Appendix 1 Baseline Report (comprising Sections 1-1 to 1-12) provides detailed information on the methods used for each study or survey, together with the results obtained, mainly as Tables. It also identifies species or groups that are considered important ecological features for the Site. Appendix 2 provides methods and results of the Arboricultural Impact Assessment and Appendix 3 sets out how the Biodiversity Net Gain obtained has been calculated.

2 IDENTIFYING THE IMPORTANT ECOLOGICAL FEATURES

Wildlife legislation, planning policy and guidance.

- 2.1 The assessment has considered all statutorily protected sites and species, that is, those covered by UK Acts and Regulations.

2.2 The assessment has also consulted the following documents as they concern the protection of biodiversity or nature conservation:

- The National Policy Statement for Hazardous Waste¹ (NPS).
- The National Planning Policy Framework, 2019² (NPPF).
- The North Northamptonshire Joint Core Strategy 2011-2031³ (NNJCS), supported by the East Northamptonshire Local Plan Part 2⁴, submitted March 2021.
- The Northamptonshire County Council (NCC) Supplementary Planning Document (SPD) on biodiversity⁵.
- The Northamptonshire Minerals and Waste Local Plan⁶ (NMWP).

2.3 Other relevant guidance has been provided by:

- The Northamptonshire Biodiversity Action Plan⁷ (NBAP).
- The Northamptonshire Wildlife Sites Criteria⁸.

2.4 Guidance on carrying out the Ecological Impact Assessment is taken from the Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact in the UK and Ireland, Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2018)⁹. The British Standard 42020:2013 'Biodiversity - Code of practice for planning and development'¹⁰ has also been consulted in producing this document.

¹ <https://www.gov.uk/government/publications/hazardous-waste-national-policy-statement>

² The National Planning Policy Framework, 2019.

³ The North Northamptonshire Joint Core Strategy, 2011-2031.

⁴ The East Northamptonshire Local Plan Part 2.

⁵ The Northamptonshire County Council Supplementary Planning Document on Biodiversity.

⁶ The Northamptonshire Minerals and Waste Local Plan.

⁷ The Northamptonshire Biodiversity Action Plan.

⁸ The Northamptonshire Biodiversity Partnership, Local Wildlife Sites Panel, 2014 (last updated) Wildlife Sites Selection Criteria, Northamptonshire.

⁹ CIEEM, 2018. Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management, Winchester.

¹⁰ British Standard 42020:2013 "Biodiversity - Code of practice for planning and development.

Determining the Scope of the Assessment.

- 2.5 The minimum study area for ecological assessment is the Site but this is expanded for statutory and non-statutory sites (normally to 2-5 km radius from the Site and similarly for species such as great crested newts, bats and birds, whose feeding/foraging ranges may extend well beyond the Site boundaries. This 'zone of influence' is discussed in the appendices.
- 2.6 Existing information on locally important sites and protected or locally valued species within the zone of influence was sought, mainly from the Northamptonshire Biological Records Centre (NBRC); where they do not hold the records themselves, e.g., for bats, the request was tendered to the Northamptonshire Bat Group. Details of statutorily protected species were obtained on-line from the websites of the Multi-Agency Geographic Information for the Countryside (MAGIC)¹¹ and the Joint Nature Conservation Committee (JNCC)¹². Additional information was also received from the local wildlife groups and other volunteers consulted.
- 2.7 A Preliminary Ecological Appraisal was carried out in October 2018; the Site and its surroundings were walked over, with notes made on species and habitats present and the potential for the latter to support protected and notable species. Local 1:25,000 OS maps were also used to identify features, e.g., ponds not visible from the Site.
- 2.8 From this information, the following species and groups were initially targeted for more intensive field survey:
- Botanical assessments of potentially ecologically-important habitats.
 - Invertebrate surveys.
 - Great Crested Newt (GCN) environmental DNA (eDNA) sampling and conventional GCN surveys where indicated.
 - Reptile presence/absence surveys.
 - Breeding bird surveys.

¹¹ <https://magic.defra.gov.uk/>

¹² JNCC website.

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- Wintering bird surveys.
 - Bat activity and roost assessment surveys.
 - Dormice presence/absence surveys.
 - Brown hare surveys (incorporated into above surveys).

2.9 Badger surveys were carried out but in accordance with accepted practice, no further details are provided in this report; a separate confidential report provides all relevant information. All other protected and priority species not mentioned above were scoped out of the field surveys at this stage for one or more of the following reasons:

- The Site is outside the known geographic range for the species.
- The habitat required to support the species is not present on or adjacent to the Site.
- Suitable habitat on the Site is too small, isolated or fragmented to support viable populations.

2.10 A description of the work carried out to this point, including the information derived from the Desk Study, was included in the Preliminary Environmental Information Report (PEIR) which was circulated as part of the formal pre-application consultation.

Consultations on the proposed scope.

2.11 All responses received as part of the scoping exercise and the consultation responses in response to the PEIR were read, notes were made of further topics suggested and of all topics that were clearly felt to be important to the consultees. Particular thought was given to the comments of statutory consultees, local and national conservation groups and local wildlife volunteers. All these bodies and individuals were consulted (mainly by telephone, e-mail or online video due to Covid-19 restrictions), some on several occasions. All suggestions and comments were incorporated into the planned fieldwork surveys and information on findings was reported back to (and provided by) relevant consultees.

2.12 As a result of this process, the list in paragraph 2.8 was agreed for survey with adders, dormice and the whole issue of connectivity/severance added as a

topic in their own right and additional importance was given to the surveys for invertebrates.

Desk study results.

- 2.13 The proposed development is considered unlikely to have a significant effect on two sites on the National Sites Network (previously Internationally Important Sites): Barnack Hills and Holes Special Area of Conservation (SAC) and Rutland Water Special Protection Area (SPA) and Ramsar site, both within 10km of the Site. These sites, together with the Upper Nene Gravel Pits SAC and Ramsar site are considered separately in the Habitats Regulations Assessment required by PINS.
- 2.14 Seven Sites of Special Scientific Interest (SSSI) were identified lying within 5km of the Site. Three of these, Collyweston Great Wood and Easton Hornstocks NNR and SSSI, Bedford Purlieus NNR and SSSI and Bonemills Hollow SSSI include the Site in their Planning Risk Zones. Three Local Wildlife Sites (LWS), Fineshade Woods LWS, Fineshade Lane LWS and Collyweston Quarry LWS, also a Regionally Important Geological Site (RIGS), lie within 2km of the Site.
- 2.15 Large numbers of post-2000 records of invertebrates, amphibians (including GCNs), reptiles (including adders), breeding birds, bats and dormice were provided by NERC and others, all from either Collyweston Great Wood or Fineshade Woods. All desk study records are given in Appendix 1-2.

Baseline description.

- 2.16 All SSSIs for which the Site lies within a Planning Risk Zone are considered to be ecologically important features. Sites lying further away than this are all susceptible to the same risks and were therefore not separately assessed. Similarly, of the LWSs within the zone of interest, only Fineshade Woods is considered close enough to be potentially impacted by the development.
- 2.17 A full programme of field surveys was carried out through 2019 and 2020, respecting COVID-19 restrictions. Where these restrictions caused gaps in the 2020 programme, these have been or are being filled in 2021; where necessary, the results will be issued as a separate report. Monitoring surveys carried out where access was available on the existing ENRMF site from 2014

were also considered. Full details of methods and results are given in the relevant appendices (1-3 to 1-10); results are summarised below:

- 2.18 Most of the proposed western extension comprises two arable fields with narrow grassed margins crossed by a central, species-poor hedgerow with a narrow grass margin on each side and one tree at its eastern end. Moving clock-wise from the eastern end of this hedgerow, the southern field has a farm track with species-poor hedgerows beyond, an area of arable (ownership retained by the farmer) with private woodland beyond to the south (Little Wood) and Fineshade Woods on the west. The northern field has Fineshade Woods and a grown-out, gappy hedgerow with arable beyond on the west, a narrow hedgerow with grass and ponds beyond to the north and a ditch, with Collyweston Great Wood beyond, on most of its eastern side. In the southeast corner of the northern field is a small patch of thorn scrub and hardstanding around a swallow hole with a farm track on its southern edge. The northern end of the north field has a more calcareous soil, graded 'Best and Most Versatile', with potential to support calcareous grassland. The plant species and communities are not considered important ecological features botanically but had greater importance as habitat for a number of species.
- 2.19 The invertebrate surveys looked separately at the margins of the fields and then at glade and ride edges within the two adjacent woodlands for comparison. The results showed that both margins held good numbers of invertebrates and species with the populations on both sides over-lapping with those of the adjoining woodlands. The southwest-facing eastern margin, adjoining Collyweston Great Wood, also held more flowering plants, attractive to pollinator species and a higher proportion of saproxylic invertebrates. The western margin was particularly important for woodland butterflies. Both the invertebrate population and the woodland margins are considered important ecological features.
- 2.20 There are no water bodies on the proposed western extension but GCNs were confirmed to breed in ponds in both adjacent woods. The four common amphibians were also recorded in both woodlands, with palmate newts in particularly good numbers in Fineshade Woods. Common toad and common

frog were also found in the woodland margins. Amphibians are considered an important ecological feature of the Site.

- 2.21 All four of the common reptile species were known to be present in both woods. Common lizards and slow worms were found using Artificial Cover Objects (ACOs) in all the margins and hedgerow bottoms. Being predators, grass snakes were scarcer, possibly also because the edge habitats are all dry. Fineshade Woods has a strong population of adders, mainly using grassy rides and glades; Collyweston Great Wood has fewer open areas but adders are also recorded from them. One adder was found at the western end of the central hedgerow. Reptiles, particularly adders, are considered an important ecological feature of the Site.
- 2.22 Red kites and buzzards are known to breed in local woods and both were recorded, with sparrowhawks, during the bird surveys. Otherwise, the wintering bird surveys recorded only small numbers of resident species, together with winter thrushes, using the arable field and margins. Similarly, the breeding bird surveys recorded residents and some summer visitors. The Site is considered to hold a bird community typical of the local habitats and judged likely to be resilient to the proposed development due to the phased nature of the works.
- 2.23 The bat surveys confirmed that a number of species roost in the adjacent woods and use of the Site is confined mainly to commuting and foraging along the woodland edges and hedgerows. A comparison of numbers recorded over the arable with those moving along the hedgerows showed few bats cross the fields themselves. Due to COVID-19 regulations, bats could not be handled for identification but previous records and use of detectors confirmed a large number of species use the area. The bat assemblage is considered an important ecological feature of the Site but is judged likely to be resilient to the development.
- 2.24 Fineshade Woods has a good population of dormice and dormice have been re-introduced to Bedford Purlieus. Joining the two is a target for Rockingham Forest but as yet, they do not appear to have reached Collyweston Great Wood. Surveys have been carried out since 2016 on the edge of the existing ENRMF site and since 2019, along the hedgerows around and across the proposed

Western Extension but no signs of dormice have been found. Given their importance in the wider area, they are an important ecological feature of the Site for the future.

- 2.25 Brown hares have been recorded occasionally on the two fields and on adjacent fields. They are not considered an important ecological feature of the Site.
- 2.26 The table below (given as Table 7 in this document) shows the important ecological features considered in this assessment.

Ecological Feature	Reason for Importance	Geographic Context
Collyweston Great Wood and Easton Hornstocks SSSI and NNR.	A unique ancient lime woodland, part of the historic Rockingham Forest. Many unusual woodland plants and birds are recorded.	National.
Bedford Purlieus SSSI and NNR.	Ancient oak and ash coppice-with-standards woodland with a diverse flora.	National.
Bonemills Hollow SSSI.	Marshland on the valley floor and Jurassic calcareous grassland areas.	National.
Fineshade Woods LNR.	A large woodland containing areas of replanted and existing ancient woodland, important for a wide range of wildlife.	County.
Hedgerow Framework.	Providing feeding areas for invertebrates and thus for amphibians, reptiles, birds, bats and potentially dormice; providing cover and shelter for reptiles and amphibians and a movement corridor for bats.	Zone of influence.

Ecological Feature	Reason for Importance	Geographic Context
Site Margins (Proposed western extension).	Providing woodland edge habitat; mature trees and flower-rich grassland, linking the bordering woods for a suite of important invertebrate species and herpetofauna.	Zone of influence.
GCNs.	Afforded protection under the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations, 2019 and the WCA; not breeding within the Site but likely to use its margins for foraging.	Zone of influence.
Common amphibian assemblage.	Valued in Northants where a good assemblage, together with reptiles, is a selection feature for LWS.	Zone of influence.
Adders.	Priority species for Back from the Brink; one of the few areas this species occurs in the East Midlands.	County.
Bat assemblage.	Statutory protection, some use of the central (and other) hedgerows but likely resilient.	Zone of influence.
Dormice.	A protected species, not yet present, whose use of the Site would help to bolster connection of the local Rockingham Forest metapopulation.	Future site, linking the populations of Fineshade Woods and Bedford Purlieus.

3 DESCRIPTION OF THE DEVELOPMENT AND OF POTENTIAL IMPACTS

3.1 The development is fully described in the ES. A summary of the scheme, relevant to the ecology of the Site and its surroundings, is given below.

- Phased removal of certain hedgerows to allow construction of a new haul road into the proposed Western Extension.
- Erection of a fence to protect deer and protected species from accessing the working area active at any time.
- The construction of new landfill void, in a number of phases, for the disposal of the same range of hazardous wastes and low-level radioactive waste (LLW) disposed of at the existing ENRMF currently, supported by the existing site infrastructure.
- The continuation of filling of the existing ENRMF landfill with hazardous waste and LLW the subject of the current Development Consent Order (DCO) and the amendment of the consented restoration profile to tie the existing landfill in to the proposed extension landform.
- The winning and working of minerals in order to create the landfill void and provide extracted materials for use on Site as well as the exportation of clay and overburden for use at other sites.
- The stockpiling of clay, overburden and soils for use in the construction of the engineered containment system at the Site and restoration of the Site.
- The direct input of waste into the existing and new landfill.
- An increase to the waste throughput of the waste treatment and recovery facility to 250,000tpa, which comprises an increase of 50,000tpa compared with the rate consented in the 2018 DCO amendment.
- A combined total waste importation rate limit to Site including that to the waste treatment and recovery facility and to the landfill, which will be an increase of 50,000tpa compared with the currently consented total input rate.
- No increase to the hours currently worked on the site.
- The diversion of an overhead electricity cable that crosses the proposed Western Extension to an alternative route within the application area.

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- Restoration to generally domed restoration landforms in the extension area and amendment to the approved restoration profile of the existing ENRMF site to create a coherent restored landform over the whole application site.
 - Restoration of the Site to nature conservation interest using the soils available at the Site as well as suitable imported materials.
 - Completion of the landfilling and restoration operations by December 2046; retention of infrastructure until 2046 and of long-term management infrastructure beyond this date.
 - The Site will be subject to a twenty-year aftercare and maintenance period following the completion of restoration.

Specific impacts to SSSI and avoidance.

3.2 The three SSSIs for which a planning risk zone includes all or part of the Site are shown in the Table above; for the purpose of impact assessment, the issues shown on MAGIC for the proximal risk zone have been treated as referring to the whole Site. Since the planning issues identified for the proximal zone of Collyweston Great Wood and Easton Hornstocks SSSI include all of the issues identified for the relevant zones of the other SSSIs, it is assumed here that any measures required to protect the former will also protect the sites further away.

3.3 Relevant issues identified, as shown in MAGIC, for these SSSIs are:

- Infrastructure: overhead electricity cables are to be removed and re-sited underground.
- Extraction of minerals.
- Air Pollution: creation of dust (either in construction or operation) or of air pollution from use of vehicles during both construction and operation.
- Combustion: flaring of landfill gas from the two pre-Augean cells, now diminishing (no further landfill gas will be generated).
- Waste: mechanical and biological waste treatment, hazardous landfill, low-level radioactive waste.
- Discharges: any discharge of water or liquid waste of more than 5m³/day to ground (i.e., to seep away) or to surface water, such as a beck or stream (discharge/runoff to be controlled at level obtaining pre-development).

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- There is also potential for hydrological effects, specifically restrictions on surface water drainage patterns, on the two woods by the opening of the void space.

3.4 These woodlands are ancient and provide for a large number of rare and valued species; any damage to them would constitute a significant negative effect. All these issues are considered and resolved fully in the relevant sections of the ES however, in summary:

- The existing ENRMF is the subject of three Environmental Permits (EP); extension to the waste management operations at the site will continue to be the subject of EPs.
- Environmental monitoring will be carried out to confirm the levels of contaminants and radiation in all media relevant to potential exposure pathways such as landfill gas, air emissions, leachate, surface water, groundwater and dust will not exceed the thresholds and radiation dose criteria set for the site within the EPs.
- Samples are taken to an agreed programme specified in the EPs and follow protocols approved by the Environment Agency, to which the monitoring data are reported. This gives assurance that the site is performing as expected and that standards set are effective in eliminating/controlling any exposure risks.
- Monitoring for the existing ENRMF shows that the containment measures are effective and that groundwater quality adjacent to the site is not affected by the landfill activities. The surface water and groundwater quality will continue to be monitored in accordance with schemes agreed through the EPs.
- The proposed development could generate dust through cell excavation and engineering, soil stripping and restoration, mineral extraction, on-site transportation, waste processing, stockpiles, exposed surfaces and off-site transportation. Dust emissions from the site are monitored under the EPs.
- Thresholds in the EP are set to protect both human health and the environment. Dust in the air is monitored at the boundary of the site as deposited dust and as PM₁₀. Large dust particles are deposited fairly rapidly and usually close to the point of arising but smaller particles, including PM₁₀

can travel greater distances. Monitoring data for the site boundary over the last 5 years shows that the only exceedances of the 200mg/m² deposited dust threshold resulted from agricultural activities on neighbouring fields, not as a result of waste management activities.

- No PM₁₀ concentrations above 10micrograms/m³ have been recorded at the site boundary. No air quality threshold is set for PM₁₀ for the protection of ecosystems however, the concentrations of PM₁₀ particulates recorded in the air at the site boundary are well below 40micrograms/m³, which is the annual mean air quality target concentration.
- Emissions to air from the site are also controlled under the EP. The site is not permitted to accept waste with a total organic carbon content (TOC) of greater than 6% therefore, there is minimal potential for the deposited waste to generate landfill gas or other vapours. This limit was imposed in the UK in 2004 so Phases 1 and 2 received waste with higher concentrations of organic carbon. The gas generated in these phases is collected and combusted in a flare stack, controlled through the EP.
- Gas emissions from all the other phases of the landfill are monitored regularly but volumes are so low that there is insufficient to warrant connection to the active gas collection system. All new phases of the landfill in the proposed extension will be subject to the restriction on TOC content and therefore, substantial volumes of gas are highly unlikely to be generated. The quantity of gas generated in Phases 1 and 2 already is declining and this decline will continue.

3.5 Both Collyweston Great Wood and the northern part of Fineshade Woods could suffer impacts to the growth of the trees nearest to the Site by damage to their roots resulting in weakening, particularly of older trees, caused by the erection of a steel fence for herpetofauna protection, together with a deer exclusion fence, around the working area. Such damage will be avoided by erecting the fence as described in paragraph 8.2.4 of the EclA.

General ecological impacts.

3.6 Potential impacts resulting from the development itself are limited and controlled under EPs (as described above) and are not repeated here. The

following impacts apply to both construction and operational phases, including restoration, which take place sequentially over the Site. There is no decommissioning phase as such.

- Loss of habitat arising from Site clearance and removal/stacking of clay and overburden.
- Habitat and biodiversity gain arising from preliminary works and restoration.
- Severance of territories or connecting habitats arising from Site clearance, laying down of haul routes or creation of stockpiles of clay or overburden.
- Provision of new connecting habitats arising from restoration.
- Killing or injuring protected species.
- Disturbance to specially protected birds nesting close to the Site.
- Damage to or destruction of bird nests or eggs during vegetation clearance.
- Spreading of invasive plant species as a result of vehicle movements.

4 EMBEDDED AVOIDANCE, ENHANCEMENT AND MITIGATION

4.1 The following measures to avoid, reduce, mitigate the potential impacts have been embedded in the design. These measures will take place in three phases; pre-development works, on land that lies outside the proposed development area but will enhance existing connectivity and create new habitat in these areas, work to protect reptiles, amphibians (under GCN licence) and other animals once the DCO is awarded but before work starts and ongoing measures during the development.

Pre-development.

- Create a new, species-rich hedgerow to the east of the gappy, grown-out hedgerow/tree-line on the northwest boundary of the north field.
- Create a bank and plant a new hedgerow to the west of the farm track on the southeast boundary of the south field.
- Gap-up the southern boundary hedgerow of the existing ENRMF where necessary and access is possible, continuing this as work on these phases is completed.

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- Delineate a 10m stand-off from the ditch-line all the way around the north field and western boundary of the south field. Sow this strip with wildflower meadow seed, create basking, cover and hibernation sites along it.
 - Post DCO: Erect protective fence
 - Once a GCN licence is in place, erect a 1.8m deer fence along the line of the 10m stand-off to protect large animals and form the Site security fence, with a steel-panel amphibian exclusion fence sunk into the ground along it to protect other animals from death or injury.
 - Supervise erection of the fences and digging of pits for the tensioning posts (which will be erected within the 10m stand-off). Pits will be dug by hand so that any major tree-roots encountered can be avoided (minor roots, as set out in the Arboricultural Impact Assessment, Appendix 2, may be severed). Any reptiles or amphibians found will be moved to safety.
 - This fence will initially run from the northwest corner of the existing ENRMF, all the way around the northern field, including the small scrubby area at its southeast corner, along the northern edge and down the western side to the central hedgerow and along the northern edge of the retained length of this hedgerow, with a return to the south at the end of this length.
 - Hand-search or trap the scrubby area, removing any amphibians or reptiles found to the prepared refuge so that this area can be cleared when required.
 - Remove, under ecological supervision, with hand-searching or trapping as necessary, the remainder of the central hedgerow and the length of the western hedgerow of the existing ENRMF required to provide access roads to the northern field. Any reptiles or amphibians found will be removed to the prepared refuge.

During development and restoration.

- As each phase is completed, supervise the removal of the fencing around it and the erection of this fencing for the next phase.
- Supervise erection of deer fencing around planted patches of woodland and scrub.
- Undertake nest searches before removal of any lengths of hedgerow and bat roost surveys of any trees that may need to be felled for safety reasons.

Ensure that all deadwood remains on Site and is incorporated into the 10m stand-off area.

- Maintain a watching brief for invasive alien plant species and supervise removal/treatment as required.
- Supervise planting of new double-hedgerows along both sides of the utility corridor as they are created and along both sides of the corridor to carry the new above-ground water-course required as part of the surface water drainage plan.
- Supervise sowing of wildflower grassland along these corridors.

5 RESIDUAL AND IN-COMBINATION EFFECTS

5.1 With these measures in place, all losses will be fully compensated, in advance where possible and all residual effects will be significant and positive. No further mitigation or compensation will be required.

5.2 No developments having possible cumulative effects have been identified.

6 CONCLUSIONS

6.1 Close attention to the ecological requirement of the species already present and the information and recommendations of many consultees means that these new and enhanced habitats will provide a great benefit to all of these species and to the whole of the Rockingham Forest area. There will be substantial Biodiversity Net Gain (see Appendix 3) and the phasing of the development will ensure that both the biodiversity and well-being benefits are realised relatively quickly and made available for a wider community.

ECOLOGY AND NATURE CONSERVATION

1 INTRODUCTION

1.1 This document provides a full assessment of any ecological effects on the biodiversity and nature conservation interest of the Site (the proposed western extension and the existing ENRMF) arising either directly or indirectly as a result of the development proposals. For the purpose of this assessment the majority of the assessments are focused on the proposed western extension area. The proposed western extension area is defined as the area within the inner edge of the boundary ditches around the development area (and the continuation of the ditch line where the ditch is no longer visible), except on the southern boundary where it is currently unmarked on the ground and the southwest boundary where it follows the western edge of the farm road. Where the assessments are relevant to the existing ENRMF these are identified. The Site and its surroundings are shown on Figure 1.

1.2 The purpose of the report is to:

- Establish the current baseline ecological conditions at the Site and surrounding areas.
- Identify any potentially significant ecological effects associated with the proposed development.
- Set out the measures necessary to effectively avoid or mitigate likely significant effects and to ensure compliance with nature conservation legislation, national and local planning policy objectives.
- Identify ecological enhancement measures to be delivered by the proposed scheme.
- Advise on the requirements for monitoring these measures to ensure they are meeting their objectives.
- Provide an assessment of the significance of any residual effects.

1.3 Common names for species are used throughout the text with a full list of all species recorded from the Site, with scientific names, given in Appendix 1-11. Where names of species not recorded are referred to, the scientific name is

also given in the text where first referred to. Common and scientific names for higher plants are given according to Stace, 2010.

- 1.4 This document has three separate appendices. Appendix 1 includes (as Sections 1-1 to 1-12) detailed information on the methods used for each study or survey, together with the results obtained, mainly as tables. Appendix 2 provides methods and results of the arboricultural survey and Appendix 3 sets out how the Biodiversity Net Gain obtained has been calculated.
- 1.5 This assessment has been undertaken by ESL (Ecological Services) Limited (ESL).

2 WILDLIFE LEGISLATION. PLANNING POLICY AND GUIDANCE

2.1 WILDLIFE LEGISLATION

2.1.1 The assessment has taken into account the potential effects on sites that are:

- Designated as Local Nature Reserves (LNRs) under Section 21 of the National Parks and Access to the Countryside Act, 1949¹³ by principal local authorities.
- (Re-)notified as Sites of Special Scientific Interest (SSSI) under the Wildlife and Countryside Act, 1981 (and as amended)¹⁴ (WCA).
- Of international importance as set out in the Conservation of Habitats and Species, 2017 (as amended), together with sites created under the Ramsar Convention, 1972¹⁵.

2.1.2 The assessment has also taken into account habitats and species that are:

- Listed on Schedules 1, 5 and 9 of the WCA.

¹³ National Parks and Access to the Countryside Act, 1949. Available [online] at <https://www.legislation.gov.uk/ukpga/Geo6/12-13-14/97>.

¹⁴ Wildlife and Countryside Act, 1981 (and as amended). Available [Online] at <https://www.legislation.gov.uk/ukpga/1981/69>.

¹⁵ Ramsar Convention, 1972.

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- Covered by the Hedgerows Regulations, 1997¹⁶.
 - Listed as Habitats and Species of Principal Importance by the Secretary of State in accordance with Section 41 (S41) of the Natural Environment and Rural Communities Act, 2006¹⁷ (NERC).

2.1.3 For statutorily protected species recorded on or considered likely to use the Site or its immediate surroundings, a summary of legal protection is given in each of the species/group sections of Technical Appendix 1.

2.2 RELEVANT PLANNING POLICY

2.2.1 The assessment consulted and makes reference to the following documents as they concern ecology and nature conservation:

- The National Policy Statement for Hazardous Waste, 2013¹⁸ (NPS)
- The National Planning Policy Framework, 2021¹⁹ (NPPF).
- The North Northamptonshire Joint Core Strategy 2011-2031²⁰ (NNJCS), together with saved policies from plans adopted in 2011 and 2006 for different parts of East Northamptonshire District.
- The Northamptonshire County Council (NCC) Supplementary Planning Document (SPD) on biodiversity²¹.
- The Northamptonshire Minerals and Waste Local Plan²² (NMWLP).
- The Northamptonshire Biodiversity Action Plan²³ (NBAP).

¹⁶ Statutory Instrument 1997 No. 1160. The Hedgerow Regulations, 1997. HMSO.

¹⁷ The Natural Environment and Rural Communities Act, 2006.

¹⁸ <https://www.gov.uk/government/publications/hazardous-waste-national-policy-statement>.

¹⁹ The National Planning Policy Framework, 2021.

²⁰ The North Northamptonshire Joint Core Strategy, 2011-2031.

²¹ The Northamptonshire County Council Supplementary Planning Document on Biodiversity.

²² The Northamptonshire Minerals and Waste Local Plan.

²³ The Northamptonshire Biodiversity Action Plan.

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- The Northamptonshire Wildlife Sites Criteria²⁴.

NPS.

- 2.2.2 This document sets out Government policy for hazardous waste infrastructure, for use by the Secretary of State in making decisions on development consent applications for applications that fall within the definition of a Naturally Significant Infrastructure Project (NSIP), as defined by the Planning Act, 2008.
- 2.2.3 Subsection 4.3 of the NPS sets out the requirement for the Secretary of State to carry out an assessment, under the Conservation of Habitats and Species Regulations, 2010 (as amended), to determine whether the project may have a significant effect on a European site (now a site on the National Sites Network) or on any site to which the same protection is applied as a matter of policy, either alone or in combination with other plans or projects. The applicant is required to provide the Secretary of State with the information reasonably necessary to determine whether an appropriate assessment is required. In the event that such an appropriate assessment is deemed required, the applicant must provide the Secretary of State with the information necessary to undertake it.
- 2.2.4 In Subsection 5.3, the NPS sets out the value placed by the Government on the environment; essentially, the value of nature should be at the heart of any decision. The Environmental Statement (ES) must therefore set out any effects on internationally, nationally and locally designated sites of ecological or geological conservation importance, on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity (paragraph 3.3.3), with due weight given to the different levels of importance of these (paragraph 3.8.5).
- 2.2.5 Paragraph 5.3.14 specifically discusses the value of ancient woodland and veteran trees since once lost, they cannot be recreated. Development consent should not be given for a development that causes the deterioration or loss of

²⁴ The Northamptonshire Biodiversity Partnership, Local Wildlife Sites Panel, 2014 (last updated) Wildlife Sites Selection Criteria, Northamptonshire.

such irreplaceable habitats unless the need for the development in that location clearly outweighs the loss of the habitat.

2.2.6 Finally, paragraph 5.3.20 stresses that the Secretary of State will take into account whether Natural England has granted or refused (or intends to grant or refuse) any relevant licences, including protected species mitigation licences.

NPPF.

2.2.7 The NPPF, as last revised in 2021, sets out the Government's planning policies for England and how these are expected to be applied. Section 11, 'Making effective use of land', sets out the need for strategic planning, which considers the many functions that land parcels may need to fulfil and ensures that multiple benefits, including net environmental gains such as new habitat creation or improved public access to the countryside, are obtained.

2.2.8 Section 14 of the NPPF requires that plans should take a proactive approach to adapting to climate change, including implications for biodiversity and landscapes.

2.2.9 Section 15 of the NPPF includes the requirement for plans to protect and enhance biodiversity by:

- Identifying and safeguarding local wildlife-rich habitats and wider ecological networks, including international, national and local sites of importance for biodiversity and corridors that connect them.
- Promoting the restoration and enhancement of priority habitats, ecological networks and the protection and recovery of priority species.
- Pursuing opportunities for securing measurable net gains for biodiversity.

NNJCS.

2.2.10 The adopted development plan for district-level planning matters now comprises the NNJCS together with saved policies from plans adopted in 2011 and 2006 for different parts of the district. According to the parish-by-parish index of policies, all relevant policies for King's Cliffe parish are included in the NNJCS. Specifically, the latter provides, under Policy 4 - 'Biodiversity and Geodiversity', that a net gain in biodiversity will be sought and sets out how this will be achieved, including by:

- Protecting existing biodiversity and geodiversity assets.
- Enhancing ecological networks by managing development and investment.
- Supporting, through developer contributions or development design, the protection and recovery of priority habitats and species linked to national and local targets.

2.2.11 This policy also refers specifically to the need for development proposals to take account of the Northamptonshire biodiversity SPD; this was issued in August 2015. It is a statutory Local Development Document (LDD) prepared under the Planning and Compulsory Purchase Act, 2004 (the “2004 Act”). It is intended to cover the whole of Northamptonshire and will be adopted by each Local Planning Authority as a statutory SPD.

2.2.12 This document introduces the requirement to integrate biodiversity into the development process and provides the policy basis for this. It then sets out a checklist for ensuring this and explains each stage of the process.

NMWLP.

2.2.13 This document was adopted in 2017. It provides the land-use planning strategy for minerals and waste-related development in the county and is the basis for investment in new minerals and waste development in Northamptonshire. Whilst being concerned specifically with applications for planning permission for this purpose, its policies should not be read in isolation rather, they are intended to be read in conjunction with national planning policy and legislation.

2.2.14 With this in mind, the NMWLP sets out its vision and objectives, of which Objective 10 - 'Conserving and enhancing Northamptonshire’s built and natural environment', is as follows:

Recognise Northamptonshire’s environmental systems and landscape linkages in order to conserve and enhance the built and natural environment through ensuring sensitive working and where necessary, high standards of mitigation of potentially adverse impacts of minerals and waste development.

2.2.15 The rationale for this objective explains that it is intended to ensure “*that new or extended minerals and waste-related uses not only do not damage or destroy the county’s existing environmental and natural assets but that opportunities be*

taken (including via restoration) to enhance existing and planned green infrastructure networks and to support the identified landscape character areas of the county”.

2.3 OTHER LOCAL GUIDANCE

NBAP.

2.3.1 The original document was produced by the Northants Biodiversity Partnership in 2007 and updated in 2009. Its importance in identifying ways in which development can use it to enhance biodiversity gain is noted in the biodiversity SPD. After describing how the NBAP was prepared, its place in the development planning system and the general principles for protecting and enhancing biodiversity, the document provides 16 Habitat Action Plans (including for hedgerows, meadows and ponds) and two Species Action Plans (for otter *Lutra lutra* and water vole *Arvicola amphibius*).

Northamptonshire Wildlife Sites Selection Criteria.

2.3.2 Also produced by the Northants Biodiversity Partnership in 2007, this document was updated in 2014. In providing lists and target numbers for the indicator species of particular habitats, it is very useful in designing restoration plans to provide habitat enhancement, thus meeting the requirements of the statutory policies.

2.4 PROFESSIONAL GUIDANCE ON ECOLOGICAL ASSESSMENT

2.4.1 The methods used for assessing the impacts on features of ecological and nature conservation interest are those set out in the Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact in the UK and Ireland, Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2018)²⁵.

²⁵ CIEEM, 2018. Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management, Winchester.

2.4.2 British Standard 42020:2013 'Biodiversity - Code of practice for planning and development'²⁶ has also been consulted in producing this document.

3 METHODS

3.1 DETERMINING THE SCOPE OF THE ASSESSMENT

Zone of influence/study area.

3.1.1 The zone of influence for the development is the area over which ecologically valuable sites, habitats or species may be significantly affected by environmental changes resulting from the proposed project and associated activities. It is not a set distance and is dependent on the sensitivity of the ecological features under consideration. For statutory and non-statutory designated sites (and for some species) present outside the Site boundaries, the potential zone of influence is reflected in the area of search in the desk study (see below).

3.1.2 The minimum study area for all ecological field surveys comprises all land within the Site. For specific surveys, e.g., breeding birds/great crested newts (GCN), the study area is expanded to include some adjacent land and this area is described in the relevant species/group appendices.

Desk study.

3.1.3 During 2018, the websites of the Multi-Agency Geographic Information for the Countryside (MAGIC)²⁷ and the Joint Nature Conservation Committee (JNCC)²⁸ were consulted for information on the nearest internationally important sites (now The National Sites Network) and for locations of SSSIs/ National Nature Reserves (NNRs) within 5km of the Site. Information was also sought for any LNR within a 2km radius of the Site.

²⁶ British Standard 42020:2013 "Biodiversity - Code of practice for planning and development.

²⁷ <https://magic.defra.gov.uk/>

²⁸ JNCC website.

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- 3.1.4 In August 2018, the Northamptonshire Biological Records Centre (NBRC) was asked to provide details of any non-statutory Local Wildlife Sites (LWS) within 1km of the Site. Records of any protected or S41 species within 1km of the Site were also requested. Bat records are not held by NBRC so in November 2018, these were specifically requested from the Northamptonshire Bat Group for up to 5km away. Additional later records received including those provided by local wildlife groups, which are also discussed in the relevant appendices.
- 3.1.5 A 1:25,000-scale Ordnance Survey map and aerial imagery were examined to identify ponds within 250m of the Site as part of the assessment for potential use by GCNs and to determine the Site's overall landscape connectivity (or lack of) to the wider environment.
- 3.1.6 The desk study was updated in July 2020 to ensure all the information for the Site, immediately adjacent areas and for ecologically sensitive sites within the zone of influence is current. All desk study data received are given in Appendix 1-2 and for individual species/groups, relevant records are discussed further in the species appendices.

Preliminary Ecological Appraisal (PEA).

- 3.1.7 A PEA of the Site was undertaken on 30 October 2018 by ESL Principal Ecologist Brian Hedley MCIEEM (ESL, 2018)²⁹. The Site and wider area were walked-over and notes were made on the habitats present and their potential to support notable and protected species. The results of the PEA were used to determine the follow-on surveys that would be undertaken later during 2018 and 2019-2020 to enable all important ecological features (see Subsection 3.3 below) within the Site to be identified. These follow-on surveys comprised:
- Botanical assessments of potentially ecologically-important habitats.
 - Invertebrate surveys.
 - GCN environmental DNA (eDNA) sampling and conventional GCN surveys where necessary.

²⁹ ESL, 2018. Preliminary Ecological Appraisal of ENRMF Western Extension, Northamptonshire. Unpublished report to MJCA.

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- Reptile presence/absence surveys.
 - Breeding bird surveys.
 - Wintering bird surveys.
 - Bat activity and roost assessment surveys.
 - Dormice presence/absence surveys.
 - Brown hare surveys (incorporated into above surveys).

3.1.8 Badger surveys were carried out but in accordance with accepted practice, no further details are provided in this report; a separate, confidential report provides all relevant information. All other protected and priority species not mentioned above were scoped out of the investigative follow-on surveys at this stage for one or more of the following reasons:

- The Site is outside the known geographic range for the species.
- The habitat required to support the species is not present on or adjacent to the Site.
- Suitable habitat on the Site is too small, isolated or fragmented to support viable populations.

3.2 FIELD SURVEY

Overview.

3.2.1 ESL has carried-out ecological monitoring and management of the existing East Northants Resource Management Facility (ENRMF) site since 2014, as required by its Ecological Management and Aftercare Plan (EMAP), last reviewed in 2018 (ESL, 2019)³⁰ and therefore, has a good understanding of the habitats and species present on and adjacent to the Site.

3.2.2 A summary of the survey methods used for the present purpose is given below. Fuller methods and the results of these surveys are given in the relevant sections in Appendix 1.

³⁰ ESL, 2019. East Northants Resource Management Facility, King's Cliffe. Ecological Management and Aftercare Plan. Quinquennial Review 2014-2018. Unpublished report to MJCA.

Habitats and plant communities.

3.2.3 A Phase-1 habitat survey of the proposed western extension was undertaken by Brian Hedley MCIEEM as per standard guidance (JNCC, 2010³¹ and CIEEM, 2017³²) as part of the PEA survey in October 2018 (ESL, 2018). This survey was updated by monthly visits April to August 2019 and 2020 by the same ecologist. These visits covered the whole area within the proposed western extension boundary and the edges of the adjacent woodlands (where permission was granted) and concentrated on identifying important plant species and communities, with particular concentration on grassland, woodland and hedgerow habitats. Full details of the plant surveys are given in Appendix 1-3.

Invertebrates.

3.2.4 An initial invertebrate scoping-assessment was undertaken on 4 April 2019 by Conops Entomology Ltd. All parts of the proposed western extension were visited and appraised. The aims of this survey were:

- To appraise the key habitats and/or features of the proposed western extension.
- To assess their suitability and quality to support:
 - Rich and varied invertebrate assemblages.
 - Species of Principal Importance.
 - Species with a nationally-significant status such as those listed in the Red Data Book.

3.2.5 This scoping survey recommended a suite of invertebrate surveys, using various standardised methods as per Drake *et al.*, 2007³³ to fully appraise the

³¹ Joint Nature Conservation Committee, 2010. Handbook for Phase 1 Habitat Survey - A Technique for Environmental Audit. JNCC. Peterborough.

³² CIEEM, 2017. Available (online) as <https://cieem.net/resource/guidance-on-preliminary-ecological-appraisal-gpea/>

³³ Drake, C.M. *et al.*, 2007. *NERR005. Surveying Terrestrial and Freshwater Invertebrates for Conservation Evaluation*. Natural England, Peterborough.

proposed western extension. These methods included sweep-netting, spot-sampling (for larger species), 'grubbing' (a finger-tip search of fallen dead wood, piles of rotting timber and short turf), beating (bushes and scrub) and pitfall traps, which were undertaken during monthly visits from May to August 2019.

3.2.6 In 2020, six visits were made between May and September to areas of Fineshade Woods and Collyweston Great Wood, limited to areas adjacent and near to the proposed western extension or rides with similar habitat to the proposed western extension boundaries. The same methods were used, with the addition of a search for important butterflies and the use of flight-interception traps in Collyweston Great Wood. This latter method was not used in Fineshade Woods, partly because of its high visitor-use but also because it has fewer large and rotting trees. Details of the invertebrate surveys are given in Appendix 1-4.

Amphibians.

3.2.7 Examination of aerial imagery and OS maps, together with Site walkovers and existing knowledge, identified 20 waterbodies within 500m of the Site boundary, 12 of which were within 250m. Access to eight waterbodies was granted and these were surveyed in 2019 and 2020 but could not be surveyed again in 2021 due to night frosts throughout the survey window. All these waterbodies were considered suitable for a range of amphibians. Several overgrown and/or ephemeral waterbodies are known within dense woodland north of the ENRMF site; previous investigation has shown that none of these is suitable for or used by GCNs.

3.2.8 Water samples were taken from all eight waterbodies to detect the presence of GCN eDNA as per Biggs *et al.*, 2004³⁴ and a quantitative measure of all waterbodies' suitability for GCNs was made using the Habitat Suitability Index

³⁴ 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.

(HSI) Oldham *et al.*, 2000³⁵. As the presence of GCNs was known or considered very likely from previous knowledge, waterbodies were also surveyed using a combination of methods which included torch and bottle-trap surveys, netting and egg searching (English Nature, 2001³⁶), since a population estimate would be needed for Natural England GCN licensing.

3.2.9 Additional survey visits were made February-March 2019/2020 for species known to return to breeding ponds early in the season and in late summer 2019/2020 to confirm GCN breeding by the presence of efts or juveniles. A full description of the survey methods is provided in Appendix 1-5.

Reptiles.

3.2.10 Habitat suitable for reptiles around the current ENRMF is well known but the edges of the two western fields had not been studied so all their boundaries were walked in early 2019 and assessed for their potential to support reptiles. Following this, 130 artificial cover objects (ACOs or 'tins' – 0.5m² black corrugated bitumen sheets and corrugated metal sheets) were set out in suitable habitat around the field margins (Gent and Gibson, 2003³⁷). Over the next two years, this number was increased to 183 to take in the central hedgerow and other likely areas, including the woodland north of the ENRMF.

3.2.11 Since adders are known to emerge from hibernation early in spring, three specific 'direct observation' transects were carried out for this species in early March 2021, targeting all habitat known to be particularly preferred by adders. In addition, a combination of 'direct observation' and traditional 'tinning' surveys was carried out ten times from April to September 2019 and 2020 and nine times between April and June 2021. Direct observation was also carried out on

³⁵ 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.

³⁶ English Nature, 2001. Great Crested Newt Mitigation Guidelines. English Nature, Peterborough.

³⁷ Gent A H and Gibson S D, 2003. Herpetofauna Workers Manual. JNCC Peterborough.

each visit (HGBI, 1998³⁸). Full details of the reptile surveys completed to date are given in Appendix 1-6. A further eight or nine surveys (weather-dependent) will be carried out July-September/October 2021, with the results provided in a supplementary report.

Birds.

3.2.12 Twelve visits were made to the Site between October 2018 and March 2019 to survey for and record wintering birds. This involved a combination of walking a transect around the Site and scanning from viewpoints. Adjacent land was also scanned for context. All birds seen or heard were mapped using Common Bird Census (CBC) species codes.

3.2.13 Six breeding bird survey visits were made to the Site between March and June 2019. All birds seen or heard using the Site or immediately adjacent land were mapped using CBC species codes and activity symbols (Marchant, 1983³⁹). In addition, birds seen or heard during other surveys on Site were also recorded, particularly crepuscular and nocturnal species, which were targeted during the bat and GCN surveys. Full details of all the bird surveys are given in Appendix 1-7.

Bats.

3.2.14 Surveys for this group were carried out during 2019 and 2020 with reference to the Bat Conservation Trust guidelines (Collins, 2016⁴⁰). All trees within the boundaries of the Site were assessed for their bat roost potential. The species assemblage and habitat-use were assessed by passive acoustic monitoring and walked transects. Full details of these bat surveys are given in Appendix 1-8. As a result of Covid-19 restrictions, it was not possible to undertake the full suite of surveys in April and May 2020. These surveys were undertaken in

³⁸ Herpetofauna Groups of Britain & Ireland (HGBI). 1998. Evaluating local mitigation/translocation programmes: maintaining best practice and lawful standards. Advisory notes for Amphibian and Reptile Groups. Froglife. Halesworth, Suffolk.

³⁹ Marchant J H, 1983. Common Bird Census Instructions. British Trust for Ornithology, Tring.

⁴⁰ Collins J (ed.), 2016. Bat Surveys for Professional Ecologists: Good Practice Guidelines, 3rd edition. The Bat Conservation Trust, London.

spring 2021 for completeness. Dusk emergence and dawn re-entry surveys of the tree on Site with moderate roost potential (T1) and targeted dusk/dawn surveys on trees inside the Assarts Tree Protection Area (TPA) will be carried out July-August-September 2021 and these later results will be provided in a supplementary report.

Dormice.

3.2.15 Surveys for the presence/presumed absence of dormice were carried out in 2019, 2020 and 2021 with reference to the latest standing advice from Natural England (Natural England, 2015⁴¹). Fifty dormouse tubes were placed within the limited suitable dormouse habitat present within or bordering the Site (hedgerows and scrubby woodland). These tubes were checked six times in all years, monthly from April to September 2019/2020 and April to June 2021. An additional 36 tubes were placed along the north-western boundary in March 2021 and were included in the 2021 monthly checks. Additionally, 25 dormouse nest boxes, present in adjacent woodland to the north of the ENRMF, have been checked annually since 2014. Checks for gnawed hazel nuts (from the 2018 autumn crop) were also undertaken to supplement the dormouse tube and nest box checks.

Other mammals.

3.2.16 Fallow, roe and muntjac deer are occasionally seen and recorded on the arable fields, as are brown hares, particularly on early-morning surveys. All sightings are recorded but no special surveys are undertaken for these species.

3.3 IMPACT ASSESSMENT METHODOLOGY

Identification of important ecological features.

3.3.1 In accordance with CIEEM guidance (CIEEM, 2018), the baseline conditions of the Site, obtained by consultation, desk study and field survey, are used to

⁴¹ Natural England, 2015. Online standing advice: <https://www.gov.uk/guidance/hazel-or-common-dormice-surveys-and-mitigation-for-development-projects>

identify the ecological features (which may be habitats, communities, species or ecosystems and their functions or services) and to determine which are important by virtue of their scarcity, sensitivity or legal status. This includes features that would not qualify in their own right but provide a supporting role or function to features that do, for example, an area of semi-improved grassland between two ponds that support breeding GCNs. The geographical area (e.g., international, national, county or smaller area) within which the feature is important also needs to be understood.

- 3.3.2 The important ecological features thus identified are subject to an assessment of potential impacts from the project. Features that are common, widespread, not threatened and considered likely to be resilient to any project impacts may not require assessment.
- 3.3.3 In describing impacts, consideration is given to the extent to which the important features identified could be lost, damaged, disturbed or subject to severance (such as to reduce their viability) because of the development and the proportion of each habitat, community, species or ecosystem that could be affected. Throughout the process, reference is made to the characteristics in Table 3-1.

Table 1. The characteristics used to determine ecological effects.

Characteristic	Description
Positive.	A change that improves the quality of the environment, e.g., by increasing species diversity, extending habitat or improving water quality. This may also include halting or slowing an existing decline in the quality of the environment.
Negative.	A change that reduces the quality of the environment, e.g., destruction of habitat, removal of foraging habitat, habitat fragmentation and/or pollution.
Extent.	The extent is the spatial or geographical area over which the impact/effect may occur under a suitably representative range of conditions. A local impact on an important habitat

Characteristic	Description
	or species may have an effect over a wider area than the immediate surroundings.
Magnitude.	The size, amount, intensity and volume (quantified if possible) and expressed in absolute or relative terms, e.g., the amount of habitat lost or gained, percentage change to habitat area and/or percentage change in a species population.
Duration.	To be defined in relation to ecological characteristics (e.g., life-times, breeding cycles) as well as months/years. Duration of the impact may differ from duration of the effect. Effects (defined in months or years) may be short/medium/long-term, permanent or temporary.
Frequency and Timing.	The number of times an impact/activity (e.g., walker/dog/vehicle movements) occurs and the season in which it occurs. Seasonal sensitivity will also have a bearing on the resulting effect (e.g., breeding/summering/migration or wintering for birds).
Reversibility.	<p>An irreversible effect is one from which recovery is not possible within a reasonable timescale (e.g., in terms of the lifetime of the species affected) or for which there is no reasonable chance of action being taken to reverse it.</p> <p>A reversible effect is one from which spontaneous recovery is possible or which may be counteracted by mitigation. In some cases, the same activity can cause both reversible and irreversible effects.</p>

Assessment of cumulative impacts and effects.

- 3.3.4 A cumulative effect can result from actions that may be individually insignificant but which, taken together, produce a significant result at a specific time or place. Alternatively, a feature may already be close to a critical threshold due to

exposure to a background level of some activity or pressure such that the addition of an otherwise insignificant impact from another development could produce a significant negative effect. Different impacts resulting from the same development, each individually not significant, may also combine to produce a significant negative effect. In some cases, there may be a known and measurable threshold so quantitative surveys (e.g., noise level, air quality) can then provide a decision. At other times, a judgement must be made using professional experience.

3.3.5 The local authorities (Northamptonshire County Council and East Northants District Council, which have now been replaced by North Northamptonshire Council) were consulted with respect to projects to be included in the cumulative impact assessments. Northamptonshire County Council confirmed that the development that should be included are Collyweston Quarry, Wakerley Quarry, Cooks Hole Quarry and Thornhaugh Quarry. East Northants District Council did not identify any relevant additional developments. The operations at the sites identified above are relatively close to the proposed development and all are operating in combination with the existing site currently. It is considered likely that due to the consistency of the proposed operations compared with the current consented activities there will not be any in combination likely significant effects.

Determining significance.

3.3.6 In accordance with CIEEM guidance (CIEEM, 2018), the significance of an effect takes into account the characteristics acting on the important feature (see Table 1) and then attaches a weighting based on the following geographic scale at which the effect occurs:

- International.
- National.
- Regional.
- County.
- Zone of influence or Site (to be specified).

3.3.7 The geographical scale has a direct bearing on the mitigation or compensation measures that must be achieved since these are required to reduce the effect

to a level that accords with nature conservation objectives, as defined by relevant legislation and planning policy.

3.3.8 This method of assessment does not use a matrix approach where, for example, magnitudes are assigned categories of low, medium or high in order to identify whether an effect is minor, moderate or major. For the purpose of this assessment, effects are either:

- **Significant:** an effect on an important ecological feature arising from activities associated with the project that is likely to undermine nature conservation objectives.
- **Not significant:** an effect arising from activities associated with the project that does not undermine biodiversity conservation objectives or where important habitats, groups or species under consideration would be resilient to such effects were they to occur.

3.3.9 A significant effect may be positive or negative. Ideally, the judgement will be based on the best available scientific evidence. Where this is not available, a more subjective assessment will need to be used and, in such cases, the assumptions and limitations of this are stated. Under CIEEM guidelines (CIEEM, 2018), no confidence levels are attributed to the certainty of an outcome so as a precaution, the effect of an impact identified here has not been understated and the success of mitigation has not been overstated.

Avoiding/mitigating identified impacts.

3.3.10 Potentially significant impacts arising as a result of the scheme were identified as early as possible and the scheme was designed to avoid or minimise them. The impact assessment takes into account the embedded mitigation and its likely effectiveness, with further mitigation only recommended when the embedded mitigation will not reduce residual effects to an acceptable degree. Further details of the measures planned are set out in Section 6.2 below.

3.3.11 The overall aim is to achieve net biodiversity gain either as a result of mitigation alone or in combination with bespoke enhancement measures. The mitigation hierarchy used in this assessment is defined in Table 2 from CIEEM, 2018.

Table 2. Mitigation hierarchy.

Measure	Definition
Avoidance.	Seek options that avoid harm to ecological features (for example by adjusting phasing or creating new habitat in advance of works).
Mitigation.	Negative effects should be avoided or minimised through mitigation measures, either through the design of the project or subsequent measures that can be guaranteed, for example, through a condition or planning obligation.
Compensation.	Where there are significant residual negative ecological effects despite the mitigation proposed, these should be offset by appropriate compensatory measures.
Enhancement.	Seek to provide net benefits for biodiversity over and above requirements for avoidance, mitigation or compensation.

3.4 CONSULTATIONS AND SCOPING REQUESTS

3.4.1 In response to the scoping request and associated scoping report submitted to the Planning Inspectorate (PINS) on 1 July 2020, responses relevant to the proposed scope for ecology and nature conservation were received from PINS and the following statutorily consulted bodies:

- The Forestry Commission, in relation to impacts on ancient woodland, specifically Fineshade Woods.
- The Ministry of Defence, in relation to the requirement for a Bird Hazard Management Plan.
- Natural England, setting out their formal requirements for Environmental Impact Assessment (EIA) regarding statutorily protected sites and species, together with locally important sites.
- Public Health England, regarding the potential to provide for improved well-being through the provision of access to natural habitats and open spaces.

3.4.2 Formal pre-application consultation was undertaken in October 2020. Section 42 responses were received from the following parties:

- Natural England raised the potential for impacts on designated sites, the potential for impacts on protected species, the potential for impacts on air quality that may affect the adjacent protected woodlands, the importance of using the opportunity of the restoration of the site to enhance the local distinctiveness in the long term of the Rockingham Forest landscape character and to demonstrate measurable biodiversity net gain.
- Forestry Commission focussed on the connection between the two woodlands either side of the western section of the proposed western extension and in particular the opportunity to restore a link between these woods as part of a wider aim to deliver a more biodiverse landscape across the Rockingham Forest Area.
- The Ministry of Defence, in relation to the requirement for a Bird Hazard Management Plan.
- Public Health England, regarding the potential to provide for improved well-being through the provision of access to natural habitats and open spaces.

3.4.3 Section 47 responses were received from the following conservation groups:

- The Wildlife Trust for Bedfordshire, Cambridgeshire and Northamptonshire, concerned to ensure that the proposed extension protects the existing importance of the area and provides biodiversity enhancements from the outset.
- Butterfly Conservation Trust, supporting the concerns of the Friends of Fineshade.
- Amphibian and Reptile Conservation, supporting the concerns of the Friends of Fineshade and particularly, the importance of the Rockingham Forest area for adders.
- People's Trust for Endangered Species, supporting the importance of habitat connectivity for dormice in the area.
- Northants Diptera Recorder, concerned that the proposed development might create a barrier for movement of invertebrate populations.

- Back from the Brink, Roots of Rockingham, concerned regarding potential impacts on the bats of the two adjacent woodlands.
- Woodland Trust, concerned for impacts on the adjacent ancient woodlands.

3.4.4 Section 47 responses were also received from members of the public as follows:

- [REDACTED], the Friends of Fineshade group, concerned for potential loss of connectivity for wildlife using the two woodlands adjacent to the proposed extension site.
- A further 47 members of the public specifically supporting points made by [REDACTED].
- A further 35 members of the public voicing other general concerns on ecological matters.

3.4.5 Further discussions, including video meetings and telephone conversations, were held with the consultees listed in Table 3 below, together with the issues discussed and the section or paragraph(s) in this report where these issues are discussed.

Table 3. Scoping issues raised by consultees.

Consultee	Issue	Where discussed
Friends of Fineshade; Amphibian and Reptile Conservation.	Connectivity for adders.	Current distribution: See App 1-6. Discussion of how connectivity will be enhanced, Subsection 9.5 below.
PTES; Back from the Brink; Wildlife Trust.	Connectivity for dormice.	Discussion of how connectivity will be enhanced, Subsections 5.7 and 9.8 below.
Amphibian and Reptile Conservation.	Connectivity for amphibians and reptiles.	Discussed regarding the importance and enhancement provision for amphibians/reptiles

Consultee	Issue	Where discussed
		paragraphs 8.1.1, 9.3.4, 9.4.1 and 9.4.4.
Northants Diptera Recorder.	Connectivity for invertebrates.	Survey results, known distribution: Appendices 1-4, Subsection 5.2. Enhancement, Subsection 9.3.
Natural England; Forestry Commission; Wildlife Trust; Woodland Trust.	Impacts on adjacent woodlands (general).	See Appendix 2, arb survey/report and Section 8 (embedded avoidance/mitigation/enhancement measures, especially 8.1, pre-development). Embedded measures, also discussions with consultees, Appendix 1-11.
Back from the Brink.	Protecting habitat for important butterflies.	See Appendix 1-4 and Appendix 1-11.
Back from the Brink.	Importance of connectivity for foraging bats.	See Appendix 1-8 and Appendix 1-11.
Forestry Commission, Natural England, Wildlife Trust.	Preventing deer browsing on new habitat.	See Section 8 (embedded avoidance/mitigation/enhancement measures, especially 8.2 'Fencing' and Table 8.1), also discussion with consultees.
Wildlife Trust.	Achieving Biodiversity net gain.	See Appendix 3.

3.4.6 Copies of e-mail discussions with these consultees and with others suggested by them, together with reports of meetings and telephone conversations, are given in Appendix 1-11. In some cases, further information was supplied to them and by them.

4 DESK STUDY RESULTS

4.1 DESIGNATED SITES

4.1.1 The nearest sites included in the National Sites Network (previously Internationally Important Sites) are Barnack Hills and Holes Special Area of Conservation (SAC), which is approximately 7.5km to the northeast, Rutland Water Special Protection Area (SPA) and Ramsar site, which is approximately 8.8km to the northwest and the Nene Valley Gravel Pits SPA and Ramsar site, which lies some 19km southeast of the application boundary as its closest point. These sites are considered separately in the Habitats Regulations Screening Assessment. None of their SSSI planning risk zones include the Site.

4.1.2 SSSIs lying within 5km of the Site, together with a summary of their interest and overlying planning risk zones, are listed in Table 4 and those with non-statutory protection within 2km are listed in Table 5. All SSSIs for which the Site lies within a Planning Risk Zone⁴² are considered to be ecologically important features.

Table 4. SSSIs lying within 5km of the Site.

Name, designation and description	Proximity to the site	Site within Planning Risk Zone
Collyweston Great Wood and Eastern Hornstocks NNR and SSSI. Ancient coppice-with-standards woodland with a very rich ground flora.	Immediately adjacent to the northeast.	Yes.
Collyweston Slate Mine Geological SSSI (no ecological interest).	2.2km to the north.	No.

⁴² <https://magic.gov.uk>

Name, designation and description	Proximity to the site	Site within Planning Risk Zone
King's Cliffe Banks SSSI. Former quarry, now calcareous grassland with a rich flora and many bryophytes and lichens.	2.45km to southeast.	No.
Bedford Purlieus NNR and SSSI. Ancient oak and ash coppice-with-standards woodland with a diverse flora.	2.93km to east.	Yes.
Bonemills Hollow SSSI. Marshland dominated by rushes and sedges on the valley floor and Jurassic calcareous grassland areas.	3.38km to northeast.	Yes.
Wakerley Spinney SSSI. Broadleaved woodland and semi-natural grassland, a remnant of the mediaeval Royal Forest of Rockingham.	3.40km to west.	No.
Racecourse Farm Fields SSSI. Former quarry, now grassland on Jurassic limestone. The flora is diverse, with several locally-rare plants.	3.75km to northeast.	No.

Table 5. Biological sites with non-statutory protection lying within 2km of the Site.

Name, designation and description	Proximity to the site
Fineshade Woods LWS. A large area of ancient woodland and mixed plantation on an ancient woodland site with neutral grassland and ponds.	Immediately adjacent to west.

Name, designation and description	Proximity to the site
Fineshade Lane LWS. A green-lane leading to Fineshade Wood, providing a useful wildlife corridor and exhibiting a diverse range of scrub species.	0.98km to the west.
Collyweston Quarries RIGS/LWS. A former quarry, now rough grassland on Jurassic limestone. The flora is diverse and there is a substantial butterfly population.	470m to the west.

Key: SSSI - Site of Special Scientific Interest, NNR - National Nature Reserve, LWS - Local Wildlife Site. RIGS - Regionally Important Geological Site.

4.2 PROTECTED AND VALUED SPECIES

4.2.1 A summary of the recent (post-2000) available records of species with nature conservation designations within 1km of the Site is given as Table 6, taken from Appendix 1-2.

Table 6. Species of nature conservation interest.

Species/group	Status	Proximity to the site
1,501 records for around 125 species of invertebrates, 2000-2020.	NERC S41. RDB.	Mainly from Collyweston Great Wood.
51 records for GCN, 2014-2020.	HSR, WCA, S5.	Mainly from Fineshade Woods.
49 records for other amphibians, including common toad, common frog, smooth newt and palmate newt, 2014-2020.	WCA, S5, NERC S41.	Closest record is 1.1km to the southwest.
238 records of reptiles including slow worm, common lizard, grass snake and adder, 2006-2020.	WCA, S5.	Present in Fineshade Woods.

Species/group	Status	Proximity to the site
584 records for 54 bird species, including 11 WCA S1 and 23 Red List species.	WCA S1, Red List, NERC S41.	Most of records from Fineshade wood; others within 1.1km.
77 records including 11 roost records for at least eight species of bat, 2000-2020.	HSR, WCA.	The closest are of hibernacula from Collyweston Great Wood.
24 records for dormouse supplied, all from Fineshade Woods.	HSR, WCA, NERC S41.	1.5km to southwest.

Key: NERC S41 - Section 41 of the Natural Environment and Rural Communities Act, 2006; RDB – Red Data Book (Invertebrates); HSR - The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations, 2019; WCA - Wildlife and Countryside Act, 1981: S5 - Schedule 5 of the WCA; S1 - Schedule-1 of the WCA; Red List - Birds of Conservation Concern 4, Eaton *et al.*, 2015⁴³.

5 BASELINE DESCRIPTION

5.1 HABITATS, PLANT COMMUNITIES AND PLANT SPECIES

5.1.1 The western extension comprises two arable fields with grass margins of varying width and species-richness. The fields are separated by a trimmed hedgerow, 2m-high, dominated by hawthorn and blackthorn with small numbers of other woody species and a single, large pedunculate oak at its eastern end. This hedgerow qualifies as 'important' under the Hedgerow Regulations, 1997 (HR) since it is used by a number of protected reptile species. There is also a small block of scrubby woodland, mainly hawthorn, with one large pedunculate

⁴³ 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 United Kingdom, Channel Islands and Isle of Man. British Birds 108: 705-746.

oak jutting into the northern field just to the north of the central hedgerow. The scrubby area has been used for pheasant rearing; an area to the south has been used as a storage yard and has some hardstanding and spoil/rubble heaps present.

5.1.2 The fields are bound by the adjacent woodlands, Collyweston Great Wood SSSI and NNR to the northeast, a small, private wood with grassland and duck ponds to the north and Fineshade Woods to the west and south, with stretches of hedgerow on the west and southeast edges. The hedgerow/treeline on the north side, linking Fineshade Woods to the northern private woodland and a short length linking two areas of Fineshade Woods also qualifies as 'important' under the HR since they are also used by protected species but lie outside the Site boundary so are not affected. The managed hedgerow on the southeast boundary of the southern field of the proposed western extension, with arable on both sides, does not qualify as 'important' under the HR.

5.1.3 The existing ENRMF site is active and its habitats are constantly changing but when surveyed, it comprised rough grassland and scrub, mainly around the margins, areas of ruderal vegetation, bare ground, hardstanding, haul-routes, buildings, water bodies (including those forming part of the water-management system, together with ponds managed for GCNs) and some more species-rich grassland on restored landfill cells. It is bound by a wire fence to the north, with privately-owned woodland beyond and hedgerows to the east, south and west, a road beyond to the east and farm tracks to the south and west. Only the hedgerow on the western side qualifies as 'important' under the HR, again for its use by protected reptile species.

Species of note.

5.1.4 The soil of the northern field is more calcareous than elsewhere on the Site and has three 'arable weeds' of interest within its margins. Dwarf spurge and field

woundwort are classified as Near Threatened and corn mint as Vulnerable in the GB Red Data Book of Vascular Plants (Stroh *et al.*, 2014⁴⁴).

- 5.1.5 Japanese knotweed, an invasive non-native plant listed on Schedule-9 of the WCA, was recorded on the existing ENRMF site (and is now being treated).

Conclusions.

- 5.1.6 The hedgerows that meet the criteria for ‘importance’ under the HR and the Japanese knotweed are considered Important Ecological Features of this Site. The arable weed species listed by Stroh *et al.*, 2014, are of interest but since arable farming is widespread in the area, they are considered resilient to the proposed activities.

5.2 INVERTEBRATES

- 5.2.1 The survey of 2019 concluded that the Site includes a range of habitats, from short, flowery turf and taller, grassy swards to scrub and woodland edge, some of which have deadwood features such as sapwood decay. This is a range of habitats that is of value to invertebrates. The most notable is the woodland edge and deadwood that is complemented by flowery grasslands and ruderal fringes, particularly on the eastern edges and the steep, flower-rich and diverse banks to certain ditches.
- 5.2.2 The hedgerows are generally of poor-value for invertebrates due to a lack of woody species-richness and an apparently regular cutting regime, which tends to reduce variation in physical structures along a hedgerow.
- 5.2.3 The survey of Fineshade Woods in 2020 recorded 238 species, including 11 species currently considered of value. The diversity of species is not especially rich, reflecting the fact that much of the survey was conducted along woodland rides and glade edges (to compare with the woodland edge) but does demonstrate the value of these edge habitats. The woodland path edges are

⁴⁴ Stroh P A, Leach S J, August T A, Walker K J, Pearman D A, Rumsey F J, Harrower C A, Fay M F, Martin J P, Pankhurst T, Preston C D & Taylor I, 2014. A Vascular Plant Red List for England. Botanical Society of Britain and Ireland, Bristol.

in part flowery and characterized by open-habitat flowers such as common knapweed, thus they attract a suite of open-habitat species including many bees, wasps and fruit-flies. The presence of a suite of woodland butterflies, the most noteworthy of which is the white admiral, is a feature of Fineshade Woods.

5.2.4 The Collyweston Great Wood survey recorded 212 species, with 18 species considered as being of value. The woodland is rich with saproxylic species and includes some scarce and niche species, such as those of heartwood decay. It thus recorded fewer species than Fineshade Wood but had a greater number and proportion of scarce species; which is likely due to its greater number of mature and degenerate trees. The two woodlands are connected to one-another by tree lines and hedgerows that also border the proposed Western Extension Site. There are similarities in the faunas present in the woodlands but also significant differences, largely around the suites of species associated with deadwood and to a lesser extent, the open habitats.

Summary of importance.

5.2.5 The Site's boundary, providing woodland edge habitat with flower-rich grassland, is a high-value resource; the surrounding woodland survey acknowledges the importance of the Site to the robustness of populations within the two adjacent woodlands. The Site's invertebrate populations and the edge habitat are therefore Important Ecological Features, certainly in the zone of influence and probably the Rockingham Forest region.

5.3 AMPHIBIANS

GCNs.

5.3.1 Of the eight waterbodies surveyed in 2019 and 2020, GCNs were recorded in six, with confirmed breeding in ponds on both sides of the Site. Surveys carried out found GCNs using seven of them, with breeding confirmed by the finding of eggs. Two of the ponds surveyed on the east side were created and managed for GCNs, with open banks and much aquatic vegetation. The ponds in Fineshade Woods are typical woodland ponds, more shaded and therefore with less-optimal habitats and generally-lower numbers of GCNs.

Other amphibians.

5.3.2 Smooth newts were recorded in every waterbody surveyed in at least one year, with larger numbers generally found on the eastern side. Conversely, palmate newts apparently preferred the Fineshade Woods ponds. Common toads were found in relatively few ponds and common frogs only in one but it was noted that the surveys may have started too late to find them in the ponds. Adults and juveniles were found under ACOs on both woodland margins and are considered to occur widely, if in fairly small numbers, in both the adjacent woodlands.

Summary of importance.

5.3.3 GCNs are a protected species, present and breeding in both woods. It is therefore considered an Important Ecological Feature in the context of the zone of influence at least.

5.3.4 The common amphibians currently have limited statutory protection but the presence of a full range of species is a consideration for selection as an LWS⁴⁵. Amphibians are therefore considered an Important Ecological Feature, in the context of the Site.

5.4 REPTILES

Adders.

5.4.1 Adders are known to be present within Fineshade Woods and have also been found on roadside verges in the area. More recent surveys identified a good population on the south-facing side of a wide, grassy ride in The Assarts and found adders at three sites in Collyweston Great Wood (S O’Riordan, *pers. comm.*). They have also been recorded to the north and west of the existing ENRMF, most recently in 2016 and on the western edge of the central hedgerow across the Site in 2019.

⁴⁵Northamptonshire Biodiversity Partnership, Local Wildlife Sites Panel, 2014 (last updated) Wildlife Sites Selection Criteria, Northamptonshire.

Other reptiles.

5.4.2 Common lizards and slow worms were found around all margins of the Site and have also been recorded regularly to the north of the existing ENRMF. The largest concentrations appear to be on the western edge of Collyweston Great Wood (which is south facing) but it is likely that good populations occur in similar sunny ride edges in both woods. Immature grass snakes have also been found infrequently on the ditch bank on the south-eastern boundary of The Assarts.

Summary of importance.

5.4.3 The Rockingham Forest area is said to be “of particular importance for the adder as it is one of the few areas where this formerly widespread species occurs in the East Midlands” (J Foster, Amphibian and Reptile Conservation Trust, consultation response) and with scattered, separate populations on both sides of the Site, it is clearly an Important Ecological Feature in a county or regional context.

5.4.4 With populations on all woodland margins, the common reptiles are probably also found throughout the woodland, particularly on sunny rides and glades. It is considered likely that they will be resilient to the development activities.

5.5 BIRDS

Passage and wintering birds.

5.5.1 The existing ENRMF does not accept household waste so does not attract large numbers of birds such as corvids or gulls. The waste types accepted at the site will not change as a result of the proposed development. The survey area as a whole is not known for large passage/wintering bird flocks and the 2018/19 survey has confirmed this. The passage/wintering bird survey recorded 37 species, mainly passerines, with most of these feeding in the arable fields and hedgerows. No wintering waders such as lapwings or golden plover were recorded using the Site.

Summary of importance.

5.5.2 The birds using the Site in autumn and winter are mainly residents, all found locally and are considered resilient to this development so do not form an Important Ecological Feature of the Site.

Resident, breeding and summering birds.

5.5.3 The summer bird survey of the proposed western extension recorded 47 species and of the existing ENRMF recorded 34 species, using mainly the boundary hedgerows, northern slope and ponds on the northern edge. Not surprisingly, there was a very large overlap in the two lists considering the proximity of the survey areas. Several of the birds, such as red kite and peregrine, are resident elsewhere and visit the area to forage.

Summary of importance.

5.5.4 It is considered likely that the assemblage will be resilient to the development. Many of the birds are woodland and scrub species or conversely, need open habitats such as farmland. For all these birds, not only will large areas of their preferred habitats continue to be present throughout but as the restoration is completed, the new habitats will be able to carry even greater numbers and a larger range of species than the Site does at present. Breeding birds are therefore considered resilient and are not assessed further.

5.6 BATS

5.6.1 Whilst the fields of the proposed western extension area have woodland on two sides and there are at least two trees within the woodland TPA due to be retained, these are only two trees within the proposed western extension. One of these, T1, was identified as having moderate bat roost suitability with Potential Roost Features (PRF) provided by lateral fissures on a storm-damaged bough. Whilst this tree may be retained, the results of the 2020 surveys have been used to inform a supplementary PRA of trees within the TPA and, along with T1, targeted dusk/dawn surveys are currently being undertaken and will continue through late summer 2021. The results of these surveys will be provided in a supplementary report.

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- 5.6.2 Bat activity on the walked transects was overwhelmingly located along the wood edges, with very few bat passes recorded over the arable fields. The majority of the activity was due to common and soprano pipistrelles, with the same individuals responsible for multiple passes. Occasional passes by *Myotis* species of bats, barbastelles and brown long-eared bats were also recorded, with noctules and Leisler's bats making high, overhead passes.
- 5.6.3 The static detector surveys recorded the same six species plus passes by *Myotis* species and three passes by a Nathusius' pipistrelle. This level of activity by Nathusius' pipistrelle is insignificant given the sampling effort and the Site is very unlikely to be of material importance to this species. The *Myotis* species were considered most likely to comprise a mixture of Daubenton's bat, Natterer's bat and whiskered/Brandt's bat. Regular use of hedgerows, including the central hedgerow, for commuting was recorded by soprano pipistrelle, common pipistrelle and barbastelle but there was little evidence for commuting-use by other species, including brown long-eared bat.
- 5.6.4 There are no buildings or structures on the Site suitable for roosting bats but all bat passes were time-stamped by the detector and by comparing the number and timing of passes to known emergence and dawn-return times for individual species, likely roost locations could be identified in the adjacent woods. Two detectors on the same ride in Collyweston Great Wood recorded high soprano pipistrelle activity in the roost emergence period and a doubling of passes in September and October, a time when juveniles would be on the wing; mating roosts of this species have been recorded in the bat boxes south of this wood. Most of the common pipistrelle activity over the emergence period was recorded along the wood edges of the northern field, making it likely that there are several roosts in this area.
- 5.6.5 For *Myotis* bats, high activity in the emergence period was recorded on one ride in The Assarts and at two locations in Collyweston Great Wood. Most barbastelle activity was recorded along woodland edges with very little in open habitat; most emergence-time activity was recorded in Collyweston Great Wood and this species has been recorded using bat boxes in woodland to the north of the existing ENRMF.

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- 5.6.6 Noctules are high-flyers with loud calls so one bat can be responsible for multiple recordings however, most emergence-time activity was recorded at one detector in The Assarts. Leisler's bats are similarly high-flyers but most calls indicated they simply commute over the Site and there were few passes in the emergence period so there is no indication of a roost, although this species has also been found in bat boxes to the north of the existing ENRMF.
- 5.6.7 Brown long-eared bats have very low-amplitude calls and feed mainly on moths, often in open grassland areas. This survey gave no indication of a potential roost site, although they are also found in the bat boxes to the north of the existing ENRMF.

Summary of importance.

- 5.6.8 Due to its high statutory protection, the bat assemblage using the Site is considered an Important Ecological Feature within the zone of influence however, given their mobility and the fact that most species are foraging and commuting along the woodland margin and along rides within the woodland, it is considered likely that they will be generally resilient to any effects of the development. Several bats were recorded using the central hedgerow but the same species were also recorded crossing the open field, although in smaller numbers.

5.7 DORMICE

- 5.7.1 Dormice have been introduced into Bedford Purlieu (Ian White, PTES, *pers. comm.*) and have been present in Fineshade Woods as long as historically known (Dr. G Hitchcock, *pers. comm.*) but as yet, have not crossed into Collyweston Great Wood from either side. Annual box checks carried out since 2016 just to the south of Collyweston Great Wood have found no sign of them and nut hunts have also proved negative.
- 5.7.2 NBRC provided 24 dormouse records within 2km of the Site from Fineshade Wood to 2018 and more recent annual checks there indicate they are getting nearer to the Western Extension. Dormouse nest tubes have also been placed in the central hedgerow in 2019, 2020 and 2021. To date (30 June 2021), there is no evidence they use the Site or the current ENRMF.

Summary of importance.

5.7.3 Extending the area occupied by dormice to include Collyweston Great Wood would be excellent for the Roots of Rockingham project, a large step on the way to reaching the Bedford Purlieus mice and establishing a metapopulation. Though not strictly an Important Ecological Feature of the Site at present, they are certainly such a feature for Fineshade Woods and will hopefully be so for the development Site in the future.

5.8 OTHER MAMMALS

Deer.

5.8.1 Fallow, roe and muntjac deer are all known to be present in the area and all have been recorded crossing the arable fields. Although locally shot to control the population, they must be prevented from accidental death or injury on the active Site and therefore, standard deer fencing will be erected adjacent to the GCN fence to exclude all deer. Signage will also alert vehicle drivers to be aware of and to avoid deer.

Brown hares.

5.8.2 Only one post-2000 record was provided by NERC but individuals of this species are occasionally seen using the arable fields on and adjacent to the Site, particularly on early morning surveys. Although an S41 species, they are not considered an Important Ecological Feature of the Site due to their scarcity and probable resilience to the development activities but they are recorded for reporting to NERC.

5.9 SUMMARY OF IMPORTANT ECOLOGICAL FEATURES

5.9.1 The Important Ecological Features identified above are shown in Table 7, together with the geographical area over which they are considered important. No plant species or communities, other than hedgerows, have intrinsic value so they are assessed as habitat for important species and discussed with these species.

5.9.2 Some of the hedgerows meet the criteria for importance under HR but aside from this, all the hedgerows on the Site are important for providing what little connectivity there is between the two adjacent woodlands; this hedgerow framework is therefore also an important ecological feature of the Site in its own right. This framework provides food, shelter, cover and a movement corridor for all the faunal groups using the Site and is the key to expanding these attributes to the whole of the Western Extension.

Table 7. Summary of Important Ecological Features.

Ecological Feature	Reason for Importance	Geographic Context
Collyweston Great Wood and Easton Hornstocks SSSI and NNR.	A unique ancient lime woodland, part of the historic Rockingham Forest. Many unusual woodland plants and birds are recorded.	National.
Bedford Purlieus SSSI and NNR.	Ancient oak and ash coppice-with-standards woodland with a diverse flora.	National.
Bonemills Hollow SSSI.	Marshland on the valley floor and Jurassic calcareous grassland areas.	National.
Fineshade Woods LNR.	A large woodland containing areas of replanted and existing ancient woodland, important for a wide range of wildlife.	County.
Hedgerow framework.	Providing feeding areas for invertebrates and thus for amphibians, reptiles, birds, bats and potentially dormice; providing cover and shelter for reptiles and amphibians and a movement corridor for bats.	Zone of influence.

Ecological Feature	Reason for Importance	Geographic Context
Site margins (proposed western extension).	Providing woodland edge habitat; mature trees and flower-rich grassland, linking the bordering woods for a suite of important invertebrate species and herpetofauna.	Zone of influence.
GCNs.	Afforded protection under the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations, 2019 and the WCA; not breeding within the Site but likely to use its margins for foraging.	Zone of influence.
Common amphibian assemblage.	Valued in Northants, where a good assemblage, together with reptiles, is a selection feature for LWS.	Zone of influence.
Adders.	Priority species for Back from the Brink; one of the few areas this species occurs in the East Midlands.	County.
Bat assemblage.	Statutory protection, some use of the central (and other) hedgerows but likely to be resilient.	Zone of influence.
Dormice.	A protected species, not yet present, whose use of the Site would help to bolster connection of the local Rockingham Forest metapopulation.	Future site, linking the populations of Fineshade Woods and Bedford Purlieus.

5.10 DATA LIMITATIONS

5.10.1 The information provided by the desk study, consultations and suite of field surveys described above is fully adequate for the assessment of potential impacts and identification of mitigation measures.

6 DEVELOPMENT PROPOSALS

6.1 The details of the proposed scheme are presented in full detail in the application documents. A summary of the scheme, relevant to the ecology of the Site and its surroundings, is given below.

- Phased removal of certain hedgerows to allow construction of a new haul road into the Western Extension.
- Erection of a fence to protect deer and protected species from accessing the active working area in the western extension area at any time.
- The construction of new landfill void, in a number of phases, for the disposal of the same range of hazardous wastes and low-level radioactive waste (LLW) currently disposed of at the existing ENRMF site, supported by the existing site infrastructure.
- The continuation of filling of the existing ENRMF landfill with hazardous waste and LLW (subject of the current Development Consent Order (DCO)) and the amendment of the consented restoration profile to tie the existing landfill in to the proposed extension landform.
- The winning and working of minerals in order to create the landfill void and provide extracted materials for use on Site as well as the exportation of clay and overburden for use at other sites.
- The stockpiling of clay, overburden and soils for use in the construction of the engineered containment system at the Site and restoration of the Site.
- The direct input of waste into the existing and new landfill.
- An increase to the waste throughput of the waste treatment and recovery facility to 250,000tpa, which comprises an increase of 50,000tpa compared with the rate consented in the 2018 DCO amendment.

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- A combined total waste importation rate limit to Site including that to the waste treatment and recovery facility and to the landfill, which will be an increase of 50,000tpa compared with the currently consented total input rate.
 - No increase to the hours currently worked on the site.
 - The diversion of an overhead electricity cable that crosses the Western Extension to an alternative route within the application area.
 - Restoration to generally domed landforms in the extension area and amendment to the approved restoration profile of the existing ENRMF site to create a coherent restored landform over the whole application site.
 - Restoration of the Site to nature conservation interest using the soils available at the Site as well as suitable imported materials.
 - Completion of the landfilling and restoration operations by December 2046; retention of infrastructure until 2046 and of long-term management infrastructure beyond this date.
 - The Site will be subject to a twenty-year aftercare and maintenance period following the completion of restoration.

7 IDENTIFICATION OF POTENTIAL IMPACTS

7.1 IMPACTS AND AVOIDANCE SPECIFIC TO SSSI

7.1.1 Table 7 above shows the three SSSIs for which a planning risk zone includes all or part of the Site. Where parts of the Site lie within more than one risk zone, the issues required to be considered for the closest zone have been taken to refer to the whole Site. Since the planning issues identified for the closest zone to Collyweston Great Wood and Easton Hornstocks SSSI include all of the issues identified for the relevant zones of the other SSSIs, it is assumed that any measures required to protect the former will also protect the sites further away.

7.1.2 Relevant issues identified, as shown in MAGIC, for these SSSIs are:

- Infrastructure: overhead electricity cables are to be removed and re-sited underground.

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- Extraction of minerals.
 - Air Pollution: creation of dust either in construction or operation or of air pollution from use of vehicles during both construction and operation.
 - Combustion: flaring of landfill gas from the two pre-Augean cells, now diminishing (no further landfill gas will be generated).
 - Waste: mechanical and biological waste treatment, hazardous landfill and LLW.
 - Discharges: any discharge of water or liquid waste of more than 5m³/day to ground (i.e., to seep away) or to surface water, such as a beck or stream (discharge/runoff to be controlled at level obtained pre-development).
 - There is also potential for hydrological effects, specifically restrictions on surface water drainage patterns, on the two woods by the opening of the void space.

7.1.3 These woodlands are ancient and provide for a large number of rare and valued species and any damage to them would constitute a significant negative effect. All these issues are considered and resolved fully in the relevant sections of the ES however, in summary,

- The ENRMF is the subject of three Environmental Permits (EP): for the hazardous waste landfilling operations, for the waste treatment and recovery facility and for the LLW disposal activities. Any extension to the waste management operations at the site will continue to be the subject of EPs.
- Environmental monitoring during the operational and aftercare phases while the Site is managed will be carried out to confirm that the levels of contaminants and radiation in a range of media relevant to potential exposure pathways such as landfill gas, air emissions, leachate, surface water, groundwater and dust will not exceed the environmental thresholds and radiation dose criteria that are set for the site within the EPs.
- Samples are taken to an agreed programme specified in the EPs and follow protocols approved by the Environment Agency with the resulting monitoring data reported to it. The monitoring regime provides assurance that the Site is performing as expected and that the design, construction and operating

standards of the Site are effective in eliminating or controlling any exposure risks.

- Monitoring for the existing landfill site shows that the engineered containment measures are effective and that groundwater quality adjacent to the site is not affected by the landfill activities. The surface water and groundwater quality will continue to be monitored in accordance with schemes agreed with the Environment Agency through the EPs.
- The proposed development has the potential to generate dust through cell excavation and engineering, soil stripping and restoration, mineral extraction operations, materials handling, on-site transportation, waste processing, stockpiles and exposed surfaces together with off-site transportation. The dust emissions from the site are monitored under the EPs. The thresholds in the EP are set to protect both human health and the environment. Dust in the air is monitored at the boundary of the site as deposited dust and as PM₁₀. Large dust particles are deposited fairly rapidly and usually close to the point of arising at most whereas smaller particles including PM₁₀ have the potential to travel greater distances from the point of arising. Monitoring data for the site boundary over the last five years shows that the only exceedances of the 200mg/m² deposited dust potential nuisance threshold were as a result of agricultural activities on neighbouring fields and not as a result of waste management activities. No PM₁₀ concentrations have been recorded at the boundary of the site above 10micrograms/m³. No air quality threshold is set for PM¹⁰ for the protection of ecosystems however, the concentrations of any PM¹⁰ particulates recorded in the air at the boundary of the site are well below 40micrograms/m³, which is the annual mean air quality target concentration.
- The emissions to air from the site are also controlled under the EP. The site is not permitted to accept waste with a total organic carbon content (TOC) greater than 6% therefore, there is minimal potential for the deposited waste to generate landfill gas or other vapours. The limit on TOC in hazardous waste was imposed in the UK in 2004 so in Phases 1 and 2, waste with higher concentrations of organic carbon was deposited. The gas generated

in these phases is collected and combusted in a flare stack, which is controlled through the EP.

- Gas emissions from all other phases of the landfill are monitored regularly but volumes are so low that there is insufficient to warrant connection to the active gas collection system. All new phases of the landfill in the proposed extension will be subject to the restriction on TOC content and therefore, substantial volumes of gas are highly unlikely to be generated. The quantity of gas generated in Phases 1 and 2 already is declining and this decline will continue.

7.1.4 Both Collyweston Great Wood and the northern part of Fineshade Wood could suffer impacts to the growth of the trees nearest to the Site by damage to their roots resulting in weakening, particularly of older trees, caused by the erection of a steel fence for herpetofauna protection, together with a deer exclusion fence, around the working area. Such damage will be avoided by erecting the fence as described in paragraph 8.2.4 below.

7.2 IDENTIFICATION OF GENERAL ECOLOGICAL IMPACTS

7.2.1 From an ecological perspective, the activities associated with quarrying and landfilling are very similar during the construction and operational phases and are likely to take place simultaneously in different parts of the Site so are considered together. Similarly, since restoration takes place sequentially as work progresses, there is no specific decommissioning phase. The potential impacts arising from these activities are considered to be the following:

- Loss of habitat arising from Site clearance and quarrying.
- Habitat and biodiversity gain arising from restoration.
- Severance of territories or connecting habitats arising from Site clearance, laying down of haul routes, creation of soil bunds or stockpiles of clay and overburden, etc.
- Provision of new connecting habitats arising from restoration.
- Killing or injuring protected species.
- Disturbance to specially protected birds nesting close to the Site.

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- Disturbance to local hydrology, resulting in reduction in ground water available to local trees.
 - Damage or destruction of bird nests or eggs during vegetation clearance.
 - The spread of invasive plant species as a result of vehicle movements.
 - Prolonged noise, vibrations and dust from extraction activities.
 - Increase in vehicle movements with associated noise and dust.

8 EMBEDDED AVOIDANCE, MITIGATION AND ENHANCEMENT MEASURES

8.1 PRE-DEVELOPMENT

8.1.1 The following measures will take place in advance of the development activities summarised in Section 6. They are intended to build up the existing hedgerow framework and to improve and protect the current field margins, together greatly increasing habitat connectivity. They will also provide significant biodiversity net gain. These measures will include:

- The creation of a new species-rich hedgerow, running parallel to and 1-2m away from the existing grown-out tree-line and gappy hedgerow currently forming the western boundary of the western extension. It will run between the northeast end of The Assarts (Fineshade Woods) and the northwest corner of the western extension. This double hedgerow will provide egg-laying sites and larval food plants for some of the important woodland butterflies (including white-letter and black hairstreaks) and strengthen connectivity for a range of other invertebrates and mammals, including dormice.
- Creating a bank and planting a new hedgerow/treeline along the southeast boundary of the southern field to the west of the farm track. This will in time provide wind-shelter and connectivity with the utility corridors.
- Gapping-up the southern boundary of the existing ENRMF, where work in this area is complete (and continuing as these phases are completed) to provide further connectivity, extending to the roadside hedgerow.

- Delineating a wide buffer-strip, measured from the top of the field-side ditch-top, around the whole of the northern field of the proposed western extension. At the moment, this strip is part arable, part rough grassland; it will all be converted to grassland, mainly wildflowers for pollinators and other invertebrates and partly tussocky grassland providing cover for amphibians and reptiles. No habitat other than a strip of arable will be lost in creating this buffer, which will include (and in some areas extend beyond) the Root Protection Area (RPA)/Construction exclusion Zone (CEZ) of the adjacent woodlands, in order to give them maximum protection.
- Low scrub, including bramble, will be encouraged to spread over the tussocky areas and any available deadwood, bricks or rubble will be used to create hibernacula and basking areas. This buffer strip will include (and in some areas, extend beyond) the RPA of the adjacent woodlands, protecting them from disturbance. No vehicles, fires or piling of material of any description, other than deadwood etc. for the creation of hibernacula and basking sites, will be allowed inside it, which will also protect any nests or roost in the woodland edge from disturbance. It will be retained and managed throughout the development on the northern field.

8.2 ON GRANT OF THE DCO: FENCING AND REMOVAL TO SAFETY OF AMPHIBIANS AND REPTILES

8.2.1 Before development starts in the northern field of the proposed western extension, it will be necessary to erect fencing around at least the first cell (Phase 12) in order to protect deer from accidental death or injury. This fence will also serve as the Site security fence. Finer mesh wire fencing will be attached to the bottom of the deer fencing with a buried horizontal return to prevent badgers from burrowing under the fence. At the moment there is no evidence that GCNs use most of this area but they have been recorded from the ditch on the eastern boundary of Collyweston Great Wood and as a protective measure (both for amphibians and reptiles), an exclusion fence for these animals will be included in the fence-line.

8.2.2 An initial application has been made to Natural England Wildlife Licensing to obtain, if possible, a provisional acceptance or alternatively, an indication that

district-level licensing would be more appropriate. Whichever is selected, a full application will be made as soon as the DCO is granted.

8.2.3 The erection of protective fencing around the operational areas of the Site will be carried out progressively as the Site development proceeds in a phased manner. The principles of the phased development are explained in the ES but in general terms, the northern area of the proposed western extension will be developed and completed first from north (Phase 12) to south (Phase 14). The southern part of the extension will then be operated and completed from south to north (Phase 15 to Phase 18). The final section of the Site to be operated will be the central sections of the Western Extension (Phases 19 to 21), which will include the completion of the adjoining areas of Phases 7 to 9 and Phase 11 in the existing ENRMF site.

8.2.4 The fencing for each operational phase will comprise one or both of amphibian exclusion fencing and deer exclusion fencing (which will also serve as Site security fencing) depending on the needs for each area of the Western Extension as described in detail below.

- The first phase of development and hence fencing will be around at least the northern first phase (Phase 12) and will include a lockable gate for the new haul route.
- The GCN protective fence will be constructed on the line of the stand-off from the inner bank (i.e., the site-side) of the boundary ditches. This steel fence will be 1.2m-high, with the top bent towards the woodland and the base sunk 200mm into the ground. This will ensure that amphibians, reptiles and small mammals are not admitted to the active area and are therefore not killed or injured during the development works in this area.
- A deer exclusion fence 1.8m-high will be constructed immediately inside the GCN fence. This will prevent deer (fallow and smaller) and other mammals from gaining entrance to the working area.
- The deer fence will require tensioning posts on the woodland side of the fence at 50m intervals and on any change of the fencing line and for this operation, tree roots will be protected by digging holes for the posts manually under supervision. Minor tree roots (as defined in the Arboricultural Report, Appendix 2, may be severed but if major tree roots

are encountered, the posts will be moved far enough away to avoid damaging the root.

- 8.2.5 Following the erection of the fences around each phase of the proposed operational area, trapping and translocation (to a previously designated mitigation area as set out in the licence) will be carried out under licence to remove to safety all amphibians and reptiles currently using the fenced area.
- 8.2.6 Once all animals are removed to safely, initial works will include the removal of enough of the western boundary hedgerow between the existing ENRMF and Western Extension, most of the eastern half of the central hedgerow and the grassland strip currently crossing the Western Extension. Hedgerow removal is required in order to create the route for the haul road from the existing ENRMF site to the northern Phase 12 area. It will be carried out under ecological supervision.

8.3 DURING DEVELOPMENT AND RESTORATION

- 8.3.1 Fencing will be removed and moved as phases are complete, releasing restored areas to provide additional connectivity for wildlife (see Table 8 below), trapping and transporting reptiles from hedgerows due to be removed and installing targeted areas of deer fencing around the scrub and woodland plantings as required.
- 8.3.2 The nature of the exclusion fencing that will be needed around each operational area will be confirmed at the time in accordance with the DCO Environmental Commitments. Based on the findings of the ecological surveys, the fencing proposals for operational areas are as follows:

Table 8. Fencing requirements for each development phase.

Operational area	Fencing types needed
Phases 12 to 14 in the northern area of the western extension including any haul road or other operational areas	10m standoff area from the inner bank of the boundary ditches Amphibian exclusion fencing Deer exclusion fencing

Operational area	Fencing types needed
Phases 15 to 17 in the southern area of the Western Extension.	<p>10m standoff from the western woodland boundary ditch.</p> <p>5m standoff from the eastern boundary hedgerow to be planted to the west of the farm track.</p> <p>No standoff needed from the southern boundary.</p> <p>Amphibian and deer exclusion fence all around the area.</p>
Phase 18.	<p>10m standoff from the western woodland boundary ditch.</p> <p>No standoff needed from the southern and north-eastern boundaries.</p> <p>Deer exclusion fence all around the area.</p>
Phases 19 to 21 in the central area of the Western Extension.	<p>10m standoff from the western and north-western woodland boundary ditch.</p> <p>No standoff needed from the northern boundary. The eastern boundary will be continuous with the operational area of the existing ENRMF.</p> <p>Amphibian and deer exclusion fence all around the outer boundary of the area.</p>

8.3.3 Throughout the works, the embedded mitigation measures proposed to ameliorate any negative effects will be undertaken. Other opportunities for enhancement of the Site will also be taken and will be implemented during the restoration phases of the Site to achieve biodiversity gain where appropriate and feasible.

8.3.4 The fields separating the two woods are currently under arable management, involving regular movement of farm machinery. This management will continue

on the areas of the Site not being used for deposition of waste and restoration or other operations. The impact of this management (dust, noise and vibration) will be no greater than at present.

8.3.5 Hydrological effects on the woodlands are assessed in detail in the ES but are not considered significant based on the proposed surface water management plan, which will retain current surface water flow patterns to the boundary drainage ditches and other features.

8.3.6 With the embedded mitigation and plans for management of dust and surface-water runoff in place, it is considered likely that Collyweston Great Wood and Fineshade Wood, considered as woodland, including their woody and ground flora species, would be resilient to the development. Impacts on the faunal species for which they are important are considered below.

9 DETAILS OF AVOIDANCE AND ENHANCEMENT MEASURES

9.1 HEDGEROWS

9.1.1 To allow for Site clearance, working and restoration, two hedgerows, totalling some 800m of existing hedgerow, will eventually be lost. One of these runs east-west between the two fields of the Western Extension and the second is on the western edge of the existing ENRMF. Both of these meet the criteria for S41 Habitats of Principal Importance and for importance under the HR but only because the adjacent verges of both are used by all four common reptiles; both hedgerows are species-poor. These hedgerows act as movement corridors, nesting habitats, feeding areas and cover for a variety of plant and animal species.

9.1.2 Both hedgerows will be removed in two operations, initially with only sufficient taken from each to allow creation of a haul route from the existing ENRMF to the northern field. The reptiles will be removed to safety before either hedgerow is breached. By the time the remainder of the hedgerows is removed, there will be at least two hedgerow corridors across the Site, new and enhanced hedgerows along three field edges, a large area of new reptile habitat and all the remaining reptiles will have been removed to safety. The planned

restoration will provide several times as much new and gapped-up hedgerow, all of it species-rich, as will be lost.

Significance of residual effects.

- 9.1.3 With these measures in place, there may still be a small, temporary loss of hedgerows until the new hedgerows grow up however, even in the context of the Site, this will be negative (not significant). In the medium-term, the planned mitigation will constitute a significant positive effect.

9.2 INVASIVE PLANT SPECIES

- 9.2.1 A small area of Japanese knotweed was identified in ruderal ('wasteland') vegetation on the northern edge of the existing ENRMF site. This is now being treated and will not be allowed to spread. No other invasive aliens have been found to date. There is therefore no negative impact from this source. Approved methods of dealing with this plant are set out on the Gov.UK website⁴⁶ and further advice is available from the Environment Agency. A watching brief will be kept for any new occurrence and should any further invasive alien plants be found, treatment will begin at once. The Site is considered resilient to this issue.

9.3 THE SITE MARGINS

- 9.3.1 The invertebrate surveys have shown that the arable fields have minimal interest but the grassed Site margins of the proposed western extension hold a good variety of invertebrates. Further, surveys of the adjacent woodlands have also shown that many, if not most, of the important woodland invertebrates also use the adjacent Site margins, particularly those margins with an open, sunny aspect and a good range of flowering plants, which supply nectar and pollen for the adults of the saproxylic species. This is a good indication that the relatively

⁴⁶ <https://www.gov.uk/guidance/prevent-japanese-knotweed-from-spreading>

species-rich Site margins are essential to the woodland species, particularly those that are restricted to ancient woodland.

- 9.3.2 ACOs placed in these margins were also used by all four of the common reptile species and by at least two of the five amphibians found on the Site. Since all the smaller species are insectivorous and the two snake species prey on herptiles or small mammals, woodland margins that provide a good range of structure and invertebrate food plants are important to these groups also. For all these reasons, loss of the margins, especially the widest, would constitute a significant negative impact within at least the zone of influence and given the importance of the ancient woodland, possibly to the wider Rockingham Forest area.
- 9.3.3 A wide margin will be retained around the borders of all woodland, including the RPA for the adjoining woods. These margins will be managed to maintain a good range of flowering (pollinator) species and a wide variety of structural habitats. The non-woodland margins will abut species-rich hedgerows, including larval foodplants for a number of butterflies and will also include a number of plants to attract pollinators.
- 9.3.4 With these plans in place, very little woodland marginal grassland will be lost and all of the margins around the proposed western extension will be enhanced as set out above to support strong populations of invertebrates and their predators, that is reptiles, amphibians, birds and bats, on all boundaries. These species will therefore be immediately available to move onto the restored area. This will ensure a significant positive residual effect.

9.4 AMPHIBIANS

- 9.4.1 Currently, there are no waterbodies on the proposed Western Extension to the site but amphibians also require terrestrial habitat; the survey results show that both common toad and common frog use the woodland margins for this purpose. This habitat will be increased and enhanced, both by extending the grassland and by also creating new basking and hibernating sites, including log and rubble piles. There will also be a new wetland at the northern edge of the proposed western extension and a new watercourse (Swallow Brook)

connecting the two adjacent woodlands, together with a number of ponds along the southern edge of the existing ENRMF.

9.4.2 No waterbodies will be lost but at present there is minimal connectivity between the ponds, thus limiting the potential for establishment of metapopulations. Without new habitat creation and provision of an improved marginal habitat, there is the potential for some populations to be reduced or lost, which would constitute a significant negative effect over an unknown area.

9.4.3 The protective fence to be erected around the northern field of the proposed western extension area as an embedded measure will prevent death or injury of amphibians. This, together with the restoration plan and the early enhancement measures already described, envisages active improvement of the woodland margin habitat, with the provision of species-rich grassland and basking/hibernating sites, including log and rubble piles.

Significance of effects.

9.4.4 With these enhancements in place, the animals will be protected and the current limited connectivity of amphibian populations will be improved, bringing the potential for genetic mixing and for increasing the populations, thus reducing the likelihood of losing any species, at least locally. This outcome would constitute a significant positive effect over at least the study area.

9.5 ADDERS

9.5.1 Adders, a Priority Species for the Roots of Rockingham project, are predatory on the common reptiles and amphibians so are much the least widespread reptile species and to date, have not been recorded in the woodland marginal strip anywhere along the field edges. They are found in both Fineshade Woods and Collyweston Great Wood but appear to be scarce in the latter, possibly because there is less open grassland near to low cover there.

9.5.2 One adder was recorded several times in 2016 in grassland between the existing ENRMF and Collyweston Great Wood but since then, the grassland has been shaded-out by trees and no adders have been recorded. There is one record, from 2019, of an adder at the western end of the central hedgerow

that crosses the proposed western extension and there is a strong need to improve habitat connectivity as a step towards linking the scattered populations. More recently, some felling in Collyweston Great Wood has increased the potential for adders to use more open areas so linking the two populations would be a significant positive effect.

- 9.5.3 As part of the restoration, three wide, grassy corridors are planned to cross the Western Extension (along the watercourse between Phases 14 and 21, between Phases 18 and 19/20 and between Phases 17 and 18). All three will have a double hedgerow on each side with wildflower grassland, managed to give a range of heights. The most northerly of these will directly connect Fineshade Woods to the area on the eastern side where there was an adder record in 2016. The western half of the central hedgerow will remain in place and will be managed to provide good habitat for reptiles and invertebrates until the northern hedgerow of the northern corridor is established and the three cells to the north of it are completed and restored. Only then will the remainder of the central hedgerow be removed.

Significance of effects.

- 9.5.4 With these enhancements in place, the connectivity of adder habitat will be improved, providing the means for linking the populations and reducing the likelihood of losing the species, at least locally. This outcome would constitute a significant positive effect over at least the study area and possibly over all of Rockingham Forest.

9.6 BIRDS

- 9.6.1 The surveys showed that the Site supports a good range of probable/possible breeding species. These include many S41 species, Red-/Amber-listed species and local BAP species, which are declining nationally, particularly farmland birds such as skylark, yellowhammer, reed bunting and corn bunting. They also showed that several S1 bird species, including hobby and barn owl, feed and probably breed in the vicinity. The breeding bird community of the Site is thus significant at the scale of the zone of influence. Removal of hedgerows or clearance of arable fields in the breeding season would have a

negative effect on this breeding bird community; damaging or destroying active nests or eggs and/or killing or injuring nestlings are also offences under the WCA and would comprise a significant negative effect.

9.6.2 All hedgerow removal will take place outside the breeding season and the arable fields will remain in this use until required for development. Loss of hedgerow breeding habitat will be minimised and adjoining arable land will continue to be available. Numbers of breeding pairs of some species may show short-term reductions but no species will be lost and no active nests will be destroyed or damaged. Restoration to land of higher biodiversity value will provide habitat not only for many farmland species but also for additional birds of woodland, scrub and wetlands. The bird community is therefore considered resilient to this development.

9.7 BATS

9.7.1 There are no buildings or structures on the Site suitable for bats to roost in and no tree-roosts are known within the Site, although any trees to be felled will be re-assessed. There will normally be no night-time working and the Site will not be floodlit so bats will not be subject to disturbance by light, noise or dust when they emerge. If lighting is necessary for health and safety reasons, it will be directed downward; at the time of year when lighting might be needed during working hours, bats will be in hibernation.

9.7.2 The great majority of commuting and foraging activity currently takes place along the woodland edges and woodland rides. The hedgerows abutting and crossing the Site are also used by a small number of species and some bats do also cross the open fields both north and south of the central hedgerow in the Western Extension. Overall, this group is considered resilient to the development, although the loss of part of the central hedgerow may have a negative (not significant) effect on some species.

9.7.3 Three wide, grassy corridors are planned to cross the Western Extension as part of the development. All three will have a double hedgerow on each side with wildflower grassland; all bats are insectivores and the species-rich grassland and hedgerows will be designed to attract insects and therefore

provide additional foraging. The western half of the central hedgerow will remain until the northern hedgerow of the most northerly of the new corridors, together with the three cells to the north of it, are completed and restored. Only then will the remainder of the central hedgerow be removed. In the meantime, enhancement of the marginal strip adjacent to the woodlands will attract more insects so increasing the foraging available along the edges. In due course, restoration of the Site to woodland, grassland, scrub and hedgerows will greatly improve both foraging and, in time, roost opportunities.

- 9.7.4 There will be a temporary (not significant) negative effect due to the loss of part of one hedgerow but with the embedded mitigation and continuous restoration habitat in place, there will be a significant positive effect over the zone of influence.

9.8 DORMICE

- 9.8.1 No dormice or signs of them have been found anywhere on or close to the Site so at present, no mitigation is needed but monitoring surveys will continue so that protective measures can be put in place should they reach the Site. New habitat creation will include woody species known to be preferred by dormice.

9.9 SUMMARY OF RESIDUAL EFFECTS

- 9.9.1 A summary of the significance of the residual effects for each ecological feature, together with the proposed mitigation, is given in Table 9.

Table 9. Summary of residual effects and any proposed further mitigation.

Ecological feature	Proposed mitigation and enhancement	Residual effect
Collyweston Great Wood and Easton Hornstocks SSSI and NNR.	Provision of a wide RPA managed to provide habitat for many woodland plants and animals. Measures to	Significant positive.

Ecological feature	Proposed mitigation and enhancement	Residual effect
Fineshade Woods LNR.	prevent dust and to control water movements.	Significant positive.
Short-term loss of two short lengths of species-poor hedgerows, important for reptiles; eventual loss of both hedgerows.	Protection and enhancement of off-site hedgerows in advance; retention of at least half of the central hedgerow and western hedgerow for as long as possible and replacement with three east-west species-rich hedgerow corridors, with additional connectivity through the restoration plan.	Phased loss of two existing hedgerows, advance provision of new and gapped-up hedgerows and long-term significant positive effect on restoration.
Site Margins.	Enhancement through management to create increased and improved habitat for invertebrates and herpetofauna and improved foraging for other mammals.	Significant positive.
GCNs.	Erection of protective fence before works start to prevent death or injury.	Significant positive.
Common amphibian assemblage.	Enhanced management of the marginal grassland to provide improved and increased habitat for invertebrates and herpetofauna.	Significant positive.
Adders.	Retention of at least half of the current central hedgerow, managed as suitable adder habitat. Creation of three east-	Significant positive.

Ecological feature	Proposed mitigation and enhancement	Residual effect
	<p>west corridors to provide movement and foraging areas for adders.</p> <p>Enhanced management of the marginal grassland to provide improved and increased habitat for herpetofauna.</p>	
Bat assemblage.	<p>Retention of at least half of the current east-west hedgerow to provide commuting habitat for bats.</p> <p>Creation of three new east-west corridors to provide commuting and foraging habitat for bats.</p> <p>Enhanced management of the marginal grassland to provide improved and increased habitat for invertebrates.</p>	Significant positive.

9.10 ASSESSMENT OF CUMULATIVE EFFECTS

9.10.1 The local authorities (Northamptonshire County Council and East Northants District Council, which have now been replaced by North Northamptonshire Council) were consulted with respect to projects to be included in the cumulative impact assessments. Northamptonshire County Council confirmed that the development that should be included are Collyweston Quarry, Wakerley Quarry, Cooks Hole Quarry and Thornhaugh Quarry. East Northants District Council did not identify any relevant additional developments. The operations at the sites identified above are relatively close to the proposed development and all are operating in combination with the existing site currently. It is considered likely that due to the consistency of the proposed operations compared with the current consented activities there will not be any in combination likely significant effects.

10 COMPENSATION AND ENHANCEMENT

- 10.1 Replacement habitats are embedded within the design, fully mitigating all adverse effects and providing additional enhancement therefore, no compensation is necessary.
- 10.2 The proposed restoration is to a mosaic of woodland with shrubby edges, flower meadow grassland, scattered trees, hedgerows and waterbodies. This will complement and link existing habitats to give a greater area of woodland, with habitats also for amphibians, reptiles and invertebrates, including butterflies.
- 10.3 The tree and shrub planting will restore future potential for roosting bats, nesting birds and saprophytic invertebrates and hopefully, in time, dormice.
- 10.4 Provision of these new habitats and of footpaths throughout the new area and linking to existing or potential new footpaths in the surrounding land, will greatly enhance the potential for improved well-being through closeness to a wide range of greenery and wildlife.
- 10.5 As set out in Appendix 3, the proposed new and extended habitats, all developed on existing arable land and to be managed for biodiversity, will provide a very high Biodiversity Net Gain.

11 CONCLUSION

- 11.1 Close attention to the ecological requirement of the species already present and the information and recommendations of many consultees means that these new and enhanced habitats will provide a great benefit to all of these species and to the whole of the Rockingham Forest area. In particular, the phasing of the development will ensure that both the biodiversity and well-being benefits are realised relatively quickly and made available for a wider community.

12 REFERENCES

- Amphibian and Reptile Conservation, 2009. Common toads and roads. Guidance for planners and highways engineers.
- Atherton I, Bosanquet S, & Lawley M (eds), 2010. Mosses and Liverworts of Britain and Ireland – a Field Guide. British Bryological Society.
- Baker J, Beebee T, Buckley J, Gent A and Orchard D, 2011. Amphibian Habitat Management Handbook. Amphibian and Reptile Conservation, Bournemouth.
- Beebee J C and Griffiths R, 2000. Amphibians and Reptiles. Harper Collins, London.
- 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.
- 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.
- British Standard 42020:2013 "Biodiversity - Code of practice for planning and development".
- CIEEM, 2017. Available (online) as <https://cieem.net/resource/guidance-on-preliminary-ecological-appraisal-gpea/>
- CIEEM, 2018. Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management, Winchester.
- Colin Plant Associates, 2009. Criteria for defining invertebrate sites of significance. Unpublished Guidance provided to the Chartered Institute of Ecology and Environmental Management.
- Collins J (ed.), 2016. Bat Surveys for Professional Ecologists: Good Practice Guidelines, 3rd edition. The Bat Conservation Trust, London.
- Collins J. (ed.) 2016. Bat Surveys for Professional Ecologists: Good Practice Guidelines, 3rd edition. The Bat Conservation Trust, London.
- Cresswell W & Whitworth R, 2004. An assessment of the efficiency of capture techniques and the value of different habitats for the great crested newt *Triturus cristatus* English Nature Research Reports No. 576, Peterborough: English Nature.
- Drake C M, Lott D A, Alexander K N A and Webb J, 2007 NERR005. Surveying terrestrial and freshwater invertebrates for conservation evaluation. Natural England, Peterborough.

Drake C M *et al.*, 2007 NERR005. Surveying Terrestrial and Freshwater Invertebrates for Conservation Evaluation. Natural England, Peterborough.

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 United Kingdom, Channel Islands and Isle of Man. In: British Birds 108, 708–746.

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 United Kingdom, Channel Islands and Isle of Man. British Birds 108: 705-746.

Edgar P, Foster J and Baker J, 2010. Reptile Habitat Management Handbook. Amphibian and Reptile Conservation, Bournemouth.

English Nature, 1994 (and as updated). Species Conservation Handbook. English Nature, Peterborough.

English Nature, 2001. Great Crested Newt Mitigation Guidelines. English Nature, Peterborough.

ESL, 2015. Ecological Management and Aftercare Plan (EMAP) for East Northants Resource Management Facility, version 4. Unpublished report to Augean Plc.

ESL, 2018. Preliminary Ecological Appraisal of ENRMF Western Extension, Northamptonshire. Unpublished report to MJCA.

ESL, 2019. East Northants Resource Management Facility, King's Cliffe. Ecological Management and Aftercare Plan. Quinquennial Review 2014-2018. Unpublished report to MJCA.

Gent A H and Gibson S D (eds.), 1998. Herpetofauna Workers Manual. JNCC Peterborough.

Gent A H and Gibson S D. eds 2003. Herpetofauna Workers Manual. JNCC Peterborough.

Herpetofauna Groups of Britain & Ireland (HGBI), 1998. Evaluating local mitigation/translocation programmes: maintaining best practice and lawful standards. Advisory notes for Amphibian and Reptile Groups. Froglife. Halesworth. Suffolk.

Herpetofauna Groups of Britain & Ireland (HGBI), 1998. Evaluating local mitigation/translocation programmes: maintaining best practice and lawful standards. Advisory notes for Amphibian and Reptile Groups. Froglife. Halesworth. Suffolk.

<https://magic.defra.gov.uk/>

Joint Nature Conservation Committee. 2010. Handbook for Phase 1 Habitat Survey - A Technique for Environmental Audit. JNCC. Peterborough.

Marchant J H, 1983. Common Bird Census Instructions. British Trust for Ornithology, Tring.

National Parks and Access to the Countryside Act, 1949. Available [Online] at <https://www.legislation.gov.uk/ukpga/Geo6/12-13-14/97>

National Planning Policy Framework, 2019.

Natural England, 2015. Online guidance. Hazel or Common Dormice: Surveys and Mitigation for Development Projects. Published 29 July 2015 (<https://www.gov.uk/guidance/hazel-or-common-dormice-surveys-and-mitigation-for-development-projects>).

Natural England, 2015. Online standing advice: <https://www.gov.uk/guidance/hazel-or-common-dormice-surveys-and-mitigation-for-development-projects>

Natural Environment and Rural Communities Act, 2006.

North Northamptonshire Joint Core Strategy, 2011-2031.

Northamptonshire Biodiversity Partnership, Local Wildlife Sites Panel, 2014 (last updated) Wildlife Sites Selection Criteria, Northamptonshire.

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.

Ramsar Convention, 1972.

Stace C, 2010. New Flora of the British Isles. 3rd Edition, CUP, Cambridge.

Statutory Instrument 1997 No 1160. The Hedgerow Regulations, 1997 HMSO.

Stewart A, Pearman D A and Preston C D, 1994. Scarce Plants in Britain. JNCC, Peterborough.

Stroh P A, Leach S J, August T A, Walker K J, Pearman D A, Rumsey F J, Harrower C A, Fay M F, Martin J P, Pankhurst T, Preston C D & Taylor I, 2014. A Vascular Plant Red List for England. Botanical Society of Britain and Ireland, Bristol.

The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations, 2019.

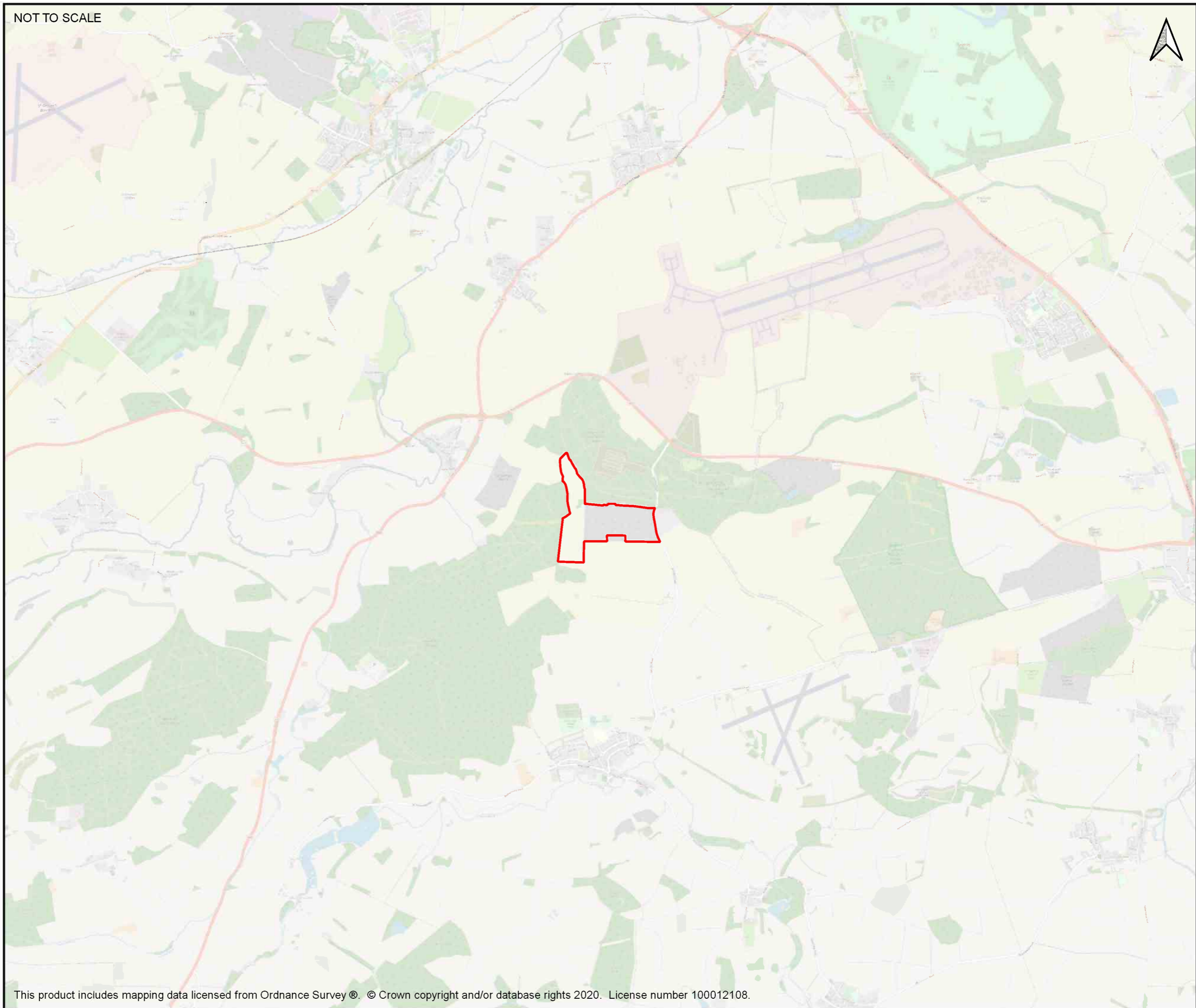
Wigginton M J, 1999. British Red Data Books. 1 Vascular Plants. 3rd edition. JNCC, Peterborough.

Wildlife and Countryside Act, 1981 (and as amended). Available [online] at <https://www.legislation.gov.uk/ukpga/1981/69>

KEY

— Red line application boundary

NOT TO SCALE



SITE NAME:
ENRMF Western Extension.

DRAWING TITLE:
Site location.

Figure 1
Dwg no.: 118-L049-005 Date: Aug 2020



**EAST NORTANTS RESOURCE
MANAGEMENT FACILITY PROPOSED
WESTERN EXTENSION
ECOLOGICAL BASELINE -
TECHNICAL APPENDIX 1**

**Final
July 2021**

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1 INTRODUCTION

- 1.1 This Appendix provides details of how the information given in the Ecological Impact Assessment (EclA) was obtained. Sections 2-11 describe for each separate species or group the methods used, with references to the publication from which the methods are taken, the results obtained (mainly in tables) and an indication of whether the species or group is considered an Important Ecological Feature for the Site, as described in the EclA, Sub-section 3.3.
- 1.2 A record of meetings and discussions with consultees is given in Section 11 and full lists of the species recorded are given in Section 12. No full surveys were carried out over this period on the existing ENRMF, which was subject to Health and Safety restrictions on access but where possible, some recording was carried out from the boundaries. The existing ENRMF also experienced continual change and all the active working areas are disturbed in ecological terms.
- 1.3 Note that figures and tables are numbered with respect to the section to which they refer.

2 DESK STUDY

2.1 METHODS

- 2.1.1 The Natural England 'MAGIC' and 'Nature on the Map' websites were consulted to obtain information on the nearest internationally protected sites and for citations of any Sites of Special Scientific Interest (SSSI) or National Nature Reserves (NNR) within 5km of the Site. Information was also sought on any Local Nature Reserves (LNR) within a 2km radius of the Site.
- 2.1.2 Additional data providers consist of:
- Northamptonshire Biodiversity Records Centre (NBRC), providing local sites of conservation interest, including Local Wildlife Sites (LWS), together with notable species within a 2km search area. This report was provided on 15 July 2020.

- Cambridgeshire & Peterborough Environmental Records Centre, providing local sites of conservation interest, including LWSs, together with notable species within a 2km search area. This report was provided on 13 July 2020.
- Northants Bat Group, providing records of bats within a 5km search area of the Site for the period 2018-2020.
- Cambridgeshire Bat Group, providing hibernation records of bats within a 5km search area. This report was provided in 2018.
- Other species records were provided by the Back from the Brink project (invertebrates, adders, bats) and the Bedfordshire, Cambridgeshire and Northamptonshire Wildlife Trust (dormice).

2.2 RESULTS

2.2.1 The results of the Desk Study are summarised in Tables 2.1 and 2.2 below. Pre-2000 records have been screened out. For the purposes of this report, 'Important Species' are those:

- Having statutory protection under The Conservation of Habitats and Species Regulations, 2017, as amended (HSR).
- Listed as Species of Principal Importance under Section 41 of the Natural Environment and Rural Communities Act, 2006 (NERC) (formerly UK BAP species), hereafter referred to as S41 species.
- Listed in the Vascular Plant Red List for England (Stroh *et al.*, 2014).
- Listed in the Northamptonshire Biodiversity Action Plan (Northamptonshire Local Nature Partnership, 2016).
- Considered to be target species for the Back from the Brink 'Roots of Rockingham' project.

Table 2.1. Sites with statutory or non-statutory protection for nature conservation within the search area.

Name, designation and description	Proximity
Barnack Hills and Holes Special Area of Conservation (SAC). Semi-natural dry grasslands and scrubland facies: on	7.5km to the northeast.

Name, designation and description	Proximity
calcareous substrates for which this is considered to be one of the best areas in the United Kingdom.	
Collyweston Quarries SSSI. An area of rough grassland on the site of a former limestone quarry representing the largest example of this type of vegetation in Northamptonshire. Grassland developed on the Jurassic (oolite series) limestone is confined to the Cotswolds and a discreet part of the East Midlands.	2.9km to the north.
Rutland Water Special Protection Area (SPA) and Ramsar site. During the non-breeding season, this site regularly supports important numbers of ten species of wildfowl. It also hosts an important assemblage of wintering waterfowl.	8.8km to the northwest.
The Nene Valley Gravel Pits SPA and Ramsar site. In the non-breeding season, this site regularly supports important numbers of 12 species of waterfowl. It also hosts an important assemblage of wintering waterfowl.	19km to the southeast (nearest).
Collyweston Great Wood and Easton Hornstocks SSSI and NNR. Largest Northamptonshire remnant of the ancient Purlieu coppices of Rockingham Forest. The main coppice types area variants of ash-lime and oak-lime woodland. An extremely rich ground flora with a combination of calcareous and acidic soils present.	Adjacent to the east.
Bonemills Hollow SSSI. Supports grassland communities of calcareous and marsh types. The calcareous grassland is of the Jurassic limestone type, which is restricted nationally to a belt running from the Western Cotswolds through Northamptonshire and the Soke of Peterborough to eastern Lincolnshire.	1.5km to the east.
Bedford Purlieus SSSI and NNR. An ancient woodland supporting a variety of woodland community types, which are largely restricted nationally in their distribution to lowland England.	2km to the east.
King's Cliffe Banks SSSI. Supports a fine example of oolitic limestone grassland. This is predominantly found in the Cotswolds and East Midlands. Unimproved oolitic limestone grasslands are now greatly reduced in area and have become highly fragmented.	2.3km to the south.
Wakerley Spinney SSSI. A small strip of native broadleaved woodland and semi-natural grassland among extensive softwood plantations. The site is part ancient - a relic of the Royal Forest of Rockingham and part secondary, where woodland has developed on old limestone workings.	3.5km to the southwest.

Name, designation and description	Proximity
Racecourse Farm Field SSSI. A small meadow on the site of a former limestone quarry, comprising an excellent example of grazed Jurassic limestone grassland. This vegetation type is confined to the Cotswolds and a discrete part of the East Midlands.	3.5km to the northeast.
Luffenham Heath Golf Course SSSI. Includes some of the best remaining areas of calcareous grassland in Leicestershire and is representative of grassland developed on soft limestones in Central and Eastern England.	4.1km to the northwest.
West Abbot's and Lound Woods SSSI. Holds a range of lowland woodland types, many of which are scarce in Britain. These include a stand of plateau alder wood (a type known from no other ancient woodland in Cambridgeshire), stands of wet ash-wych elm and calcareous ash-wych elm woodland as well as areas of pedunculate oak and wet ash-maple.	4.1km to the east.
Whitewater Valley SSSI. Comprises part of a stream running through Lower Lincolnshire Limestone and the associated habitats of base poor marsh, tall fen and willow carr.	4.3km to the northeast.
Old Sulehay Forest SSSI. One of an important group of ancient woodlands on calcareous strata in the north-eastern part of Rockingham Forest.	4.6km to the southeast.
Ketton Quarries SSSI. A complex mosaic of grassland, scrub and woodland vegetation has developed in disused pits and on spoil heaps.	4.8km to the northwest.
North Luffenham Quarry SSSI. A disused limestone quarry, which contains a rich flora characteristic of calcareous grassland.	4.9km to the northwest.
Fineshade Lane LWS. A green lane leading to Fineshade Wood, providing a useful wildlife corridor and exhibiting a diverse range of scrub species.	0.98km to the west.
Fineshade Woods LWS. A large area of replanted and ancient woodland.	Adjacent to the west.

Table 2.2. Important species within the search area.

Species/group	Status	Proximity to the site
Invertebrates: 1,501 records for around 125 species, 2000-2020.	NERC S41. RDB.	Mainly from Collyweston Great Wood.
Great crested newt: 51 records, 2014-2020.	HSR, WCA, S5.	Mainly from Fineshade Woods.

Species/group	Status	Proximity to the site
Other common amphibians, i.e., common toad, common frog, smooth newt and palmate newt: 49 records, 2014-2020.	WCA, S5, NERC S41.	Closest record is 1.1km to the southwest.
Common reptiles, i.e., slow worm, common lizard, grass snake and adder: 238 records, 2006-2020.	WCA, S5.	Adders are present in Fineshade Woods, the closest being 50m to the west. Adder records are also present from Collyweston Great Wood, particularly along the northeast side adjacent to the A47.
Birds: 584 records for 54 species.	WCA S1, Red List, NERC S41.	Most of the records are from Fineshade Wood; others within 1.1km.
Bats: 77 records including 11 roost records for at least 8 species, 2000-2020.	HSR, WCA.	The closest are of hibernacula from Collyweston Great Wood.
Badgers: Six records, 2002-2020.	PBA.	Collyweston Great Wood and Fineshade Woods, also road-kills locally.
Dormouse: 24 records, 2015-2020.	HSR, WCA, NERC S41.	All from Fineshade Woods, the closest record ca.400m southwest.

Key:

RDB – Red Data Book (Invertebrates).

WCA – Wildlife and Countryside Act, 1981 (and as amended).

S5 – Schedule 5 of the WCA.

S1 – Schedule-1 of the WCA.

Red List – Birds of Conservation Concern 4.

PBA – Protection of Badgers Act, 1992.

3 HABITATS, PLANT COMMUNITIES AND PLANT SPECIES

3.1 INTRODUCTION

3.1.1 ESL (Ecological Services) Limited (ESL) has carried out ecological monitoring and management of the existing East Northants Resource Management Facility

(ENRMF) site since 2014, as required by the Ecological Management and Aftercare Plan (EMAP), last reviewed in 2018 (ESL, 2019) and therefore, has a good understanding of the habitats and species present.

- 3.1.2 Land to the north of the ENRMF, between the northern edge of the landfill and the southern edge of Collyweston Great Wood, is privately-owned woodland but has also been surveyed since 2014, under permit, mainly for its populations of amphibians and reptiles.

3.2 METHODS

- 3.2.1 A Phase-1 habitat survey of the proposed Western Extension was undertaken by Brian Hedley MCIEEM during the Preliminary Ecological Appraisal (PEA) survey in October 2018 (ESL, 2018¹) as per Joint Nature Conservation Committee (JNCC, 2010) and Chartered Institute of Ecology and Environmental Management (CIEEM) guidelines (CIEEM, 2017). Further plant-recording by the same surveyor was undertaken in each habitat of the proposed Western Extension, together with parts of the adjacent woodlands, from April to August in both 2019 and 2020. A habitat update survey of the current ENRMF site was undertaken in June 2020. A list of plant species recorded for the whole Site, from 2018 to 2021, is included in Section 12.1.

3.3 RESULTS

The proposed Western Extension.

- 3.3.1 The habitats present within the proposed Western Extension area currently comprise two arable fields with grassed headlands, a central hedgerow with grassed margins, ditches, scrubby broadleaved woodland (with some wasteland vegetation, hardstanding and spoil heaps), isolated trees and small areas of scrub. Beyond the Site boundary, the fields are bound by the adjacent

¹ESL, 2018. Preliminary Ecological Appraisal of ENRMF Western Extension, Northamptonshire. Unpublished report to MJCA.

woodlands, with some ditches and several lengths of hedgerow. A habitat map of the Site is given as Figure 3.1 and as Figure 1 in the EclA document.

Arable fields.

- 3.3.2 The north-end of the northern field (Photograph 1) has a more calcareous soil than elsewhere with a good range of 'arable weeds' present, primarily in the margins. Common species include field forget-me-not, dove's-foot crane's-bill, and common field speedwell with occasional dwarf spurge, maple-leaved goosefoot, grey field-speedwell, round-leaved fluellen and fool's parsley. A previous game cover-crop area in the south-western corner of this field, now ploughed, had a wider variety of arable weeds present, including many-seeded goosefoot, fat-hen, henbit dead-nettle, redshank, field woundwort and corn mint (Photograph 2).



Photograph 1. View south from northeast corner of northern arable field.



Photograph 2. Former game cover-crop (now ploughed) in southwest corner of northern arable field.



Photograph 3. Looking north over southern arable field, grass headland next to Fineshade Wood.



Photograph 4. Wide grassland strip next to Collyweston Great Wood NNR.

-
- 3.3.3 The southern field (Photograph 3) had only sparse arable weeds, mainly in the margins, including common field speedwell, barren brome and occasional scarlet pimpernel, field madder and both round-leaved and spear-leaved fluellens.
- 3.3.4 Grassed headlands, varying in width and species-richness, form the margins of the two arable fields. They are generally 3-6m-wide but up to 10m-wide along part of the eastern side of the northern arable field and are cut or ploughed once or twice a year. Typically-dominant species are perennial rye-grass, false oat-grass, Yorkshire-fog, tall fescue, tufted hair-grass, cock's-foot, red fescue and creeping bent. Occasional species include wild parsnip, hoary ragwort, wood sedge, spiked sedge, glaucous sedge, wood small-reed, teasel and meadow buttercup.
- 3.3.5 The wider grassland strip on the eastern side the northern arable field is partly marshy in nature and generally more diverse than the other field margins (Photograph 4). Additional species here include greater bird's-foot-trefoil, meadow vetchling, common fleabane, hairy tare, common knapweed and common spotted-orchid. This area is attractive to a variety of insects, particularly those from the adjacent Collyweston Great Wood NNR.

Wasteland (ruderal) vegetation.

- 3.3.6 A small area of wasteland vegetation is present just north of the east-end of the central hedgerow and adjacent to a patch of scrubby broadleaved woodland jutting into the northern field of the proposed Western Extension. This area has been used as a storage yard and has some hardstanding and spoil/rubble heaps present. Typically-dominant species are creeping bent, Yorkshire-fog, bramble, creeping cinquefoil, knot-grass, false oat-grass, creeping buttercup and cut-leaved crane's-bill with occasional fern-grass, swine-cress and red bartsia.

Hedgerow, scrubby broadleaved woodland and isolated trees.

- 3.3.7 The hedgerow dividing the two arable fields in the proposed Western Extension is trimmed, 2m-high, 1.25m-wide and dominated by hawthorn with blackthorn and occasional dog-rose, wych elm, wayfaring-tree, spindle, wild privet and a

single, large pedunculate oak near its eastern end (Photograph 5). The ground flora is dominated by common nettle, false oat-grass, cow parsley, cleavers and bramble. A narrow, shallow ditch runs adjacent to the hedgerow; it is usually dry except after heavy rain.



- 3.3.8 The small area of scrubby broadleaved woodland projecting into the northern arable field of the proposed Western Extension (Photograph 6) is dominated by hawthorn with blackthorn, dog-rose, spindle, goat willow, ash and elder and a single, large pedunculate oak tree. The ground flora is fairly disturbed due to pheasant-rearing activities and typically dominated by bramble, bracken, common nettle, false brome, dog's mercury, cow parsley, male-fern and wood avens.
- 3.3.9 In addition to the pedunculate oak trees in the central hedgerow and scrubby broadleaved woodland north of it, there are a few large, isolated ash and pedunculate oak trees in the northern field margin adjacent to The Assarts (Photograph 7). One of these trees had a wild honeybee nest present and is also of interest for nesting birds and possibly bats.

The existing ENRMF.

- 3.3.10 The habitats of the existing ENRMF currently comprise wasteland (ruderal) vegetation, bare ground, rough grassland, areas of hardstanding and buildings, capped and grassed landfill cells, including the restored northern slopes, grassed earth bunds and waterbodies. It is bound by an exclusion fence on the northern and western edges to prevent amphibians and reptiles accessing the

active areas and by hedgerows on the east, south and west sides. The eastern hedgerow has a main road beyond it and the south and west hedgerows are backed by farm roads.



Photograph 7. Large ash trees on Site-side of boundary ditch next to The Assarts.



Photograph 8. Typical wasteland-type vegetation found over much of the ENRMF.

Wasteland (ruderal) vegetation.

3.3.11 Wasteland habitat is widespread throughout the existing ENRMF as a result of landfill activities (Photograph 8). Typically-dominant ruderal species are bristly oxtongue, coltsfoot, annual meadow-grass, creeping bent, black medick and scentless mayweed. Less frequent species include dwarf elder, stone parsley, narrow-leaved bird's-foot-trefoil, hawkweed oxtongue, Greek dock and annual beard-grass. Several of these species are not locally-native, having arrived with imported waste material. A small stand of the invasive alien Japanese knotweed present in this habitat near to the northern boundary of the existing ENRMF is being treated. Areas of rough grassland dominated by coarse grasses and tall herbs also occur, usually unmanaged apart from a few areas in the southeast corner of the existing ENRMF near to buildings and along the reptile/amphibian exclusion fence where it is regularly managed.

Grassland.

3.3.12 A strip of grassland on the steep north-facing slope of the existing ENRMF (Photograph 9), seeded as part of the restoration plan, has developed into good calcareous grassland with the addition of several 'terraces' to add habitat diversity and prevent soil creep. Species here include common spotted orchid, bee orchid, yellow-wort, common centaury, rough hawkbit, fairy flax, hoary

plantain, hoary ragwort, musk-mallow and perforate St. John's-wort. This grassland has proved very attractive to a variety of butterflies, including dingy skipper (one of the target species for the Site) and several day-flying moths.

Hedgerows.

3.3.13 The hedgerow bounding the western edge of the existing ENRMF is continuous but species-poor, dominated by hawthorn with occasional dog-rose, blackthorn and grey willow (Photograph 10). It is managed by flailing to a height of approximately 2m and a width of 1.5m but with areas of adjacent grey willow and bramble scrub creating wider stretches. At its northern end, for approximately 20m, it is unmanaged and reaches a height of about 3m with occasional spindle, honeysuckle and dog-rose. Ground flora is limited to common species such as cock's-foot, false oat-grass, ground-ivy, garlic mustard, cow parsley, bramble, rough chervil, white bryony and common nettle.



Photograph 9. Calcareous grassland on north slope of ENRMF.



Photograph 10. ENRMF western boundary hedgerow.

3.3.14 The hedgerow on the southern boundary of the existing ENRMF is divided into three sections by two entrances to a farmyard. All three sections are similar, being managed by cutting to a height of approximately 1.5m and a width of about 1m. All are hawthorn-dominated with blackthorn and dog-rose frequently occurring and scarce field maple, wild privet and elder. Barren brome and cow parsley are abundant in the base of the hedgerow with garlic mustard, white bryony, dog's mercury and creeping cinquefoil also present.

3.3.15 The roadside hedgerow along the eastern boundary of the existing ENRMF is divided into two sections separated by the ENRMF entrance. The southern

section has hawthorn and wych elm abundant with occasional dog-rose and blackthorn. The side facing the road has been cut to a height of about 2m, with the remainder unmanaged and merging with an area of bramble scrub. To the north of the entrance, the hedgerow is hawthorn- and blackthorn-dominated and managed by flailing to a height of 2m and a width of 2.5m. Field maple, bramble, wayfaring-tree and spindle also occur rarely. The ground flora of both sections is limited to common hedgerow species such as garlic mustard, common nettle and cow parsley but dog's mercury and wild arum do rarely occur.



Photograph 11. Waterbody in northwest corner of ENRMF being drawn-down.



Photograph 12. Wet ditch on edge of Collyweston Great Wood NNR.

Waterbodies.

3.3.16 The only waterbodies within the existing ENRMF are two at the base of the northern slope (managed for great crested newts and other amphibians) and one in the northwest corner of the existing ENRMF, which forms part of this Site's water-management system and is actively drawn-down for operational purposes (Photograph 11 above). This pond is concrete-lined and has only sparse marginal vegetation such as bulrush, yellow iris, great willowherb and creeping bent present. The waterbodies surveyed for great crested newts are described in Appendix 1-5.

Ditches.

3.3.17 A series of narrow, shallow ditches on the margins of the existing ENRMF form part of the Site drainage system and generally only hold water after heavy

rainfall (Photograph 12 above). They typically support bulrush, great willowherb, soft-rush, jointed rush, creeping bent, celery-leaved buttercup and various docks.

Adjacent habitats.

3.3.18 The existing ENRMF is bordered by the main road to the east, arable to the south and west (including the proposed Western Extension) and by a strip of privately-owned woodland to the north, with Collyweston Great Wood and Easton Hornstocks SSSI and NNR beyond. The proposed Western Extension is bordered by an arable field and the existing ENRMF to the east, Collyweston Great Wood and Easton Hornstocks SSSI and NNR to the northeast, privately-owned woodland to the north, hedgerows with arable land beyond to the northwest and by Fineshade Woods LNR to the west. There is a strip of arable land adjacent to the south with the privately-owned Little Wood (part of Fineshade Woods) beyond that.

3.3.19 Collyweston Great Wood is an ancient woodland, managed as coppice-with-standards. Typical tree species are ash, pedunculate oak, hazel, field maple, hawthorn, blackthorn, dog-rose, wych elm and goat willow. Occasional tree and shrub species include small-leaved lime *Tilia cordata*, wild service *Sorbus torminalis*, sycamore, Scot's pine *Pinus sylvestris*, wayfaring-tree, wild privet, dogwood and Midland hawthorn *Crataegus laevigata*. Typical ground flora species include dog's mercury, false brome, tufted hair-grass, bramble, wood avens, wood-sedge, several ferns and bluebell *Hyacinthoides non-scripta*. Occasional species include ramsons *Allium ursinum*, spurge-laurel *Daphne laureola*, primrose, early purple orchid *Orchis mascula*, deadly nightshade *Atropa belladonna* and wood melick *Melica uniflora*.

3.3.20 Fineshade Woods LNR is a very large area of woodland, having both ancient woodland and areas of plantation on an ancient woodland site. The northern end of this wood, 'The Assarts', abuts the western side of the proposed Western Extension. Much of this area is conifer plantation at present, although the edges of the stands have more diversity. Species include hazel, field maple, dogwood, English elm, oak, ash, beech, silver birch, rowan, wild service tree, spindle and guelder rose, amongst others. The Assarts also has wide, grassy

areas, forming wayleaves and rides, which hold much of the biodiversity interest.

3.3.21 Several strips of woodland adjacent to the northwest of the northern arable field are more recent 'plantation-like' in nature and are dominated by sycamore, common lime *Tilia x europaea*, hawthorn, blackthorn, wych elm, snowberry and elder.

3.3.22 A gappy hedgerow-cum-tree-line connects the north end of The Assarts to a small block of woodland and grassland on the north side of the northern field of the proposed Western Extension. This hedgerow is currently unmanaged, approximately 4m tall, 2-3m-wide and is dominated by hawthorn and blackthorn with occasional common buckthorn, elder, white bryony, wild privet and spindle. It has many standard trees present including wych elm and sycamore. The ground flora is dominated by common nettle, false-brome, rough chervil, cow parsley, dog's mercury, wild arum and hedgerow bedstraw. Several black hairstreak butterflies were noted near the northern end of this hedgerow, where dense blackthorn is present.

3.3.23 A short section of hedgerow lying across the wayleave through The Assarts is currently unmanaged, approximately 3m-tall, 2m-wide and dominated by blackthorn with hawthorn and dog-rose. The ground flora is dominated by bramble with common nettle, great willowherb, false-brome, false oat-grass and cleavers.

3.3.24 The hedgerow section on the south-eastern side of the south field of the proposed Western Extension (with another arable field beyond) is trimmed, 2m-high, 1.5m-wide and dominated by hawthorn with blackthorn, dog-rose, ash and field maple. The ground flora is poor and dominated by barren brome, cow parsley, common nettle, white dead-nettle and cleavers.

3.3.25 Several small ponds are present within the adjacent wooded areas, especially The Assarts. There is also a complex of duck ponds to the north and a pond within Little Wood but permission to access these areas was refused. The ponds surveyed for great crested newts are described in Appendix 1-5.

3.3.26 Small ditches are present along much of the boundary of the proposed Western Extension; most are dry but some are permanently damp or hold water during

the winter months or after heavy rain. They typically support great willowherb, hard rush, tufted hair-grass and false fox-sedge. A permanently-wet stretch of ditch next to Collyweston Great Wood NNR (Photograph 12) is more diverse and supports brooklime, water mint, floating sweet-grass and bittersweet.

3.4 CONCLUSIONS

- 3.4.1 Both the hedgerows on the Site, that is the existing ENRMF western boundary hedgerow and the hedgerow between the northern and southern fields of the proposed Western Extension, are considered S41 habitats (NERC, 2006) and they also meet the criteria as 'Important' under the Hedgerow Regulations (HMSO, 1997) as they support one or more species listed in Schedule 5 of the Wildlife and Countryside Act, 1981 (as amended), namely slow worm, common lizard, grass snake and adder. Hedgerows are therefore considered an ecologically important feature of the Site (the boundary hedgerows to the northwest and west of the proposed Western Extension area are also Important for this reason but are not considered in this category since they lie outside the redline boundary and will not be affected).
- 3.4.2 The two waterbodies managed for great crested newts are also S41 habitats (open standing water), as are some of the other off-site ponds and ditches (not considered here).
- 3.4.3 Two of the 'weeds' within the margins of the two arable fields in the proposed Western Extension area (especially the northern field where the soil is more calcareous in nature) are classified above Least Concern in the GB Red Data Book of Vascular Plants (Stroh *et al.*, 2014²). They are dwarf spurge and field woundwort (listed as Near Threatened), with corn mint listed as Vulnerable on the England sub-list. These species, together with the good assemblage of other arable 'weeds', are therefore considered an ecologically important feature of the Site.

²Stroh P A, Leach S J, August T A, Walker K J, Pearman D A, Rumsey F J, Harrower C A, Fay M F, Martin J P, Pankhurst T, Preston C D & Taylor I, 2014. A Vascular Plant Red List for England. Botanical Society of Britain and Ireland, Bristol.

4 INVERTEBRATES

4.1 INTRODUCTION

4.1.1 Three invertebrate surveys were carried out during 2019-2020 by Conops Entomology Ltd. On 4 April 2019, a one-day 'Scoping Assessment' was undertaken with the survey aims being:

- To appraise the key habitats and/or features of the Site.
- To assess their suitability and quality to support:
 - Rich and varied invertebrate assemblages.
 - Species of Principal Importance.
 - Species with a nationally significant status such as those listed in the Red Data Book.

4.1.2 This assessment recommended a follow-up suite of surveys in order to fully assess the Site's importance and these surveys were carried out monthly during May-August 2019.

4.1.3 Finally, in order to set the Site in context, six visits were made to areas of Fineshade Woods and Collyweston Great Wood adjacent and near to the Site or along rides with similar habitat to the Site boundaries between May and September 2020.

4.2 METHODS

4.2.1 The initial scoping assessment involved the entomologist walking all areas of the Site, identifying and photographing features of potential value for supporting key species, including NERC S41 species, RDB or Nationally Scarce species, species of special interest or rich assemblages of invertebrates. The Site was assessed on the quality, frequency and footprint of the existing key features or juxtaposition of such features forming a mosaic.

4.2.2 The follow-up assessment required visiting all parts of the Site using the following standardised methods as per Drake *et al.*, 2007³, modified as necessary for undertaking a site assessment in a development context (as opposed to condition assessment for conservation management):

- Sweep-netting of ground and other low vegetation with an entomological net; this is the most efficient method of cataloguing a site's invertebrate resource and provides the largest proportion of the results.
- Spot-sampling is often the most effective method of recording species from special niches and is used to collect large, conspicuous invertebrates such as bees and wasps from flowering plants, supplementing the sweep samples.
- 'Grubbing' comprises a finger-tip search of fallen deadwood, piles of rotting timber and short turf for any hiding or crawling invertebrates, principally beetles.
- Beating bushes and scrub using a long stick, collecting dislodged invertebrates on a sheet positioned beneath the branch for sorting and retaining.
- Pitfall traps. Three sets of these pitfall traps were installed in representative habitats, namely grassy field margins, grassland and brownfield (pheasant-rearing area and lorry park).

4.2.3 In 2020, the six visits to areas of Fineshade Woods and Collyweston Great Wood used the same methods, with the addition of a search for important butterflies and the use of flight-interception traps in Collyweston Great Wood. This latter method was not used in Fineshade Woods, partly because of its high visitor use and partly because it has fewer large and rotting trees.

4.2.4 The principal target groups used in site assessment are those providing information on the quality and range of features at such a site. These groups are:

³Drake C M *et al.*, 2007. NERR005. Surveying Terrestrial and Freshwater Invertebrates for Conservation Evaluation. Natural England, Peterborough.

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- Shieldbugs and allies (*Heteroptera*).
 - Bees, wasps and ants (*Hymenoptera*).
 - Particular fly groups such as hoverflies (*Syrphidae*), danceflies (*Empidoidea*) and dolyflies (*Dolichopodidae*).
 - Beetles (*Coleoptera*).
 - Butterflies and day-flying moths (*Lepidoptera*).

4.2.5 Sundry other groups were also recorded owing to their frequency on the Site, including parasitic flies (*Tachinidae*).

4.3 RESULTS

4.3.1 The 2019 surveys of the Site recorded 300 species, including 22 with a current national status, although several of these require downward revision. The list of these 22 species is given in Table 4.1 and the full list is given in Appendix 12.

4.3.2 The survey concluded that the importance of the Site resides in its range of habitats, from short, flowery turf and taller grassy swards to scrub and woodland edges, some of which have deadwood features such as sapwood decay. This is a range of habitats that is of value to invertebrates. The most notable habitat is the woodland edge and deadwood, which is complemented by the flowery grassland and ruderal fringes, particularly on the eastern edge.

4.3.3 The features of highest invertebrate interest and potential are the mature hedgerow oak trees, particularly those with current deadwood, which is important for saproxylic invertebrates, as are the steep, flower-rich and diverse banks to certain ditches. The managed hedgerows are generally of poor value for invertebrates due to their small range of woody species and cutting regime, which tends to reduce variation in physical structures along a hedgerow.

4.3.4 The survey of Fineshade Wood in 2020 recorded 238 species, including 11 species currently considered of higher value. The list of these 11 species is given in Table 4.2 and the full list in Appendix 12, Section 12.3. The relatively-low diversity of species reflects the fact that much of the survey was carried out along woodland rides and glade edges (in order to be comparable with the woodland edge) but does demonstrate the value of these edge habitats. The

woodland path edges are in part flowery and characterised by open-habitat flowers such as common knapweed and thus, attract a suite of open-habitat species including many bees, wasps and fruitflies. The presence of a suite of woodland butterflies, the most noteworthy of which is the white admiral, is also a feature of this Site.

- 4.3.5 The 2020 survey of Collyweston Great Wood recorded 212 species, including 18 species currently considered of higher value. These latter species are included in Table 4.2 and the full species list is given in Appendix 12, Section 12.3. The woodland is rich with saproxylic species and includes some scarce and niche species such as those of heartwood decay. It thus recorded fewer species than Fineshade Woods but had a greater number and proportion of scarce species, relating to its greater number of mature and degenerate trees. The two woodlands are connected to one another by tree-lines and hedgerows that also border the proposed Western Extension. The woodlands therefore have some similarities in their faunas but also significant differences, largely around the suites of species associated with deadwood and to a lesser extent, the open habitats.

4.4 CONCLUSION

- 4.4.1 The Site's boundary, providing woodland edge habitat with flower-rich grassland, is a high-value resource; the surrounding woodland surveys gives weight to the Site being influential to the robustness of populations within the two adjacent woodlands. The Site's edge habitat and the invertebrate populations this holds are therefore Important Ecological Features, certainly in the zone of influence and probably the Rockingham Forest region.

Table 4.1. Invertebrate species with national importance found on the proposed Western Extension.

Scientific name	Vernacular name	National/local status	Habitat preferences and species notes	Site notes
<i>Ampedus quercicola</i>	a click beetle	Notable b	A deadwood species	Found along

Scientific name	Vernacular name	National/local status	Habitat preferences and species notes	Site notes
			associated with birch and beech.	western fringe of site.
<i>Anaglyptus mysticus</i>	a longhorn beetle	Notable b	A deadwood species on a range of tree species.	–
<i>Apatura iris</i>	purple hairstreak	Legal protection, Nationally Scarce	Larvae feed on goat willow, adults on oak and ash trees.	Several individuals recorded.
<i>Argogorytes fargeii</i>	a solitary wasp	Notable a	Short swards and bare ground.	Single specimen recorded foraging near to brownfield area.
<i>Cistogaster globosa</i>	a parasitic fly	Red Data Book 1*	A parasite on the bishop's mitre shieldbug. Now more common than status suggests, with huge range expansion in recent years.	Frequent in the grassland and grassy margins.
<i>Coenonympha pamphilus</i>	small heath	Section 41	Varied sward grasslands with fine-leaved grasses including bents and fescues.	On open grassy areas.
<i>Grammoptera abdominalis</i>	a longhorn beetle	Notable a	A deadwood species on oaks.	Found along northern fringe of the site.
<i>Hypera meles</i>	a beetle	Notable b*	A grassland species that	–

Scientific name	Vernacular name	National/local status	Habitat preferences and species notes	Site notes
			lives on clovers. Much more common than status suggests.	
<i>Lasioglossum malachurum</i>	a mining bee	Notable b*	Patchy bare ground and yellow composites.	–
<i>Lasioglossum pauxillum</i>	a mining bee	Notable a*	Patchy bare ground and yellow composites.	–
<i>Megamerina dolium</i>	a fly	Provisionally Nat Scarce	A deadwood species on oaks.	Found on eastern fringe of site.
<i>Merzomyia westermanni</i>	a fruitfly	Notable*	Associated with ragworts.	–
<i>Monosapyga clavicornis</i>	a cleptoparasitic wasp	Notable b	A parasite on various mason bees (Osmia and Chelostoma species).	Single specimen noted on deadwood along north-western fringe of site.
<i>Nysson trimaculatus</i>	a solitary wasp	Notable b*	A parasite on the solitary wasp <i>Gorytes quadrifasciatus</i> .	–
<i>Oxyna nebulosa</i>	a fruitfly	RDB 3*	Associated with yarrow. Requires status revision	–
<i>Phytoecia cylindrica</i>	a longhorn beetle	Notable b	A species on umbellifers.	Frequent on western

Scientific name	Vernacular name	National/local status	Habitat preferences and species notes	Site notes
				edge of site.
<i>Poecilium alni</i>	a longhorn beetle	Notable b	A deadwood species on oaks (<i>Quercus</i> spp.).	–
<i>Priocnemis schioedtei</i>	a spider-hunting wasp	Notable b	Shorts swards and bare ground. Collects spiders for its larvae.	–
<i>Pterostichus longicollis</i>	a ground beetle	Nationally Scarce	Prefers marshy habitats.	Recorded from grassland area.
<i>Satyrrium pruni</i>	black hairstreak	Endangered, S41 species	Requires intact, unmanaged tall blackthorn scrub fringes and hedgerows over 4 m in height. Prefers southerly aspects.	3 individuals recorded from west and northern edge of the site.
<i>Satyrrium w-album</i>	white-letter hairstreak	Endangered, S41 species	Requires elm trees at woodland edges or along hedgerows.	2 individuals recorded.
<i>Tanymecus palliatus</i>	a beetle	Notable b	A grassland species that lives on clovers.	–

*More common than the status suggests; requires revision.

Table 4.2. Species with National Importance found in The Assarts, Fineshade Woods and Collyweston Great Wood in 2020.

Fineshade Wood = sampling area A; Collyweston Great Wood = sampling area B

Species	Common name (if any)	Conservation status	2020 Sampling area	Habitat preferences/notes
<i>Ampedus quercicola</i>	a click beetle	Notable b	B	A deadwood species associated with birch and beech.
<i>Anaglyptus mysticus</i>	a longhorn beetle	Notable b	A, B	A deadwood species on a range of tree species.
<i>Argyra atriceps</i>	a dolyfly	Nationally Scarce	B	Breeds in muddy pools and puddles on woodland tracks.
<i>Auplopus carbonarius</i>	a spider-hunting wasp	Notable b	B	A spider-hunting wasp requiring clay to construct its nest cells under stones.
<i>Dictya umbrarum</i>	a snail-killing fly	Notable	B	Damp vegetation, pools, and wetlands. Recorded from an open area of woodland, not obviously close to a pool.
<i>Diogma glabrata</i>	a crane fly	Notable	A, B	Prefers damp woodland on calcareous soils.
<i>Dorcatoma dresdensis</i>	a beetle	Nationally Scarce	B	Deadwood beetle that breeds in hard bracket fungi on trees.
<i>Gnathoncus buyssoni</i>	a histerid beetle	Nationally Scarce	B	Recorded from a range of niches including fungi, bird nests, and rat droppings.
<i>Hilara lugubris</i>	a hybotid fly	Locally Rare*: Nationally Scarce	A, B	Associated with wet places in the shade of woodlands.
<i>Lasiosomus enervis</i>	a ground bug	Notable b	A	Found in the leaf litter of open woodlands, principally on calcareous soils.

Species	Common name (if any)	Conservation status	2020 Sampling area	Habitat preferences/notes
<i>Limenitis camilla</i>	white admiral	S41 species	A, B	Associated with open woodlands and woodland rides/edges. Larvae feed on honeysuckle in semi-shaded or dappled light.
<i>Megamerina dolium</i>	a stilt-legged fly	Provisionally Nationally Scarce	B	A deadwood species on oaks.
<i>Merzomyia westermanni</i>	a fruitfly	Notable*: Notable	A	Associated with ragworts.
<i>Mordellistena humeralis</i>	a tumbling flower beetle	Nationally Scarce	A	Larvae probably develop in deadwood of trees or in plant stems. Adults on flowers, especially umbellifers.
<i>Myolepta dubia</i>	a hoverfly	Nationally Scarce	A	A rot-hole specialist of beech and other broadleaved trees.
<i>Oxystoma cerdo</i>	a weevil	Notable b*	A	Small weevil associated with tufted vetch. Now more common than its status suggests.
<i>Platydracus latebricola</i>	a rove beetle	Notable b	A	Associated with open calcareous habitats, often under stones.
<i>Platypus cylindrus</i>	a beetle	Notable b*	B	Found within the timbers of hardwood trees, often deep in the heartwood where it feeds on fungi.
<i>Platystomus albinus</i>	a beetle	Notable b*	B	Associated with dead and dying trees. A range of tree species are used by the species. Now more common than its status suggests.
<i>Tanyptera atrata</i>	a crane fly	Notable	B	A saproxylic crane fly; breeds in decaying timbers of hardwoods.

Species	Common name (if any)	Conservation status	2020 Sampling area	Habitat preferences/notes
				Noted ovipositing into a rot hole on an ash tree.
<i>Thyreocoris scarabaeoides</i>	a shieldbug	Nationally Scarce	B	Recorded from dry sheltered places on sand or chalk.
<i>Tillus elongatulus</i>	a beetle	Nationally Scarce	B	A predator on other deadwood beetles, found in the heartwood decay of broadleaved trees such as beech.
<i>Tomoxia bucephala</i>	a beetle	Nationally Scarce	B	Prefers the stumps and trunks of beech to live.
<i>Variimorda villosa</i>	a tumbling flower beetle	Nationally Scarce	A, B	Larvae probably develop in the deadwood of trees, or in plant stems. Adults on flowers, especially umbellifers.

*Accepted as being more common than this status suggests; likely to be downgraded.

The most up-to-date information and species reviews are used in these assessments. Where there is no up-to-date review, Pantheon (Webb et al., 2017⁴) has been used.

5 AMPHIBIANS

5.1 GREAT CRESTED NEWTS (GCN)

Introduction.

5.1.1 ESL has carried out ecological monitoring and management of the existing ENRMF site since 2014, as required by the EMAP, last reviewed in 2018 (ESL, 2019⁶) and therefore has a good understanding of the habitats and species present, particularly the herpetofauna.

⁴Webb, J., Heaver, D., Lott, D., Dean, H.J., van Breda, J., Curson, J., Harvey, M., Gurney, M., Roy, D.B., van Breda, A., Drake, M., Alexander, K.N.A. and Foster, G. (2017) *Pantheon – Database Version 3.7.4*. [online] Available at: <http://www.brc.ac.uk/pantheon/> [Accessed on 28 May 2017].

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- 5.1.2 Prior to Augean acquiring the Site, the previous owners had commissioned a GCN survey of the many waterbodies then present on the Site, which confirmed the presence of GCNs. As a result of this, the species was translocated from the active quarry under licence to ponds at the bottom of the north slope of the existing ENRMF. A temporary exclusion fence was erected on the Site-side of the waste treatment and recovery facility area and the receptor ponds and across the top of the northern slope of the existing ENRMF. The west side of the existing ENRMF was also fenced but the animals in the receptor area were free to disperse to the north or west.
- 5.1.3 When ESL became responsible for protecting the GCNs and other amphibians, two ponds in the north were revitalised, a third pond (off-site) was provided and the temporary fencing was replaced with permanent steel sheet.
- 5.1.4 Surveys of amphibians using these ponds began from 2014 as each was completed and planted with aquatics. Surveys for ponds in the surrounding area began in 2018-19 as permission was obtained from the landowners.

Statutory protection.

- 5.1.5 In England, Scotland and Wales, GCNs are fully protected under the WCA⁵, as amended by the Countryside and Rights of Way Act, 2000 (CRoW)⁶. They are also protected under the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations, 2019⁷. Taken together, this legislation makes it illegal, *inter alia*, to:

- Intentionally or recklessly kill, injure or capture a GCN.
- Damage or destroy habitat which a GCN uses for shelter or protection.
- Deliberately disturb a GCN when it is occupying a place it uses for shelter and protection.

⁵Wildlife and Countryside Act, 1981 (and as amended).

⁶The Countryside and Rights of Way Act, 2000.

⁷The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations, 2019.

5.1.6 These provisions apply to all life-stages and to both their terrestrial and aquatic habitats.

Desk study.

5.1.7 There are numerous past records from Fineshade Woods. GCNs were also known to be present on the area that is now the existing ENRMF from at least 2006 (see 5.1.2 above). They have continued to breed in the receptor area to date.

Methods

5.1.8 Examination of aerial imagery and OS maps, together with Site walkovers, identified 20 waterbodies within 500m of the Site boundary, within the surrounding woodland and including those on the northern boundary of the existing ENRMF. Of these, 12 were within 250m. Access to eight waterbodies was granted and these were surveyed in 2019-2020. All eight waterbodies were considered suitable for a range of amphibians and their locations are shown on Figure 5.1. The dates and conditions for evening surveys are given in Tables 5.1 and 5.2.

5.1.9 All fieldwork was carried out by a rotating team of four experienced GCN-licensed ecologists led by Brian Hedley, Natural England GCN survey licence number 2015-16348-CLS-CLS. Whilst the surveys conducted were specific for GCNs, all other amphibians were also searched for and counted both within the waterbodies and in other suitable habitats.

5.1.10 All waterbodies were surveyed using a combination of methods, which included torch and bottle-trap surveys, netting, egg searching (English Nature, 2001⁸) and the use of eDNA (Biggs *et al.*, 2014⁹). A quantitative measure of all waterbodies' suitability for GCN was made using the Habitat Suitability Index

⁸English Nature (2001). Great Crested Newt Mitigation Guidelines. English Nature, Peterborough.

⁹Biggs 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.

(HSI) endorsed by Natural England (Oldham *et al.*, 2000¹⁰). The ten variables evaluated take into account the aquatic habitat, the surrounding terrestrial habitat and local pond density, providing a score considered to reflect overall habitat quality.

5.1.11 Where accessible, waterbodies were surveyed by torchlight between dusk and midnight. The surveyor walked slowly around the margin, where safe to do so, shining a 500,000cp Clulite torch onto the surface of the water. Particular attention was paid to areas around marginal vegetation for egg-laying females and patches of open water (used by displaying males).

5.1.12 Bottle traps, specially constructed from 2-litre plastic bottles, were placed around the margins in areas of accessible shoreline at a density of one trap per 2m. Each had an air bubble present and was anchored in position using a garden cane. Locations of all traps were mapped on each visit and the times of setting and removal were recorded. All traps were set between 18:30 and 23:00hrs and were removed between 08:30 and 10:50hrs. Because of restrictions on overnight stays due to Covid-19, for Visits 1 and 2 in 2020, traps were removed 4.5-5.5 hours after being set. The method reverted back to overnight trapping for Visits 3-6.

5.1.13 A representative sample of the aquatic plants present was carefully examined for the presence of newt- and particularly GCN-eggs. In addition, egg-laying strips were placed in the margins of ponds with little or no suitable vegetation for egg-laying. These comprise black plastic strips approximately 15-20mm wide and 500mm long, bound to garden canes in bunches of 5-10. The canes were sunk into the substratum so that the strips were floating freely below the surface. Experience shows these strips to be readily accepted and used by GCNs. These strips were also examined on each survey. To minimise disturbance, no further searching was carried out in a waterbody once a single

¹⁰Oldham 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.

GCN egg had been found there. Unused egg-strips were removed on the last visit, with any used egg strips removed later in the year when all eggs had gone.

Waterbody descriptions.

5.1.14 Eastern Waterbody Group:

- E1. This linear pond is a section of a ditch on the western boundary of Collyweston Great Wood. It is shallow and the banks are dominated by bramble scrub. To the west is the northern field of the proposed Western Extension. Emergent aquatic vegetation is limited to water mint and floating sweet-grass with hard rush, great willowherb and remote sedge in the margins.
- E2. This is the largest pond in the eastern group of ponds, at approximately 350m². It is dominated by bulrush but annual clearance of this by hand and with hand-tools ensures an open area for newt mating-displays. Aquatic and emergent vegetation is not extensive but comprises broad-leaved pondweed, common water-plantain, water forget-me-not, hard rush and great willowherb.
- E3. This small pond, 50m², was excavated in February 2017. The margins support branched bur-reed, wood small-reed, common club-rush, common spike-rush, sharp-flowered rush and hard rush. Despite the proximity to Pond E2, the steep banks have so far inhibited the colonisation of bulrush. Aquatic plants including common water-plantain and stonewort species are present, with water forget-me-not in the margins.
- E4. Improvements to this off-site pond, carried out in 2012, included increasing the depth to 1.25m to prevent bulrush colonisation from nearby pond E2 and lining with puddled clay to ensure it could hold water throughout the amphibian breeding season. Extra planting also took place in 2013 and 2015. These actions have been successful and the 150m² pond supports many aquatic plant species: common club-rush, sharp-flowered rush, hard rush, jointed rush, common spike-rush, marsh marigold, purple loosestrife, common water-plantain and yellow flag iris, with broad-leaved pondweed, water mint, water forget-me-not offering extensive opportunities for egg-laying newts.

5.1.15 Western Waterbody Group:

- W1. This is an enlarged section of ditch near to the northern boundary of Fineshade Woods. Surrounded by woodland, it is shaded, often shallow and does not support aquatic vegetation.
- W2. This is the only pond in the western group to have aquatic vegetation suitable for egg-laying newts: water mint and water starwort. Bramble scrub patches restricted access from the southern bank but at least 75% of the shoreline was accessible for setting bottle traps. As the season progressed, blanket weed became abundant across the pond.
- W3. An elongated pond within woodland with a deep layer of leaf debris. No aquatic vegetation is present and the banks are largely bare. Pollen and catkins on the surface of the water impeded torchlight surveys as the season progressed.
- W4. A large pond, approximately 520m², at the north-eastern corner of Little Wood with Fineshade Woods. The water was usually turbid so torchlight surveys were limited. Aquatic vegetation was sparse, with hard rush and creeping bent in the margins and an increasing coverage of dense least duckweed on the water surface. Bottle traps could only be placed along the southern bank and parts of the eastern bank due to dense scrub restricting access.

Survey results.

5.1.16 For ease of survey, the eight waterbodies were grouped into east and west populations. The western waterbodies were subdivided into north and south groups since 800m separates waterbodies W1-3 and W4 and therefore, there is a low probability that GCNs using these ponds would frequently mix.

5.1.17 The HSI scores are given in Table 5.3. Peak counts for GCNs for all waterbodies surveyed are shown in Tables 5.4 and 5.5. The peak counts are taken from whichever method gave the highest result on one night so peak counts between ponds may occur on different dates. GCNs were recorded in six of the waterbodies, as shown on Figure 5.1. Peak counts were low but they confirm that GCNs are present in woodland on both sides of the proposed Western Extension.

5.1.18 No significant differences were found between the surveys of 2019 and 2020 for waterbodies W1-4 and E1 however, after prolonged flooding over the winter of 2019-20, the peak counts in 2020 for waterbodies E2-4 were lower than in 2019 but had recovered in 2021.

Conclusions.

5.1.19 GCNs are present where there are suitable ponds available. Arable land is not suitable for them but grassy rides, open glades, field margins and ditch banks all provide suitable foraging for them. This species has high statutory protection and is therefore an Important Ecological Feature of the zone of influence.

5.2 OTHER AMPHIBIANS

Statutory protection.

5.2.1 All common reptiles are protected from sale and trade, dead or alive, by the WCA. The common toad is also an S41 biodiversity Priority Species under NERC¹¹, meaning that the species should be considered during planning and development.

Survey results.

5.2.2 During the GCN surveys, all amphibian species were counted using the same methods and the peak counts for 2019 and 2020 are shown in Tables 5.6 and 5.7. The counts are taken from whichever method gave the highest result on one night however, peak counts between ponds may vary with date.

5.2.3 The tables show that smooth newts were found in every waterbody in at least one of the two years, with pond E3 having the highest count, while palmate newts were found in every pond except E2 in at least one year, with the highest counts from the Fineshade Woods ponds. Common toads were scarce in all ponds (but see below) and the only common frog was found in E4. The low numbers of common toads recorded in Ponds E2-4 and W4 and common frogs

¹¹Natural Environment and Rural Communities (NERC) Act, 2006.

generally is likely due to the survey dates; just half the survey dates fell in the peak breeding months for frogs and toads (February-April), ARC, 2009¹².

- 5.2.4 Few amphibians were found beneath the artificial cover objects (ACOs) used for the reptile surveys. Two juvenile and two adult common toads and an adult common frog were found beneath the ACOs at the edges of both Fineshade Woods and Collyweston Great Wood.

Conclusions.

- 5.2.5 The common amphibians are valued in Northamptonshire, where palmate newt is a local BAP¹³ species and good numbers of a full range of species is a consideration for selection as an LWS¹⁴. They are therefore considered an Important Ecological Feature in the context of the Site.

Table 5.1. Dates and weather conditions for surveys in 2019.

Visit number	Date of visit	Weather
1	20/03/2019	10°C, dry, light wind.
2	16/04/2019	9°C, dry, light wind.
3	01/05/2019	10°C, light rain, light wind.
4	14/05/2019	12°C, dry, light wind.
5	29/05/2019	12°C, drizzle, light wind.
6	06/06/2019	14°C, dry, light wind.

¹²Amphibian and Reptile Conservation (2009) Common toads and roads. Guidance for planners and highways engineers.

¹³ <https://www.northamptonshire.gov.uk/councilservices/environment-and-planning/planning/planning-policy/archaeology-biodiversity-and-landscape/documents/PDF>

¹⁴Northamptonshire Biodiversity Partnership, Local Wildlife Sites Panel, 2014 (last updated) Wildlife Sites Selection Criteria, Northamptonshire

Table 5.2. Dates and weather conditions for surveys in 2020.

Visit number	Date of visit	Weather
1	15/04/2020	9°C, dry.
2	23/04/2020	10°C, dry.
3	30/04/2020	9°C, drizzle, light breeze.
4	06/05/2020	10°C, clear, dry.
5	14/05/2020	8°C, dry, still.
6	19/05/2020	17°C, dry, light breeze.

Table 5.3. Pond HSI scores and their interpretation.

Waterbody	HSI score	Suitability
E1	0.67	Average
E2	0.77	Good
E3	0.76	Good
E4	0.80	Excellent
W1 - Assarts North	0.42	Poor
W2 - Assarts North	0.77	Good
W3 - Assarts North	0.61	Average
W4 -Little Wood	0.74	Good

Table 5.4. Peak counts of GCNs recorded in each pond in 2019.

Waterbody	Great crested newt			
	Male	Female	Juvenile	Eggs
E1	0	0	0	No
E2	10	8	0	Yes
E3	7	6	0	Yes
E4	12	8	0	Yes
W1 - Assarts North	0	0	0	No

Waterbody	Great crested newt			
	Male	Female	Juvenile	Eggs
W2 - Assarts North	0	2	0	Yes
W3 - Assarts North	0	0	0	No
W4 - Little Wood	0	0	2	Yes

Table 5.5. Peak counts of GCNs recorded in each pond in 2020.

Waterbody	Great crested newt			
	Male	Female	Juvenile	Eggs
E1	0	0	0	No
E2	1	2	0	Yes
E3	5	2	0	Yes
E4	2	5	0	Yes
W1 - Assarts North	0	0	0	No
W2 - Assarts North	1	0	0	Yes
W3 - Assarts North	1	0	0	No
W4 - Little Wood	5	3	0	Yes

Table 5.6. Peak counts of other amphibians recorded during the 2019 survey.

Waterbody	Smooth newt	Palmate newt	Common toad	Common frog
E1	0	7	0	0
E2	10	0	0	0
E3	22	1	1 tadpoles +	0
E4	11	0	3	0
W1	0	2	0	0

Waterbody	Smooth newt	Palmate newt	Common toad	Common frog
W2	1	37	0	0
W3	2	34	0	0
W4	7	22	0	0

Table 5.7. Peak counts of other amphibians recorded during the 2020 survey.

Waterbody	Smooth newt	Palmate newt	Common toad	Common frog
E1	3	4	0	0
E2	6	0	5	0
E3	30	1	6	0
E4	3	4	6	1
W1	1	0	0	0
W2	2	9	0	0
W3	1	33	0	0
W4	3	3	1	0

6 REPTILES

6.1 STATUTORY PROTECTION

6.1.1 All four of the more widespread species of native reptiles, that is, common lizard, grass snake, slow worm and adder, are given partial protection under the WCA¹⁵, which prohibits the intentional killing, injuring or taking of any of these species. There is no provision in the Act for licensing works that could give rise to an offence but it does provide a defence where the otherwise unlawful act can be shown to be the incidental result of a lawful operation and could not reasonably have been avoided. Permitted development or a

¹⁵Wildlife and Countryside Act, 1981 (and as amended). Available [online] at <https://www.legislation.gov.uk/ukpga/1981/69>

development that has received planning permission is clearly a lawful activity but the law thus requires that a reasonable effort be made to avoid killing or injuring protected animals in the course of implementing this permission.

- 6.1.2 The habitats of rare reptile species are also protected under this Act but those of the common species listed above are not; these animals are also not protected from disturbance whilst occupying their habitat.
- 6.1.3 In addition, all the common reptiles are an S41 Species of Principal Importance for Biodiversity (NERC, 2006¹⁶) and adder is also a priority species for the Back from the Brink 'Roots of Rockingham' project.

ADDERS

Desk study.

- 6.1.4 The previous records provided by NBRC and the existing ENRMF EMAP surveys are shown on Figure 6.1. The NBRC returned 11 records of adders within the study area; eight are within Fineshade Woods, with the nearest record 1.2km southwest of the Site. A further two records, approximately 1km west of the Site, relate to the A43 road verges and the last from habitat north of the A47, approximately 1km northeast of the Site. Further surveys have been carried out for Back from the Brink in 2018-2020, with many more records coming from Fineshade Woods, much closer to the Site but these records are not yet currently publicly available (O'Riordon, *pers. comm.*).
- 6.1.5 Adders have a greater tolerance of cold than most reptiles and emerge from hibernation as soon as the temperature begins to increase in spring. This may be as early as late February or early in March if the weather is suitable, the males emerging slightly before the females. Typically, adders remain close to their hibernation site for a period after emergence to bask in the sun together and recover from their winter torpor; they will return to these sites in late autumn

¹⁶Natural Environment and Rural Communities Act, 2006.

to congregate again prior to hibernation. Adders are a priority species for the Back from the Brink project and were therefore subject to more survey effort.

Survey methods – general.

- 6.1.6 To ensure that any early-emergent or pre-hibernation behaviour was recorded, a combination of 'direct observation' surveys and traditional 'tinning' surveys using ACOs or 'tins', 0.5m² black corrugated bitumen sheets and corrugated metal sheets, were carried out for reptiles through the active season in 2019 and 2020. Reptiles will use both the upper surface of the tins and the space underneath them as part of their thermoregulatory behaviour, absorbing heat either directly or by conduction. The number of ACOs provided and the area over which they were distributed increased each year.
- 6.1.7 Direct observation involves walking slowly and quietly through all suitable habitats (woodland fringes with grassy borders, ditch banks, woodland rides and areas of rough grassland close to cover, such as bramble, to which they can retreat), watching and listening for animals or movement. Slow movements that minimised vibration were used to approach sheltered sun traps at vegetation interfaces, which make ideal basking spots. A specific search was made for aggregations of animals in March, April and September around features that could be used by adders for hibernation, such as the root-bowls of fallen trees and piles of stones or logs.

2019 survey methods.

- 6.1.8 On 20 March 2019, prior to the placement of the ACOs, experienced ecologists, specialising in reptile surveys, walked transects of the survey area in suitable weather conditions to carry out direct observation searches for adders.
- 6.1.9 One-hundred and thirty-three ACOs were placed in areas of suitable reptile habitat (see Figure 6.2). The numbers on the figure relate to the number of ACOs in each associated line. They were placed in both exposed and more sheltered locations in order to provide both basking sites and shelter under different conditions.
- 6.1.10 Each ACO was inspected ten times in weather conditions when any reptile species present could reasonably be expected to be active (English Nature,

1994¹⁷). In addition, direct observation of suitable habitat areas was carried out on every visit in an attempt to locate any reptiles basking or foraging in open areas.

2019 survey results.

6.1.11 The only adder recorded was an adult male, seen in the same basking location at the western end, south-side, of the central hedgerow on visits 3-5. The adder was observed but not photographed as it retreated quickly into dense cover as the surveyors approached. It cannot be proved but is nevertheless probable that the same adult male was involved on all three occasions.

6.1.12 The weather conditions recorded on each survey visit and a summary of the findings are shown in Tables 6.1 and 6.2.

Discussion.

6.1.13 Following the adder records associated with the central hedgerow, it was decided to intensify the survey schedule in 2020, including more early-season transect surveys to try and identify hibernation sites. The number of ACOs used was also increased in order to cover more possible adder habitat (see Figure 6.3).

2020 survey methods.

6.1.14 On 12 March, prior to the placement of the ACOs, experienced ecologists specialising in reptile survey again walked transects of the survey area in suitable weather conditions, carrying out direct observation searches for adders. This survey was repeated on 31 March and included the first inspection of the ACOs.

6.1.15 One-hundred and eighty-three ACOs were placed in areas of suitable reptile habitat and each ACO was inspected 15 times in suitable weather conditions. In addition, direct observation of areas of suitable habitat was again carried out

¹⁷English Nature, 1994 (and as updated). Species Conservation Handbook. English Nature, Peterborough.

on every visit to locate any reptiles basking or foraging in open areas (English Nature, 1994¹⁸).

2020 survey results.

6.1.16 No adders were recorded in the survey area during any of the surveys in 2020. The locations of reptile refugia are shown on Figure 6.3. As above for Figure 6.2, the numbers on the figure relate to the number of ACOs in each associated line. The weather conditions recorded on each 2020 survey visit and the 2020 results are shown in Tables 6.3 and 6.4.

Discussion.

6.1.17 No adders were recorded during the 2020 surveys. Following the examination of recent records provided by the Back from the Brink project (which included a cluster of recent and current adder sightings along a ride in The Assarts) and discussions with consultees, early season reptile transects were included in 2021 to take in further suitable habitat outside the Site, including adjacent areas of the surrounding woodlands and the number of surveys and ACOs used were further increased. Late-season surveys are also planned for 2021 and will be reported separately.

6.1.18 Mr Jim Foster, Conservation Officer, Amphibian and Reptile Trust, has commented (in response to the PEIR consultations):

"Presently the fields between Collyweston Great Wood and Fineshade Wood create a partial barrier to the movement of wildlife between the woods (woodland species will vary in their ability to disperse across this land). To exemplify this, the adder, Vipera berus, is one of the priority species within the Roots of Rockingham project.

The Rockingham Forest area is of particular importance for the adder as it is one of the few areas where this formerly widespread species occurs in the East Midlands. Even within this area the species has contracted its range and is

¹⁸English Nature, 1994 (and as updated). Species Conservation Handbook. English Nature, Peterborough.

now confined to Fineshade Wood and some nearby road verges including those bordering Collyweston Great Wood. Aside from the uncultivated margins, the fields between Collyweston Great Wood and Fineshade Wood are unfavourable habitat for adders, offering little potential for movement between the woods, creating a partial barrier, dividing the adders into small, separate populations".

6.1.19 Although there is a woodland edge link around the two woods, the central hedgerow is currently the only direct (shorter) link. To address consultee issues in respect of connectivity, the central hedgerow that crosses the Site from east to west has been given particular attention and attempts will be made to photograph the head-markings of any adders sighted. This attention will be increased in future surveys. Given its status within the region, the adder is clearly an Important Ecological Feature for this Site.

2021 reptile surveys.

6.1.20 A more intensive suite of surveys has begun in 2021, with the visits increased from the 16 carried out in 2020 to 20. The increased survey effort is intended largely to inform potential adder movements to and from likely hibernation sites and to investigate dispersal across the application area, using the central hedgerow as a corridor for movement. The results of these surveys will be issued as a supplementary document once they are complete.

6.2 OTHER REPTILES

2019 survey methods.

6.2.1 The surveys for other reptile species were carried out in conjunction with the adder surveys. Similar methods were used with the ACOs inspected 10 times in suitable weather conditions and direct observation carried out during every visit.

2019 results.

6.2.2 Adult and immature slow worms and common lizards were recorded along the field margins of the eastern boundary of The Assarts and the western boundary of Collyweston Great Wood. Peak counts of 15 common lizards and 12 slow

worms were recorded across all areas surveyed on separate survey visits. No grass snakes were recorded in 2019. Common lizards were recorded on visits 2-11 and slow worms were recorded on visits 2 and 4-11.

- 6.2.3 The survey dates and results of all of the surveys are summarised in Tables 6.1 and 6.2, as for the adder surveys.

2020 survey methods.

- 6.2.4 The surveys for other reptile species were again carried out in conjunction with the adder surveys. Similar methods were used with the ACOs inspected 15 times in suitable weather conditions and direct observation carried out during every visit.

2020 survey results.

- 6.2.5 As with the 2019 surveys, both adult and immature slow worms and common lizards were recorded along the field margins of the eastern boundary of The Assarts and the western boundary of Collyweston Great Wood. Peak counts of 15 common lizards and 17 slow worms were recorded on all areas on separate visits. Common lizards were recorded on visits 2-16 and slow worms were recorded on visits 3-16.
- 6.2.6 Individual immature grass snakes were recorded on visits 13 and 15 on the ditch bank on the south-eastern boundary of The Assarts. The survey dates and results of all of the surveys are summarised in Tables 6.3 and 6.4, as for the adder surveys.

Discussion.

- 6.2.7 The most productive area for common lizard and slow worm sightings was the grassland strip that forms the western boundary of Collyweston Great Wood and the eastern boundary of the Site. This area has an aspect that maximises the available sunlight and provides a range of suitable habitats; recorded peak counts (on separate visits) of eight common lizards and six slow worms in 2019 and 10 and three respectively in 2020. The eastern fringe of The Assarts was also productive, with plenty of suitable habitat along the margins but due to the

aspect, it does not receive as much sunlight, making it less suitable for basking reptiles.

- 6.2.8 Both sides of the proposed Western Extension provide areas for basking close to dense cover along their margins and together, they provide continuous linear-habitat that provides corridors for movement between summer and winter habitat and routes for dispersal and colonisation. The common reptiles are likely present, if only at lower density, throughout the adjoining woods and it is considered likely that (based on their widespread distribution, good numbers and presence in areas that will be retained) they will be resilient to the development.
- 6.2.9 Despite the fact that it faces due north, it is considered very encouraging that small numbers of common lizards are already being found on the north slope of the existing ENRMF site.

Table 6.1. Date, weather conditions and timings of surveys for 2019.

Visit No.	Date of visit	Times	Weather Conditions
1	20/03/2019	10:30 – 13:30	Partly sunny, dry, still, 10-12°C
2	10/04/2019	10:45 – 11:50	Sunny, dry, wind F1-2 E, 13-14°C
3	17/04/2019	13:30 – 14:45	Sunny, dry, wind F2 E, 15-16°C
4	24/04/2019	10:00 – 11:45	Partly sunny, dry, wind F2 SE, 16°C
5	02/05/2019	10:30 – 12:00	Partly sunny, dry, wind F3 NW, 15-17°C
6	14/05/2019	10:30 – 13:05	Sunny, dry, wind F2-3 SE, 15-16°C
7	22/05/2019	10:00 – 11:30	Sunny, dry, wind F1-2 W, 15-17°C
8	27/06/2019	13:50 – 15:00	Sunny, dry, wind F3-4 NE, 20°C
9	17/07/2019	10:35 – 12:30	Sunny, dry, wind F2 SW, 21°C
10	20/08/2019	12:30 – 14:20	Partly sunny, dry, wind F2-3 SW, 18-19°C

Visit No.	Date of visit	Times	Weather Conditions
11	26/09/2019	11:15 – 13:35	Partly sunny, dry, wind F3-4 SW, 18°C

Table 6.2. Summary of 2019 reptile survey results.

Visit No.	Date of visit	Results
1	20/03/2019	No reptiles recorded
2	10/04/2019	Common lizard – 2 adult males, 1 adult female Slow worm – 1 adult male
3	17/04/2019	Adder – 1 adult male Common lizard – 4 adult males, 3 adult females, 1 immature
4	24/04/2019	Adder – 1 adult male Common lizard – 3 adult males, 2 adult females Slow worm – 3 adult males, 1 adult female
5	02/05/2019	Adder – 1 adult male Common lizard – 4 adult males, 2 adult females, 2 immatures Slow worm – 1 adult male, 3 adult females
6	14/05/2019	Common lizard – 3 adult males, 4 adult females Slow worm – 1 adult male, 1 adult female
7	22/05/2019	Common lizard – 9 adult males, 5 adult females, 1 immature Slow worm – 3 adult males, 6 adult females, 1 immature
8	27/06/2019	Common lizard – 3 adult males Slow worm – 1 adult male, 3 adult females, 1 immature
9	17/07/2019	Common lizard – 2 adult males, 4 adult females, 1 immature Slow worm – 1 adult male, 1 adult female, 2 immatures
10	20/08/2019	Common lizard – 5 adult males, 3 adult females Slow worm – 4 adult males, 4 adult females, 4 immatures
11	26/09/2019	Common lizard – 1 adult male, 3 adult females, 7 immatures

Visit No.	Date of visit	Results
		Slow worm – 2 adult males, 2 adult females, 1 immature

Table 6.3. Date, weather conditions and timings of surveys for 2020.

Visit No.	Date of visit	Times	Weather Conditions
1	12/03/2020	10:30-13:30	Part sun, dry, 15-17°C, still.
2	31/03/2020	13:30- 15:30	Part sun, dry, 13-14°C, F1-2 NW wind
3	07/04/2020	13:30- 15:45	Part sun, dry, 16°C, F2 SW wind
4	22/04/2020	11:30-12:30 and 13:15-14:15	Sunny, dry, 15-16°C, F2-3 NE wind
5	07/05/2020	10:50 – 12:00	Sunny, dry, 15-16°C, still.
6	15/05/2020	12:10 – 13:15	Part sun, dry, 14-15°C, F1-2 SW wind
7	19/05/2020	11:00–12:30 and 13:00 – 14:00	Sunny, dry, 18-20°C, F2 S wind
8	27/05/2020	12:45 - 14:45	Part sun, dry, 20-22°C, F2 S wind
9	15/06/2020	12:45 – 15:30	Sunny, dry, 19-21°C, F1-2 SW wind
10	23/06/2020	12:30 – 14:30	Sunny, dry, 22-25°C, F1-2 SW wind
11	10/07/2020	10:30-11:30 and 13:45-15:00	Part sun, dry, 15-16°C, F2 SW wind
12	28/07/2020	17:10-19:15	Part sun, dry, 19-20°C, F2 W wind
13	14/08/2020	11:15-12:55 and 13:35-14:45	Part sun, dry, 18-21°C, F2-3 NE wind
14	01/09/2020	11:00-13:15	Sunny, dry, 16-18°C, F1-2 W wind
15	11/09/2020	12:45-15:00	Part sun, dry, 16-18°C, F2-3 W wind
16	24/09/2020	10:55-12:30 and 13:00-13:45	Part sun, occasional light rain, 14-16°C, F3 W wind

Table 6.4. Summary of 2020 reptile surveys.

Visit No.	Date of visit	Results
1	12/03/2020	No reptiles recorded.
2	31/03/2020	Common lizard – 1 adult male, 2 adult females
3	07/04/2020	Common lizard – 7 adult males, 2 adult females, 1 immature Slow worm – 1 adult male, 1 adult female
4	22/04/2020	Common lizard – 2 adult females, 2 immatures Slow worm – 3 adult males, 6 adult females, 2 immatures
5	07/05/2020	Common lizard – 4 adult males, 2 adult females Slow worm – 1 adult male, 6 adult females, 1 immature
6	15/05/2020	Common lizard – 7 adult males, 7 adult females, 1 immature Slow worm – 4 adult males, 5 adult females, 3 immatures
7	19/05/2020	Common lizard – 4 adult males, 2 adult females, 3 immatures Slow worm – 2 adult males, 6 adult females, 4 immatures
8	27/05/2020	Common lizard – 1 adult male, 2 adult females Slow worm – 2 adult males, 2 adult females, 5 immatures
9	15/06/2020	Common lizard – 1 adult male, 2 adult females Slow worm – 7 adult males, 7 adult females, 3 immatures
10	23/06/2020	Common lizard – 1 adult male Slow worm – 3 adult males, 3 adult females
11	10/07/2020	Common lizard – 7 adult males, 4 adult females, 3 immatures Slow worm – 3 adult males, 2 adult females
12	28/07/2020	Common lizard – 1 adult male, 3 adult females, 2 immatures Slow worm – 1 adult female

Visit No.	Date of visit	Results
13	14/08/2020	Common lizard – 2 adult males, 3 adult females Slow worm – 4 adult males, 2 adult females, 2 immatures Grass snake – 1 immature
14	01/09/2020	Common lizard – 4 adult males, 3 adult females Slow worm – 2 adult males, 4 adult females
15	11/09/2020	Common lizard – 4 adult males, 5 adult females, 4 immatures Slow worm – 1 adult female Grass snake – 1 immature
16	24/09/2020	Common lizard – 4 adult males, 6 adult females, 3 immatures Slow worm – 1 adult male

Table 6.5. Date, weather conditions and timings of surveys for 2021.

Visit No.	Date of visit	Times	Weather Conditions
1	24/02/2021	11:00 – 16:00	Part sun, 17°C, dry, F2 S wind
2	15/03/2021	11:15 – 15:05	Part sun, 9-10°C, dry, F1-2 S wind
3	25/03/2021	11:00 – 14:00	Broken cloud, 11-13°C, dry, F2 SW wind
4	09/04/2021	12:15 – 15:00	Hazy cloud, 10-12°C, dry, F1 wind
5	15/04/2021	16:00 – 18:00	Part sun, 10°C, F2 wind
6	23/04/2021	11:30 – 15:30	Clear, 14-18°C, dry, F1 wind
7	28/04/2021	15:30 – 18:30	Part sun, 15°C, dry, F1 NE wind
8	14/05/2021	11:30 – 14:45	Broken hazy cloud, 14°C, dry, F0 wind
9	24/05/2021	11:00 – 14:45	Sunny spells, 13°C, dry F2 SW wind
10	27/05/2021	13:45 – 15:45	Broken cloud, 16-18°C, dry, F1 wind

Visit No.	Date of visit	Times	Weather Conditions
11	03/06/2021	10:00 – 11:30	Sunny spells, 18-20°C, dry
12	23/06/2021	13:30 – 16:00	Part sun, 20°C, dry, F1 SW wind
13	TBC Jul 2021		
14	TBC Jul 2021		
15	TBC Aug 2021		
16	TBC Aug 2021		
17	TBC Aug 2021		
18	TBC Sep 2021		
19	TBC Sep 2021		
20	TBC Sep 2021		

Table 6.6. Summary of 2021 reptile surveys.

Visit No.	Date of visit	Results
1	24/02/2021	No reptiles recorded.
2	15/03/2021	Common lizard – 1 adult male
3	25/03/2021	No reptiles recorded.
4	09/04/2021	No reptiles recorded.
5	15/04/2021	Slow worm – 1 adult female
6	23/04/2021	Common lizard – 3 adult males, 2 adult females Slow worm – 2 adult males, 1 adult female, 2 immatures Grass snake – 1 immature
7	28/04/2021	Common lizard – 5 undetermined Slow worm – 2 adult males, 2 adult females

Visit No.	Date of visit	Results
8	14/05/2021	Slow worm – 2 adult males, 3 adult females, 1 immature
9	24/05/2021	Common lizard – 22 undetermined Slow worm – 15 undetermined
10	27/05/2021	Common lizard – 1 adult male, 7 adult females, 5 immatures, 14 undetermined Slow worm – 5 adult males, 11 adult females, 3 immatures, 2 undetermined
11	03/06/2021	Common lizard – 1 adult female, 2 immatures, 5 undetermined Slow worm – 1 adult male, 8 adult females, 3 immatures, 11 undetermined
12	23/06/2021	Slow worm – 1 adult male, 2 immatures, 1 undetermined.
13	TBC Jul 2021	
14	TBC Jul 2021	
15	TBC Aug 2021	
16	TBC Aug 2021	
17	TBC Aug 2021	
18	TBC Sep 2021	
19	TBC Sep 2021	
20	TBC Sep 2021	

7 BIRDS

7.1 PASSAGE AND WINTERING BIRDS

Introduction.

7.1.1 From regular visits to the existing ENRMF for species monitoring or habitat maintenance work as part of the EMAP, the Site is not known for supporting large flocks of passage or wintering birds such as waders or waterfowl and the desk study results also confirmed this. The survey area for the proposed

Western Extension included the existing ENRMF, together with the adjacent woodland boundaries.

Methods.

7.1.2 Twelve passage/wintering bird surveys of the proposed Western Extension survey area were undertaken between October 2018 and March 2019, comprising a combination of dawn and dusk visits with walked transects and vantage point counts. The method used was specifically designed for the Site. Birds using the existing ENRMF were also noted during the survey visits. The dates, times and weather conditions of the survey visits are given in Table 7.1 below.

Results.

7.1.3 The passage/wintering bird survey recorded 37 species, mainly passerines, feeding in the arable fields and hedgerows. No wintering waders, such as lapwings or golden plover, were recorded using the Site. The survey results are given in Table 7.2.

Conclusion.

7.1.4 The survey area as a whole is not known for large passage/wintering bird flocks and the 2018/19 survey has confirmed this. As no household waste is accepted, the existing ENRMF does not attract the large flocks of gulls or corvids that can congregate at landfill sites that do take that sort of waste. In summary, passage and wintering birds are considered resilient to this development and do not form an Important Ecological Feature of the Site.

7.2 BREEDING AND SUMMERING BIRDS

Introduction.

7.2.1 Breeding bird surveys of the existing ENRMF have been undertaken regularly as part of EMAP monitoring since 2014. Notable findings have included probable breeding by skylarks (a NERC S41 species) and by little ringed plovers (a WCA S1 species) plus regular foraging visits by red kites (also WCA S1).

Methods.

- 7.2.2 From March to June 2019, six breeding bird survey visits were undertaken by walking all habitats within the proposed Western Extension area, together with the adjacent woodland boundaries, mapping all birds seen/heard, together with activity codes, following Marchant, 1983¹⁹. The dates, times and weather conditions for these survey visits are given in Table 7.3.
- 7.2.3 A further three breeding bird survey visits were made to the existing ENRMF from April to June 2019 with dates, times and weather conditions given in Table 7.4. Additional bird records were made during other fieldwork visits, particularly during evening newt and bat surveys when nocturnal species such as owls are active.

Results.

- 7.2.4 The 2019 summer bird survey recorded 45 species, including eleven S41 species of Principal Importance of which skylark, dunnock, song thrush, linnet, bullfinch and yellowhammer are considered likely to breed here. All S41 species are also either Red- or Amber-listed (Eaton *et al.*, 2015²⁰) and one other, stock dove, is amber-listed. The surveys also recorded two WCA S1 breeding species (red kite and peregrine) using the Site but only as visitors from surrounding habitats where they could be breeding. The counts for each visit are given in Table 7.5.
- 7.2.5 The 2019 summer bird survey of the existing ENRMF recorded 34 species, including eight S41 species of Principal Importance, all of which are considered able to breed there, including skylark, linnet, bullfinch, yellowhammer and reed bunting. All S41 species are also either Red- or Amber-listed species (Eaton *et al.*, 2015) with stock dove also amber-listed. The surveys also recorded two WCA S1 breeding species, red kite and little ringed plover, using the Site. Red

¹⁹ Marchant J H, 1983. Common Bird Census Instructions. British Trust for Ornithology, Tring.

²⁰Eaton 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 United Kingdom, Channel Islands and Isle of Man. British Birds 108: 705-746.

kites are regular visitors to the existing ENRMF but only for foraging and are known to breed in nearby woodlands. Little ringed plovers have been regular summer visitors to the existing ENRMF site over the years, with breeding considered likely in some years. Their preferred breeding habitat of bare ground with shallow pools has now virtually disappeared; it may re-appear in the future on the proposed Western Extension area but this will depend on how much suitable habitat is available. The counts for each visit are given in Table 7.6.

Conclusions.

7.2.6 Most of the species recorded are individually common, widespread and typical of the habitats present on the Site, though some are also declining locally and/or nationally and their importance is recognised for this reason however, the assemblage is likely resilient to the development since large areas of their preferred habitats will continue to be present throughout and once the restoration is complete, the new habitats will be able to carry even greater numbers and a larger range of species than the Site does at present. Breeding birds are therefore not assessed further.

Table 7.1. Passage/wintering bird survey 2018/19: dates, times and weather conditions.

Visit	Date of visit	Sunrise /set	Times	Weather Conditions
1	29/10/2018	Sunset: 16:39	15:00 – 17:00	Dry, part sun, 6-8°C, F1 NE wind
2	30/10/2018	Sunrise: 06:54	06:35 – 08:35	Overcast, light drizzle, 4-7°C, F2-3 N wind
3	20/11/2018	Sunset: 16:01	1400 – 16:20	Overcast, occ. drizzle, 4-6°C, F2-3 E wind
4	21/11/2018	Sunrise: 07:33	07:13 – 09:33	Dry, overcast, 4-6°C, F1-2 E wind
5	17/12/2018	Sunset: 15:46	14:05 – 16:05	Dry, mostly sunny, 5-7°C, F2 W wind
6	18/12/2018	Sunrise: 08:07	07:45 – 09:45	Dry, overcast, 9-10°C, F3-4 SW wind

Visit	Date of visit	Sunrise /set	Times	Weather Conditions
7	15/01/2019	Sunset: 16:16	14:35 – 16:35	Dry, part sun, 6-8°C, F3-4 NW wind
8	16/01/2019	Sunrise: 08:03	07:40 – 09:40	Overcast, occ. drizzle, 6-7 °C, F3 SW wind
9	13/02/2019	Sunset: 17:09	15:30 – 17:30	Dry, part sun, 9-12°C, F2-3 SW wind
10	14/02/2019	Sunrise: 07:19	07:00 – 09:05	Dry, part sun, 2-6°C, F1 S wind
11	05/03/2019	Sunset: 17:46	16:06 - 1800	Dry, overcast, 8-10°C F3-4 SW wind
12	06/03/2019	Sunrise: 06:37	06:17 – 08:15	Light rain overcast, 7-9°C F4 SW wind

Table 7.2. Results of the passage/wintering bird survey 2018/2019.

Species	V 1	V 2	V 3	V 4	V 5	V 6	V 7	V 8	V 9	V 10	V 11	V 12
Red kite	0	2	2	4	3	1	4	1	2	1	2	2
Buzzard	0	2	2	4	3	1	4	1	2	1	2	2
Woodcock	0	0	1	0	0	0	0	0	2	0	0	0
Stock dove	0	2	4	4	0	5	12	6	6	2	2	5
Woodpigeon	3	5	88	37	1	0	0	1	0	1	8	2
Skylark	0	0	0	0	0	0	0	0	0	0	0	1
Pied wagtail	0	0	0	1	0	0	1	0	0	0	0	0
Wren	1	4	1	0	0	1	1	1	2	1	1	4
Dunnock	5	4	4	5	4	4	3	1	5	9	0	5
Robin	5	1	3	1	0	1	1	4	3	2	2	6
Blackbird	4	8	20	16	2	6	4	7	10	5	5	2
Fieldfare	1	10	19	0	0	0	0	0	0	0	0	0
Song thrush	1	0	2	0	0	0	1	1	0	1	0	1
Redwing	8	7	14	13	0	9	0	1	0	0	0	2
Mistle thrush	1	2	0	0	0	1	0	3	0	2	0	0
Goldcrest	1	0	2	0	0	1	0	0	0	1	0	0

Species	V 1	V 2	V 3	V 4	V 5	V 6	V 7	V 8	V 9	V 10	V 11	V 12
Long-tailed tit	8	0	8	0	26	0	6	0	4	4	1	0
Blue tit	6	6	2	3	2	2	3	2	2	6	3	3
Great tit	6	4	1	2	0	4	3	6	9	2	7	7
Coal tit	1	0	0	0	0	0	1	0	0	0	0	1
Marsh tit	1	1	2	0	1	1	1	0	0	0	2	0
Treecreeper	4	1	1	1	0	1	3	0	0	0	0	1
Jay	0	1	1	0	0	0	0	0	0	0	0	0
Magpie	4	3	3	7	2	5	4	1	2	3	0	1
Jackdaw	9	0	2	5	0	2	20	0	8	4	0	7
Rook	0	0	14	0	27	0	15	0	33	0	0	0
Carrion crow	1	2	1	3	13	1	6	3	10	2	0	1
House sparrow	0	8	0	10	0	5	0	4	20	14	2	4
Chaffinch	2	4	3	1	1	3	2	1	0	1	1	3
Goldfinch	0	0	2	0	0	0	0	0	0	4	0	0
Siskin	0	0	0	0	0	0	0	0	0	0	4	0
Lesser redpoll	0	0	1	0	0	0	0	0	0	0	0	0
Bullfinch	0	0	0	0	0	0	0	1	0	0	0	2
Yellowhammer	5	9	0	2	4	3	14	25	61	14	43	16
Reed bunting	0	0	0	1	0	0	0	0	0	0	0	0

NB. Red-legged partridges and pheasants are not included in these tables as they are released in this area.

Table 7.3. Dates, times and weather conditions during the 2019 summer bird survey of proposed western extension area.

Visit	Date of visit	Sunrise	Times	Weather Conditions
1	26/03/2019	05:50	06:05 – 08:10	Clear, dry, light frost, 3-4°C, F1 W wind
2	10/04/2019	06:15	06:10 – 08:10	Overcast, dry, 4-6°C, F1 E wind
3	24/04/2019	05:44	05:40 – 08:00	Overcast, misty, dry, 9°-14°C, F2 SE wind

Visit	Date of visit	Sunrise	Times	Weather Conditions
4	03/05/2019	05:26	06:00 – 08:15	Overcast, dry, 7°C, F1 NW wind
5	22/05/2019	04:55	05:45 – 08:15	Partly sunny, dry, 8°C, F1 NW wind
6	14/06/2019	04:37	05:45 – 08:00	Overcast, occ. light rain, 11°C, F2-3 SW wind

Table 7.4. Dates, times and weather conditions during the 2019 summer bird survey of the ENRMF.

Visit	Date of visit	Sunrise	Times	Weather Conditions
1	18/04/2019	05:56	06:35 – 08:30	Dry, foggy to start, 6°C, F1 S wind
2	23/05/2019	04:53	06:05 – 08:00	Dry, clear, 14°C, no breeze, light cloud
3	27/06/2019	04:40	06:30 – 08:30	Dry, overcast, 13°C, F2-3 NE

Table 7.5. Results of 2019 breeding/summering bird survey of proposed Western Extension survey area.

Species	Visit 1	Visit 2	Visit 3	Visit 4	Visit 5	Visit 6
	26/03/19	10/04/19	24/04/19	03/05/19	22/05/19	14/06/19
Greylag goose	0	2	2	1	0	0
Mallard	3	2	0	0	0	0
Mandarin Duck	0	0	2	0	0	0
Red-legged partridge	2	2	3	0	0	0
RED KITE	4	2	1	1	1	0
Sparrowhawk	1	0	0	0	0	0
Buzzard	1	2	3	1	1	1
PEREGRINE	0	1	0	0	0	0
Stock dove**	4	1	2	12	25	2
Woodpigeon	12	9	5	0	1	6
Collared dove	0	1	0	0	0	0

Species	Visit 1	Visit 2	Visit 3	Visit 4	Visit 5	Visit 6
	26/03/19	10/04/19	24/04/19	03/05/19	22/05/19	14/06/19
Cuckoo*	0	0	0	0	1	0
Great spotted woodpecker	0	0	0	0	1	0
Skylark*	1	0	4	1	3	0
Swallow	0	0	0	0	1	0
Pied wagtail	2	0	0	0	0	0
Wren	3	4	4	3	4	1
Dunnock**	2	3	2	1	2	1
Robin	7	2	2	2	3	1
Blackbird	5	0	3	1	2	1
Song thrush*	0	1	0	0	0	1
Blackcap	0	0	5	3	6	1
Garden warbler	0	0	0	4	4	1
Lesser whitethroat	0	0	0	1	0	0
Whitethroat	0	0	1	0	4	3
Chiffchaff	1	1	1	1	1	1
Goldcrest	0	1	1	1	0	0
Long-tailed tit	6	2	0	3	8	0
Blue tit	10	8	6	11	10	4
Great tit	3	2	1	2	5	7
Marsh tit*	2	0	0	0	1	4
Nuthatch	0	0	0	0	1	1
Treecreeper	1	0	1	0	0	1
Magpie	1	2	1	1	3	4
Jackdaw	0	13	6	2	30	2
Carrion crow	2	2	1	1	1	2
House sparrow*	3	3	0	0	0	0
Chaffinch	6	0	1	0	4	0

Species	Visit 1	Visit 2	Visit 3	Visit 4	Visit 5	Visit 6
	26/03/19	10/04/19	24/04/19	03/05/19	22/05/19	14/06/19
Greenfinch	0	0	0	0	1	0
Goldfinch	3	0	0	0	0	0
Linnet*	0	2	4	0	1	2
Lesser redpoll*	20	0	0	0	0	0
Bullfinch**	1	0	0	0	0	1
Yellowhammer*	11	8	6	9	6	3
Reed bunting**	0	0	1	0	0	1

KEY to breeding tables: Species names shown in bold are S41 Species of Principal Importance. Those in capitals are birds on Schedule-1 of the WCA. Red List species shown with * and Amber List species with ** (Birds of Conservation Concern: Eaton et al, 2015).

Table 7.6. Results of 2019 breeding/summering bird survey of ENRMF.

Species	Visit 1	Visit 2	Visit 3
	18/04/2019	23/05/2019	27/06/2019
Mallard	11	1	1
Tufted duck	2	0	0
RED KITE	0	1	1
Buzzard	0	0	1
LITTLE RINGED PLOVER	3	1	3
Stock dove**	0	0	2
Woodpigeon	5	0	22
Collared dove	0	1	1
Skylark*	0	2	4
Swallow	0	1	2
Meadow pipit	2	0	0
Pied wagtail	1	2	3
Wren	3	1	5
Dunnock*	5	3	2
Robin	3	1	0
Wheatear	2	0	0
Blackbird	5	2	5

Species	Visit 1	Visit 2	Visit 3
	18/04/2019	23/05/2019	27/06/2019
Song thrush*	0	0	1
Blackcap	5	2	2
Whitethroat	2	4	4
Chiffchaff	1	1	1
Blue tit	2	1	4
Great tit	3	0	6
Magpie	0	1	4
Carrion crow	0	0	1
House sparrow*	1	1	7
Chaffinch	1	0	0
Greenfinch	0	0	1
Goldfinch	9	3	6
Linnet*	11	4	12
Bullfinch**	1	0	1
Yellowhammer*	7	3	7
Reed bunting**	5	2	1

8 BATS

8.1 INTRODUCTION

Statutory protection & derogation.

8.1.1 In England, Scotland and Wales, all species of bat are fully protected under the WCA, including by CRoW. They are also protected under The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations, 2019. Taken together, this legislation makes it illegal, *inter alia*, to:

- Intentionally or recklessly kill, injure or capture a bat.
- Deliberately disturb a bat when it is occupying a roost.
- Damage, destroy or obstruct access to a bat roost.

8.1.2 A bat roost is defined as being any structure or place that is used for shelter or protection and since it may be in use only occasionally or at specific times of year, a roost retains such designation whether the bats are present or not.

8.1.3 Where bats are affected by development, derogation from the legislation is possible under a European Protected Species Licence (EPSL), which is issued at the discretion of Natural England under the requirements of The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations, 2019.

8.2 DESK STUDY SUMMARY

Northamptonshire Bat Group.

8.2.1 Northamptonshire Bat Group provided 47 bat records for nine species between 2000-2018, all to 1km resolution. The closest records were from Fineshade Woods, a minimum of 150m to the east of the Site.

Cambridgeshire Bat Group.

8.2.2 Cambridgeshire Bat Group provided 30 hibernation records for eight species from 2006 to 2020. The closest record was from approximately 800m north of the Site, within Collyweston Great Wood.

Back from the Brink project.

8.2.3 The Back from the Brink (BFTB) project conducted overnight acoustic surveys at five static locations on the Site over three nights in July, August and September 2020 and provided a summary of their results. They recorded activity by barbastelle bat, serotine bat, *Myotis* sp., Leisler's bat, noctule, common pipistrelle, soprano pipistrelle and brown long-eared bat.

ESL bat boxes.

8.2.4 In 2014, ESL fixed 10 bat boxes to trees in the woodland north of the ENRMF. These boxes were monitored annually by ESL from 2014 to 2020. To date, five species have been recorded in the boxes: soprano pipistrelle, common pipistrelle, brown long-eared bat, barbastelle and Leisler's bat. The boxes have been used by low numbers of individual bats, predominantly males. In recent

years, male and female soprano pipistrelles have been found between late August and October, suggesting the boxes are being used as mating roosts.

8.3 METHODS

Survey area.

8.3.1 The Site is here defined as the area within the inner edge of the boundary ditches around the development area (and the continuation of the ditch line where the ditch is no longer visible), except on the southern boundary, where it is currently unmarked on the ground and the southwest boundary, where it follows the western edge of the farm road. The survey area comprises the existing ENRMF, proposed Western Extension area and parts of the adjacent woodlands. The existing ENRMF is an active landfill site. There are no roost opportunities for bats on the existing ENRMF and annual acoustic monitoring surveys over the past eight years indicate it is not important for commuting or foraging. The bat surveys therefore focus on the proposed Western Extension.

Preliminary Ecological Appraisal (PEA).

8.3.2 The desk study information was reviewed and a site walkover was undertaken to assess the suitability of the habitats on Site for use by foraging and commuting bats against criteria in Table 8.1 (from Collins, 2016²¹). This information was then used to determine the optimal survey methods and survey effort necessary to identify the assemblage of bat species using the Site and the levels of activity in each habitat.

8.3.3 The PEA indicates that whilst the bulk of the Site comprises habitats likely to be of 'Low' suitability of use by foraging and commuting bats (open, arable crop), the marginal headlands and interface with adjacent woodlands and the two hedgerows are likely of 'High' suitability for use by foraging and commuting

²¹Collins J. (ed.) 2016. Bat Surveys for Professional Ecologists: Good Practice Guidelines, 3rd edition. The Bat Conservation Trust, London.

bats. The survey was therefore designed to assess habitats on the basis of 'High' suitability.

Preliminary Roost Assessment (PRA).

8.3.4 There are no buildings or structures within or adjacent to the proposed Western Extension. Whilst the fields have woodland on three sides and there are at least two trees within the woodland tree protection area (TPA) due to be retained, there are only two trees within the Site. Each tree was examined from the ground using close-focusing binoculars for Potential Roost Features (PRF) such as woodpecker holes, rot holes, cavities, snag ends and delaminating bark, then categorised using the criteria in Table 8.2 (from Collins, 2016²²).

Activity surveys – dusk/dawn watches.

8.3.5 As only one of the two trees on Site (T1) was evaluated as having 'Moderate' roost potential (T1, Figure 8.2) and this may be retained, no dusk/dawn watches were undertaken in 2020 however, there is a possibility that trees inside The Assarts TPA could support bats and may at some point need to be felled or trimmed. The results of the 2020 surveys have been used to inform a supplementary PRA of these trees and, along with T1, targeted dusk/dawn surveys are currently being undertaken and will continue through late summer 2021. The results of these surveys will be reported separately.

Activity surveys – static ultrasound detectors.

8.3.6 In terms of its suitability for use by commuting and foraging bats, the Site comprises two habitat types:

- 'Open' - arable crop, making up around 95% of the total Site area.
- 'Edge' - woodland edge and hedgerows.

8.3.7 Automated static ultrasound detectors (Anabat Swift) were left to run overnight for seven consecutive nights each month between June and October 2020 and

²²Collins J. (ed.), 2016. Bat Surveys for Professional Ecologists: Good Practice Guidelines, 3rd edition. The Bat Conservation Trust, London.

between April and May 2021 at eight primary sample points (three open, three woodland edge and two hedgerows). The detectors were programmed to switch on 20 minutes before sunset, run all night and switch off 20 minutes after sunrise.

- 8.3.8 In order to provide a degree of local context, static detectors (Anabat Express) were deployed at seven sample points in the adjacent woodlands over the same period, in each case on woodland rides. In acoustic terms, these represent additional 'edge' habitats but are referred to hereafter as 'woodland ride' to avoid confusion.
- 8.3.9 Locations of the static detectors are shown on Figure 8.1 and the dates, sunset times, sunrise times and weather conditions are given in Table 8.3. The number of sample points in this study exceeds the minimum effort prescribed in the guidelines.

Activity surveys – walked transects.

- 8.3.10 Walked transects were undertaken between June and October 2020 (one in June and two per month thereafter) and April and May 2021. On each occasion, a pair of surveyors walked in parallel at a slow, steady pace, starting in the north and walking south. One surveyor walked through crop, maintaining a minimum of 50m from the edge to ensure an acoustic buffer; the second surveyor walked along the eastern woodland edge. On completion, the transect was reversed, with one surveyor repeating the transect through the crop and the second walking north along the western woodland edge. Each transect included a number of five-minute stationary sampling points in areas considered of potential interest, such as ride ends and hedgerow connections.
- 8.3.11 The transects commenced around 20 minutes after sunset or once the first bat pass had been detected and then continued for two hours. The transect routes are shown on Figure 8.2 and the dates, sunset times and weather conditions are given in Table 8.4.

Analysis of acoustic data.

- 8.3.12 Anabat Express sound files were analysed manually by an experienced technician using Anabat Insight software. Calls were labelled based on known

species distributions, habitat associations and call characteristics. Anabat Swift files were analysed using the open-source BatClassify auto-ID algorithms, which assigns a species label to a sound file. At least 20% of the auto-ID results were manually audited and incorrect calls were re-labelled. To qualify for inclusion in the analysis, a sound file must comprise a sequence of at least two identifiable bat calls with no more than a one second interval. Noise files, unidentified single calls and call fragments were omitted. Calls by the genus *Myotis* are difficult to identify to species level so are grouped, with a suggestion as to the most likely species based on habitat association and local distribution.

8.3.13 The static ultrasound detector records were uploaded to Ecobat²³, a web-based tool developed by the Mammal Society, the National Biodiversity Network, the Statutory Nature Conservation Bodies (SNCBs), the University of Exeter and ecological practitioners. The software analyses the records and uses percentiles to provide a numerical indicator of the relative importance of a nights' worth of bat activity by comparing it with a national database. For example, activity data in the 80th percentile would indicate that the data from the Site were in the top 20% of activity for the reference range. Percentiles are used to classify activity from low to high as set out in Table 8.5 below and the associated charts. This approach allows for an objective comparison of bat activity recorded on the Site with that recorded in the wider area, in this case, within 100km.

8.3.14 The sound files include the date and time of the call (referred to hereafter as a 'timestamp'). As bats tend to emerge from their day-roosts within a known period after sunset, the timestamps were screened for calls that were recorded within the emergence periods of each species in order to identify the likelihood of a roost in the vicinity of the detector. The emergence times used for this analysis are taken from Russ, 2012²⁴.

²³ Mammal Society. 2017. Ecobat. Available at: <http://www.ecobat.org.uk/>

²⁴Russ, Jon. 2012. British Bat Calls a Guide to species Identification. Pelagic Publishing.

Personnel and equipment.

8.3.15 The surveys were undertaken by Dave Hughes and Grant Berky, Natural England bat survey Class Licence Numbers 2015-14463-CLS-CLS (CL20) and 2015-12276-CLS-CLS (CL18) respectively and three assistants. For the transects, surveyors were equipped with a combination of Anabat Walkabout, Pettersson D240x ultrasound detectors and Gen-2 night-vision equipment; they kept in contact with 2-way radios.

Survey constraints.

8.3.16 As a result of Covid-19 restrictions, it was not possible to undertake the full suite of surveys in April and May 2020. Whilst this is unlikely to have had a significant effect on the overall assessment, these surveys were carried out in spring 2021 for completeness and the results summarised.

8.3.17 Bats are fast-flying nocturnal mammals with complex life cycles. Whilst they have preferred commuting routes and feeding areas, the ability to detect their calls is influenced by a range of factors but most importantly, the amplitude of the call. In crude terms, loud species are recorded more easily than quiet species. As a result, low-amplitude species such as brown long-eared bat and Natterer's bats are likely to be under-represented in the datasets. In addition, the number of sound files should not be interpreted as a count of individual bats but as a proxy for how well used (so perhaps ecologically important) a particular habitat is. Multi-night acoustic surveys always generate high inter-night variability and this can lead to habitats being under or overvalued. The weighting given to these constraints is accounted for in the assessment.

8.4 RESULTS AND EVALUATION

PRA.

8.4.1 One tree was assessed as Category 2b (moderate roost suitability) with PRFs provided by lateral fissures on a storm damaged bough. The tree location is shown on Figure 8.2, labelled T1. As above, targeted dusk/dawn surveys are currently being undertaken and will continue through late summer 2021. The results of these surveys will be reported separately.

Activity surveys - static ultrasound detectors.

8.4.2 The following species assemblage was recorded during the static acoustic sampling survey:

- Common pipistrelle.
- Soprano pipistrelle.
- Nathusius' pipistrelle.
- Noctule.
- Leisler's bat.
- Brown long-eared bat.
- Barbastelle bat.
- *Myotis* species (most likely to be a mix of Daubenton's bat, Natterer's bat and whiskered/Brandt's bat).

8.4.3 Bat activity charts and tables produced by the Ecobat software for each habitat type are provided below. The results of the April and May 2021 acoustic surveys are not included within the charts and tables below but are discussed in 8.4.7. The levels of bat activity as defined by Ecobat in Table 8.5 are summarised in Table 8.6 for each species in each habitat category. The data indicate that generally speaking, all species have a greater affinity to edge habitats both on Site and in the adjacent woodland than they do to the open arable crop.

8.4.4 Higher levels of bat activity were recorded in the northern field of the proposed Western Extension (higher levels of median activity and greater percentage of nights recorded on) than in the southern field of the proposed Western Extension (Table 8.7). Both fields were under arable crop for the duration of the sampling period. Arable crop is not regarded as being an important foraging habitat for bats and whilst individuals flying over the fields will exploit local insect hatches, the bulk of the activity can most likely be attributed to bats simply flying over the northern field of the proposed Western Extension from one woodland to the other. This behaviour is not observed in the southern field as it is not bound by woodland in the same way.

8.4.5 All species were recorded on the central (SP12) and eastern (SP18) hedgerows with higher activity on the central hedgerow in the proposed Western Extension

(Table 8.8). Whilst neither hedgerow provides an unbroken habitat connection, both provide foraging opportunities and a navigation aids through the landscape. Loss of hedgerows could cause species from the 'edge' guild (common and soprano pipistrelle, Daubenton's bat, whiskered/Brandt's bat and barbastelle bat) and those from the 'cluttered' guild (Natterer's bat and brown long-eared bat) to change their commuting/foraging behaviour. Noctules and Leisler's bats are open-habitat species and are less reliant upon linear landscape features such as hedgerows.

- 8.4.6 A comparison of the activity levels recorded on the hedgerows versus that recorded in the open arable crop (Tables 8.7 and 8.8) indicates that for most edge species, the hedgerows generate higher percentiles of activity levels and records from a higher proportion of sample nights than the open crop. Thus, whilst most species are willing to cross the open fields so are not wholly reliant on hedgerows, the hedgerows may provide more reliable foraging.

2021 April and May activity surveys - static ultrasound detectors.

- 8.4.7 The same species assemblage was recorded during the 2021 static acoustic sampling surveys. The levels of activity for each species recorded at the 'open', 'edge' and 'woodland ride' sample points reflected the same general patterns as those recorded during the 2020 surveys. The numbers of passes recorded per species during the 2021 surveys were lower than recorded during the 2020 surveys, which is not unexpected given they were sampling the early period of the bat activity season, that April 2021 had the lowest average minimum temperatures for April in the UK since 1922²⁵ and that May 2021 was particularly cool and wet.

2020 activity surveys - walked transects.

- 8.4.8 The species assemblage recorded during the walked transects was the same as that recorded on the static detectors. Bat activity was dominated by common and soprano pipistrelle passes, with occasional passes by *Myotis* sp.,

²⁵ <https://www.metoffice.gov.uk/>

barbastelle and brown long-eared bat. Noctule and Leisler's bat were also recorded, although these were primarily high, overhead passes.

8.4.9 The vast majority of activity was recorded along the edge habitats with very little activity in the open arable crop. Activity was typified by long bouts of silence punctuated by quick fly-pasts and occasional short bursts of foraging. It was obvious to the surveyors on the ground that in the case of pipistrelles, the same individual bats were responsible for multiple repeat passes.

2021 April and May activity surveys - walked transects.

8.4.10 The two transects in April recorded only a single pass by noctule and a *Myotis* sp. Low numbers of passes by common pipistrelle, soprano pipistrelle, *Myotis* sp., noctule and barbastelle were recorded during the May 2021 transects. As above, this is not unexpected given the low temperatures in April and the cool, wet weather conditions in May. As during the transects in 2020, the activity, albeit low levels, was predominantly recorded along the edge habitats with very little activity in the open arable crop.

Species accounts.

8.4.11 The results of the surveys are presented below for each species, together with an evaluation of habitat use and the likelihood of there being a roost in the vicinity. References to sample points are best read in conjunction with Figure 8.1. All the species recorded in the 2020 BFTB survey were recorded in this survey, with the exception of serotine.

Soprano pipistrelle.

8.4.12 Soprano pipistrelles were the most frequently-recorded species in the study. They were recorded at every sample point and in all habitat types, with low to moderate activity in the 'open', moderate to high activity along the 'edge' and high activity in the 'woodland ride' (Table 8.6). Moderate to high activity levels were also recorded at SP12 and SP18 (both hedgerows). They too may be important for foraging and commuting (Table 8.8).

8.4.13 The timestamps on calls recorded at SP04 and SP10 (Chart 8.7) covered multiple calls within the emergence period. Both sample points are on the same

ride in Collyweston Great Wood, indicating there is at least one roost in the vicinity. The activity levels for soprano pipistrelle displayed peaks in June and July, corresponding with the maternity period when young bats are on the wing and the local population almost doubles and again in September and October, when bats form mating harems. Soprano pipistrelles are a common and widespread species that roosts in buildings and trees. It is highly likely that there are multiple roosts with 1km of the Site. Soprano pipistrelles have been found in the ESL bat boxes to the north of the existing ENRMF and use them as mating roosts. All three pipistrelle species employ a resource defence polygyny mating strategy, which involves males occupying mating roosts, often in trees²⁶.

Common pipistrelle.

8.4.14 Common pipistrelles were recorded at every sample point and in all habitat types, with the lowest activity in the 'open' arable and highest along the 'edge' and 'woodland ride' habitats. As with soprano pipistrelles, moderate to high activity levels were recorded on hedgerows at SP12 and SP18 (Table 8.8).

8.4.15 The timestamps on calls recorded at SP04, SP05, SP06, SP08 and SP10 (Chart 8.8) comprised multiple calls within the emergence period. All five sample points are clustered in and around the northern field of the proposed Western Extension and adjacent woodland, which adds confidence to the likelihood of a roost in the vicinity. Common pipistrelles are a common and widespread species, capable of exploiting all habitat types, roosting in buildings and trees. It is highly likely that there are multiple roosts with 1km of the Site.

Nathusius' pipistrelle.

8.4.16 Nathusius' pipistrelles were recorded three times: once at SP09 (open arable) on 18 September 2020, once at SP06 (edge) on 10 May 2020 and once at SP12 (edge) on 20 April 2021. This level of activity is insignificant given the sampling effort. The Site is very unlikely to be of material importance to this

²⁶Barataud M, 2015. Acoustic Ecology of European Bats. Biotope & National Museum of Natural History, Paris.

species and as it would benefit from the mitigation provided for other bat species, it does not warrant further consideration.

Myotis species.

8.4.17 Low/moderate activity by *Myotis* species was recorded in the edge habitats and moderate activity in both the open arable and woodland rides (Table 8.6). The moderate activity in the open habitat was unexpected given that *Myotis* bats are typically found in edge or cluttered (woodland) habitats. Further analysis indicates that a high proportion of calls were made during intense bouts of activity, perhaps by individual or low numbers of bats taking advantage of a localised hatch of insects. Low/moderate and moderate *Myotis* activity was recorded on hedgerow SP12 and SP18 respectively (Table 8.8).

8.4.18 The timestamps on calls recorded at SP13 (a woodland ride in The Assarts to the west of the Site) and SP04 and SP10 located in Collyweston Great Wood to the northeast of the Site comprised multiple calls within the emergence periods of *Myotis* bats most likely to be using this area, indicating nearby roost sites (Chart 8.9).

Barbastelle.

8.4.19 Barbastelles were recorded at all sample points except SP17 and SP19 (both open sample points in the southern field). Low activity was recorded in the northern open habitat, low/moderate in the woodland and moderate along the edge habitat (Table 8.6). Moderate activity was also recorded on hedgerow SP12 and hedgerow SP18 (Table 8.8). The 2020 BFTB survey also recorded barbastelle on hedgerow SP12. As with common/soprano pipistrelles and *Myotis* bats, the timestamps on calls recorded at SP04 and SP10 (Chart 8.10) located in Collyweston Great Wood to the northeast of the Site indicate the proximity of a roost site. Male barbastelles have been found in the ESL bat boxes to the north of the ENRMF.

8.4.20 Barbastelles are a scarce but widespread species in the Midlands. Barbastelles feed on micro-moths so tend to favour woodland habitats, hence the bias towards 'edge' and 'woodland edge' habitat over 'open' arable. The majority of maternity roosts to date have been found in trees, often behind lifted bark. As

this is an ephemeral feature, colonies have a large number of roost trees within their home range and move between them on a regular basis.

Noctule.

8.4.21 Moderate activity levels were recorded in the 'open' and 'edge' habitats, with low to moderate activity in the 'woodland ride' habitat (Tables 8.6). Noctules, assigned to the open-habitat guild, are a fast, high-flying, aerial-hawking bat with a high amplitude call suited to hunting large invertebrate prey in open airspace. This aggregative response enables them to spend most of their time foraging in areas with the highest density of prey²⁷. This species is not reliant on linear landscape features such as hedgerows for commuting and foraging. Due to amplitude of the calls (around 120dB), one bat can be detected by multiple detectors so assigning it to specific habitat or a part of the Site can be problematic and many calls are most likely from bats commuting over the Site.

8.4.22 The timestamps on calls recorded at SP13 (a woodland ride in The Assarts) (Chart 8.11) comprised multiple calls within the emergence period. Given that noctules favour roosting in trees rather than buildings, there is high likelihood of a roost being present in the wider Fineshade Woods.

Leisler's bat.

8.4.23 The surveys recorded low activity in the 'open' arable and 'woodland ride' sample points and low to moderate activity on the 'edge' sample points (Table 8.6). This species flies high, usually in open habitats and forages by aerial hawking. As with noctule, it is not particularly reliant upon linear landscape features such as hedgerows for commuting and foraging.

8.4.24 The timestamps in relation to sunset as shown in Chart 8.12 do not strongly indicate nearby roost sites, although Leisler's bats have been recorded using the ESL bat boxes. The low levels of activity suggest this species passes through the Site but spends most of its time foraging elsewhere.

²⁷Müller J. Mehr M. Bässler C. *et al.*, 2012. Aggregative response in bats: prey abundance versus habitat. *Oecologia*.

Brown long-eared bat.

8.4.25 Very low numbers of brown long-eared bat passes were recorded during the bat surveys and this equates to low activity levels in each habitat type. There is nothing in the data to indicate that hedgerows SP12 or SP18 are important to this species. Whilst individual brown long-eared bats have been found in the ESL bat boxes to the north of the ENRMF, there is nothing in the emergence times from this study to indicate the proximity of a roost site. It is acknowledged that due to their low amplitude calls, this relatively common and widespread species is often under-represented in datasets generated by acoustic sampling alone so a degree of caution is required when interpreting the data however, as brown long-eared bats predominantly feed on moths and so tend to be associated with woodland and edge habitats, the loss of open arable crop is unlikely to have a measurable effect on this species.

8.5 CONCLUSIONS

8.5.1 All bats are an important ecological feature of the Site due their high level of statutory protection. The Site is considered to fall within Core Sustenance Zones (CSZ) for several species, as described above, by the timestamps of calls in relation to sunset. The CSZ refers to the area surrounding a communal roost within which habitat quality and availability will significantly influence the resilience and conservation status of individuals forming the colony²⁸, although in this case, the edge habitats will provide these, rather than the open arable. In addition, barbastelle bat and brown long-eared bat are primary targets for the BFTB project 'Roots of Rockingham', whilst noctule and soprano pipistrelle are secondary targets.

²⁸Collins J. (ed.), 2016. Bat Surveys for Professional Ecologists: Good Practice Guidelines, 3rd edition. The Bat Conservation Trust, London.

Table 8.1. Categorisation of habitats for suitability for use by bats.

Suitability	Description of Commuting and Foraging Habitats
Negligible.	Negligible habitat features on site likely to be used by commuting or foraging bats.
Low.	Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or unvegetated stream but isolated, i.e., not very well connected to the surrounding landscape by another habitat. Suitable or isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
Moderate.	Continuous habitat connected to the wider landscape that could be used by bats for commuting, such as lines of trees and scrub or linked back gardens. Habitat connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water.
High.	Continuous high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by commuting bats, such as river valleys, streams, hedgerows lines of trees and woodland edge. High-quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats, such as broadleaved woodland, tree-lined watercourses and grazed parkland. Site is close to and connected to known roosts.

Table 8.2. Categorisation of trees for suitability for use by bats based on visual assessment from the ground.

Suitability	Description of Roosting habitats
Negligible.	Negligible habitat features on site likely to be used by roosting bats.
Low.	A tree of sufficient size and age to contain PRFs but with none seen from the ground or features seen with only very limited roosting potential.
Moderate.	A tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high conservation status.
High.	A tree with one or more potential roosts sites that are obviously suitable for use by larger numbers of bats on a more regular

Suitability	Description of Roosting habitats
	basis and potentially for longer periods due to their size, shelter, protection, conditions and surrounding habitat.

Table 8.3. Static detector survey dates and weather conditions.

Date	Sunset	Sunrise	Weather conditions
23/04/2020	20:16	05:54	6°C 1022 mbar Wind 10 mph N
24/04/2020	20:17	05:42	6°C 1017 mbar Wind 7 mph N
25/04/2020	20:19	05:40	Fog 6°C 1016 mbar Wind 7 mph ENE
26/04/2020	20:21	05:38	3°C 1014 mbar Wind 4 mph S
27/04/2020	20:23	05:36	11°C 1007 mbar Wind 5 mph WNW
28/04/2020	20:24	05:34	8°C 1006 mbar Wind 7 mph NE
29/04/2020	20:26	05:32	7°C 998 mbar Wind 7 mph SSW @ 18:00
06/05/2020	20:38	05:18	3°C 1025 mbar Wind 7 mph ENE
07/05/2020	20:40	05:16	Fog 3°C 1025 mbar Wind 4 mph SSE
08/05/2020	20:41	05:15	11°C 1018 mbar Wind 6 mph SW
09/05/2020	20:43	05:13	11°C 1015 mbar Wind 4 mph NNW
10/05/2020	20:45	05:11	13°C 1008 mbar Wind 4 mph NW
11/05/2020	20:46	05:10	3°C 1019 mbar Wind 14 mph N
12/05/2020	20:48	05:08	1°C 1023 mbar Wind 8 mph W
24/06/2020	21:29	04:39	15°C 1021 mbar Wind 3 mph SSE
25/06/2020	21:29	04:40	16°C 1019 mbar Wind 6 mph NNE
26/06/2020	21:29	04:40	17°C 1010 mbar Wind 5 mph NNE
27/06/2020	21:29	04:41	14°C 1005 mbar Wind 9 mph S
28/06/2020	21:29	04:41	12°C 1003 mbar Wind 16 mph SW
29/06/2020	21:29	04:42	12°C 1006 mbar Wind 14 mph SSW
30/06/2020	21:28	04:43	13°C 1005 mbar Wind 16 mph WSW
20/07/2020	21:12	05:03	11°C 1021 mbar Wind 9 mph NW
21/07/2020	21:11	05:04	9°C 1025 mbar Wind 7 mph WNW
22/07/2020	21:09	05:06	13°C 1025 mbar Wind 3 mph S
23/07/2020	21:08	05:07	14°C 1017 mbar Wind 7 mph WSW
24/07/2020	21:06	05:09	15°C 1011 mbar Wind 8 mph W

Date	Sunset	Sunrise	Weather conditions
25/07/2020	21:05	05:10	17°C 1007 mbar Wind 12 mph SSW
26/07/2020	21:03	05:11	12°C 1005 mbar Wind 11 mph WSW
11/08/2020	20:35	05:37	Fog 17°C 1015 mbar Wind 9 mph N
12/08/2020	20:33	05:39	18°C 1014 mbar Wind 7 mph NNE
13/08/2020	20:31	05:40	17°C 1013 mbar Wind 10 mph NNE
14/08/2020	20:29	05:42	Fog 16°C 1014 mbar Wind 12 mph N
15/08/2020	20:27	05:44	15°C 1016 mbar Wind 12 mph NNE
16/08/2020	20:25	05:45	Fog 16°C 1012 mbar Wind 9 mph NNE
17/08/2020	20:23	05:47	Fog 16°C 1007 mbar Wind 6 mph NNE
18/08/2020	20:21	05:49	Fog 14°C 1006 mbar Wind 6 mph SSW
16/09/2020	19:15	06:37	16°C 1021 mbar Wind 4 mph NNW
17/09/2020	19:12	06:39	11°C 1030 mbar Wind 9 mph NNE
18/09/2020	19:10	06:40	10°C 1026 mbar Wind 9 mph NE
19/09/2020	19:07	06:42	11°C 1021 mbar Wind 12 mph NNE
20/09/2020	19:05	06:44	13°C 1020 mbar Wind 14 mph NNE
21/09/2020	19:03	06:45	10°C 1019 mbar Wind 4 mph NNE
22/09/2020	19:00	06:47	13°C 1012 mbar Wind 5 mph WSW
13/10/2020	18:11	07:23	7°C 1009 mbar Wind 10 mph W
14/10/2020	18:09	07:25	Fog 8°C 1018 mbar Wind 10 mph NNE
15/10/2020	18:07	07:27	7°C 1024 mbar Wind 10 mph N
16/10/2020	18:05	07:28	7°C 1025 mbar Wind 6 mph NNW
17/10/2020	18:02	07:30	8°C 1023 mbar Wind 9 mph N
18/10/2020	18:00	07:32	9°C 1023 mbar Wind 6 mph NW
19/10/2020	17:58	07:34	7°C 1019 mbar Wind 5 mph SSW
15/04/2021	20:02	05:59	2°C 1032 mbar Wind 5 mph S
16/04/2021	20:03	05:57	1°C 1030 mbar Wind 2 mph SSW
17/04/2021	20:05	05:54	3°C 1026 mbar 7 mph SW
18/04/2021	20:07	05:52	5°C 1023 mbar 3 mph SSW
19/04/2021	20:09	05:50	7°C 1018 mbar 5 mph W
20/04/2021	20:10	05:48	8°C 1018 mbar 6 mph SSW

Date	Sunset	Sunrise	Weather conditions
21/04/2021	20:12	05:46	2°C 1025 mbar 5 mph SW
13/05/2021	20:49	05:05	8°C 1009 mbar 15mph SSW
14/05/2021	20:51	05:03	8°C 1006 mbar 2 mph NW
15/05/2021	20:53	05:02	7°C 997 mbar 3 mph N
16/05/2021	20:54	05:00	9°C 997 mbar 7 mph S
17/05/2021	20:56	04:59	6°C 1009 mbar 8 mph E
18/05/2021	20:57	04:57	9°C 1013 mbar 7 mph E
19/05/2021	20:59	04:56	8°C 1019 mbar 2mph N

Table 8.4. Dusk transect survey dates, times and weather conditions.

Date	Sunset	Weather conditions
24/06/2020	21:29	23°C 1019 mbar Wind 9 mph ESE
13/07/2020	21:21	16°C 1018 mbar Wind 9 mph WSW
28/07/2020	21:00	15°C 1017 mbar Wind 11 mph W
11/08/2020	20:35	25°C 1014 mbar Wind 8 mph NE
26/08/2020	20:04	16°C 1016 mbar Wind 5 mph W
16/09/2020	19:15	14°C 1029 mbar Wind 13 mph NE
28/09/2020	18:46	12°C 1013 mbar Wind 5 mph WSW
13/10/2020	18:11	9°C 1014 mbar Wind 10 mph NNE
27/10/2020	16:41	8°C 994 mbar Wind 15 mph WSW
15/04/2021	20:02	2°C 1032 mbar Wind 5 mph S
28/04/2021	21:24	6°C 1009 mbar Wind 9 mph S
03/05/2021	20:33	9°C 990 mbar Wind 22 mph NE
27/05/2021	21:15	13°C 1022 mbar Wind 8 mph NNW

Table 8.5. BAT ACTIVITY CATEGORIES AS DEFINED BY ECOBAT

Activity Category	Percentile
Low activity.	0-20 th percentiles.
Low to moderate activity.	21 st -40 th percentiles.
Moderate activity.	41 st -60 th percentiles.
Moderate to high activity.	61 st -80 th percentiles.

Activity Category	Percentile
High activity.	81 st -100 th percentiles.

Table 8.6. Summary of median bat activity levels per species in each habitat category.

Species	Habitat Category		
	Open	Edge	Woodland Ride
Soprano pipistrelle	Low/Moderate	Moderate/High	High
Common pipistrelle	Low/Moderate	Moderate/High	Moderate
Nathusius' pipistrelle	Low	Low	N/A
Myotis	Moderate	Low/Moderate	Moderate
Noctule	Moderate	Moderate	Low/Moderate
Leisler's	Low	Low/Moderate	Low
Barbastelle	Low	Moderate	Low/Moderate
Brown long-eared	Low	Low	Low

Table 8.7. Bat activity at open sample points per species (SP05, SP09, SP17, SP19).

Bat activity quantified by the median percentile across all nights that the species were recorded at each open sample point and the proportion of nights during the sample periods it was recorded.

Species/Species Group	Detector ID	Median Percentile	Nights Recorded (as % of nights deployed)
<i>Barbastella barbastellus</i>	SP05	11	28 (66.7%)
	SP09	11	14 (40.0%)
	SP19	1	2 (11.8%)
<i>Myotis</i>	SP05	45	39 (92.3%)
	SP09	53	31 (88.6%)
	SP17	1	5 (41.7%)

Species/Species Group	Detector ID	Median Percentile	Nights Recorded (as % of nights deployed)
	SP19	55	13 (76.5%)
<i>Nyctalus leisleri</i>	SP05	40	15 (35.7%)
	SP09	20	10 (28.6%)
	SP17	1	3 (25.0%)
	SP19	1	1 (5.9%)
<i>Nyctalus noctula</i>	SP05	49	35 (83.3%)
	SP09	45	31 (88.6%)
	SP17	45	5 (41.7%)
	SP19	43	14 (82.4%)
<i>Pipistrellus pipistrellus</i>	SP05	20	31 (73.8%)
	SP09	40	27 (77.1%)
	SP17	32	9 (75.0%)
	SP19	20	11 (64.7%)
<i>Pipistrellus pygmaeus</i>	SP05	20	37 (88.1%)
	SP09	49	30 (85.7%)
	SP17	20	10 (83.3%)
	SP19	32	14 (82.4%)
<i>Plecotus auritus</i>	SP05	20	27 (64.3%)
	SP09	20	15 (42.9%)
	SP17	20	1 (8.33%)
	SP19	32	3 (17.6%)
<i>Pipistrellus nathusii</i>	SP09	1	1 (2.9%)

Table 8.8. Bat activity at edge sample points per species (SP06, SP08, SP12, SP16 and SP18) (SP12 AND SP18 being hedgerows).

Bat Activity quantified by the median percentile across all nights that the species were recorded at each edge sample point and the proportion of nights during the sample periods it was recorded.

Species/Species Group	Detector ID	Median Percentile	Nights Recorded (as % of nights deployed)
<i>Barbastella barbastellus</i>	SP06	49	33 (82.5%)
	SP08	32	16 (57.1%)
	SP12	45	28 (71.8%)
	SP16	55	26 (86.7%)
	SP18	53	12 (57.1%)
<i>Myotis</i>	SP06	43	36 (90.0%)
	SP08	20	21 (75.5%)
	SP12	40	35 (89.7%)
	SP16	40	26 (86.7%)
	SP18	53	17 (81.0%)
<i>Nyctalus leisleri</i>	SP06	43	26 (65.0%)
	SP08	20	14 (50.0%)
	SP12	20	21 (53.8%)
	SP16	32	14 (46.7%)
	SP18	53	3 (14.3%)
<i>Nyctalus noctula</i>	SP06	45	35 (87.5%)
	SP08	47	18 (64.3%)
	SP12	40	31 (79.5%)
	SP16	47	26 (86.7%)
	SP18	36	16 (76.2%)
<i>Pipistrellus pipistrellus</i>	SP06	66	38 (95.0%)
	SP08	54	22 (78.6%)
	SP12	72	37 (94.9%)

Species/Species Group	Detector ID	Median Percentile	Nights Recorded (as % of nights deployed)
	SP16	71	30 (100.0%)
	SP18	70	16 (76.2%)
<i>Pipistrellus pygmaeus</i>	SP06	67	37 (92.5%)
	SP08	69	28 (100.0%)
	SP12	73	38 (97.4%)
	SP16	59	28 (93.3%)
	SP18	76	20 (95.2%)
<i>Plecotus auritus</i>	SP06	20	18 (45.0%)
	SP08	1	15 (53.8%)
	SP12	20	8 (20.5%)
	SP16	11	16 (53.3%)
	SP18	1	1 (4.8%)

Table 8.9. Bat activity in adjacent woodland edge sample points (SP04, SP10, SP13).

Bat Activity quantified by the median percentile across all nights that the species were recorded at each adjacent woodland sample point and the proportion of nights during the sample periods it was recorded.

Species/Species Group	Detector ID	Median Percentile	Nights Recorded (as % of nights deployed)
<i>Barbastella barbastellus</i>	SP04	40	28 (70.0%)
	SP10	45	31 (81.6%)
	SP13	11	12 (40.0%)
<i>Myotis</i>	SP04	53	36 (90.0%)
	SP10	59	36 (94.7%)
	SP13	49	23 (76.7%)
<i>Nyctalus leisleri</i>	SP04	1	13 (32.5%)

Species/Species Group	Detector ID	Median Percentile	Nights Recorded (as % of nights deployed)
	SP10	48	6 (15.8%)
	SP13	1	6 (20.0%)
<i>Nyctalus noctula</i>	SP04	45	26 (65.0%)
	SP10	20	19 (50.0%)
	SP13	20	16 (53.3%)
<i>Pipistrellus pipistrellus</i>	SP04	45	27 (67.5%)
	SP10	87	24 (63.2%)
	SP13	32	18 (60.0%)
<i>Pipistrellus pygmaeus</i>	SP04	82	39 (97.5%)
	SP10	87	37 (97.4%)
	SP13	49	23 (76.7%)
<i>Plecotus auritus</i>	SP04	1	6 (15.0%)
	SP10	20	5 (13.2%)
	SP13	1	3 (10.0%)

Bat activity charts produced by Ecobat.

Bat activity charts produced by the Ecobat software are given below. The box-plot illustrates the bat activity levels recorded across each night of the surveys by the detectors located in each of the habitat categories. The centreline on the box-plots indicates the median activity level and the box represents the interquartile range (the spread of the middle 50% of nights of activity). The chart below each box plot shows the corresponding species composition as a percentage of the sound files recorded for each species.

Chart 8.1. Summary of bat activity across all open sample points.

The recorded activity of bats during the survey at the open habitat sample points. The centreline indicates the median activity level whereas the box represents the interquartile range (the spread of the middle 50% of nights of activity).

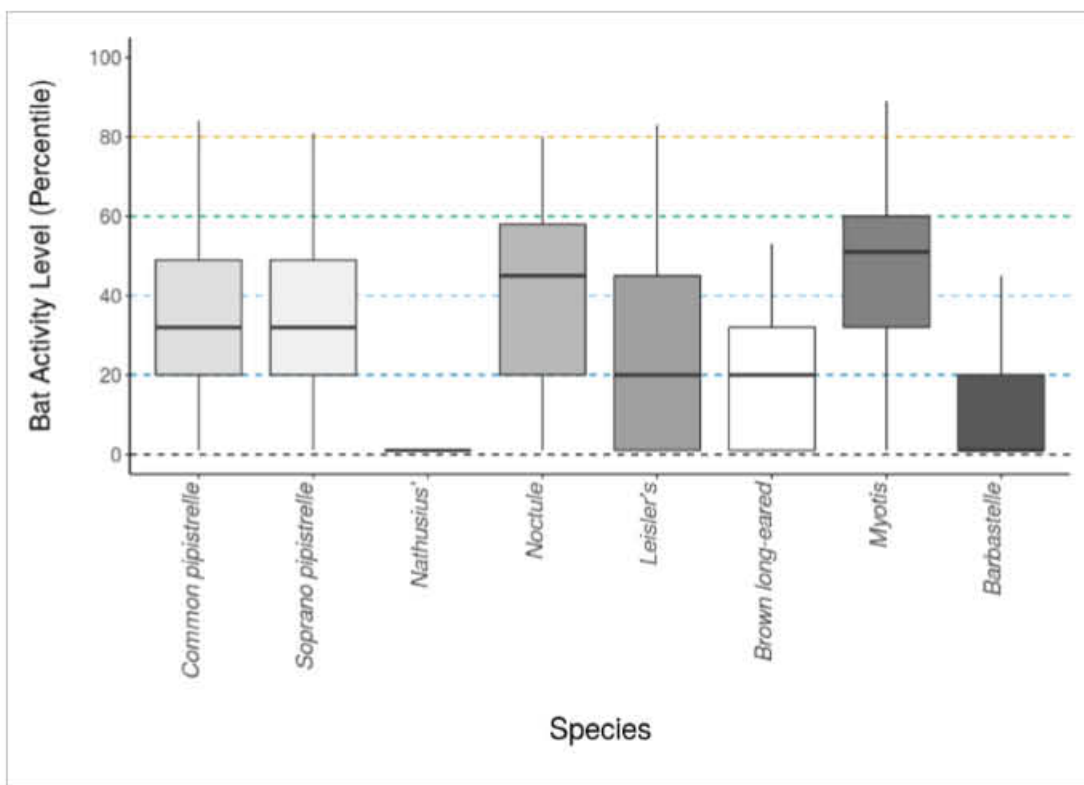


Chart 8.2. Proportion of calls per species recorded at open sample points.

The box plot shows the corresponding species composition as a percentage of the sound files recorded for each species at each open habitat sample point.

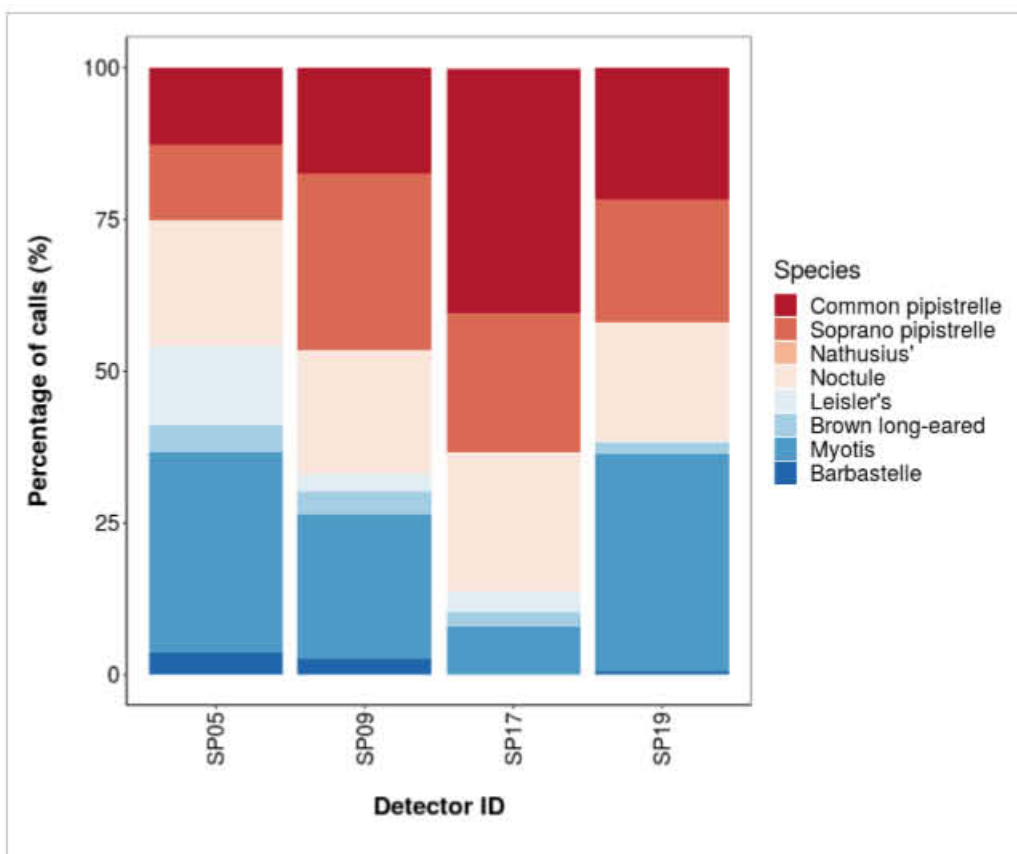


Chart 8.3. Summary of bat activity across all edge sample points.

The recorded activity of bats during the survey at the edge habitat sample points. The centreline indicates the median activity level whereas the box represents the interquartile range (the spread of the middle 50% of nights of activity).

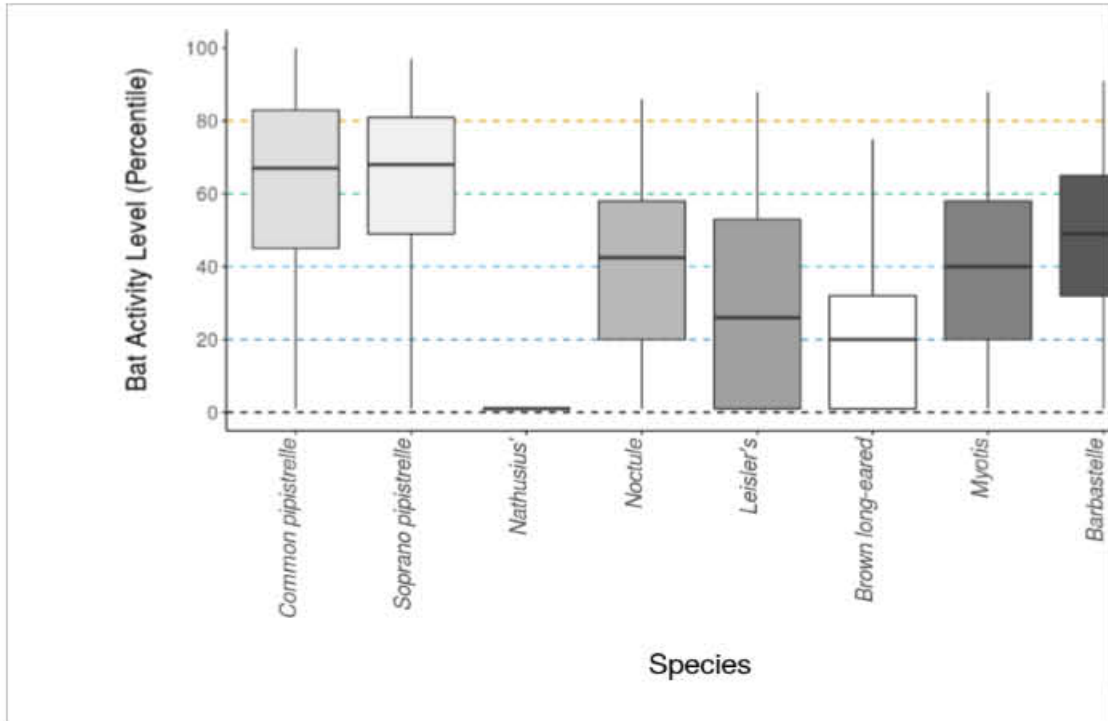


Chart 8.4. Proportion of calls per species recorded at edge sample points.

The box plot shows the corresponding species composition as a percentage of the sound files recorded for each species at each edge habitat sample point.

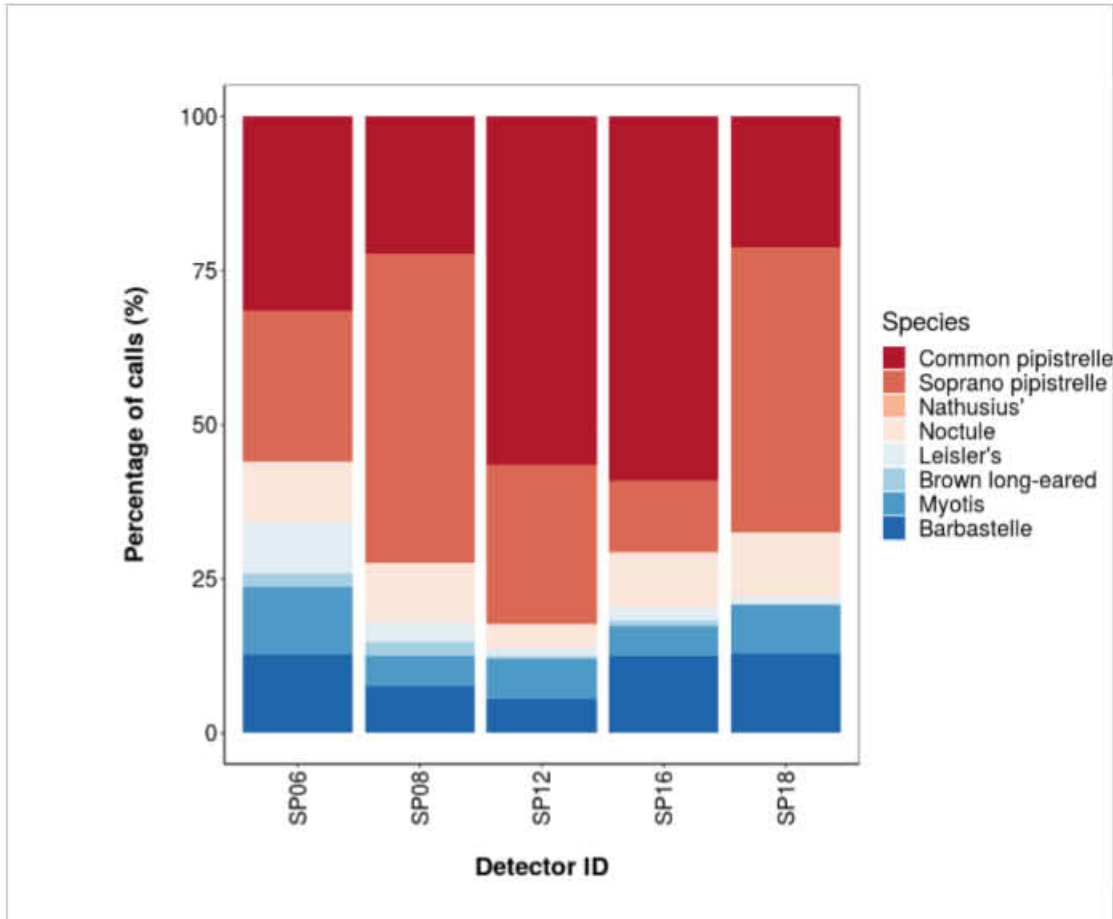


Chart 8.5. Summary of bat activity across all adjacent woodland sample points.

The recorded activity of bats during the survey at the adjacent woodland habitat sample points. The centreline indicates the median activity level whereas the box represents the interquartile range (the spread of the middle 50% of nights of activity).

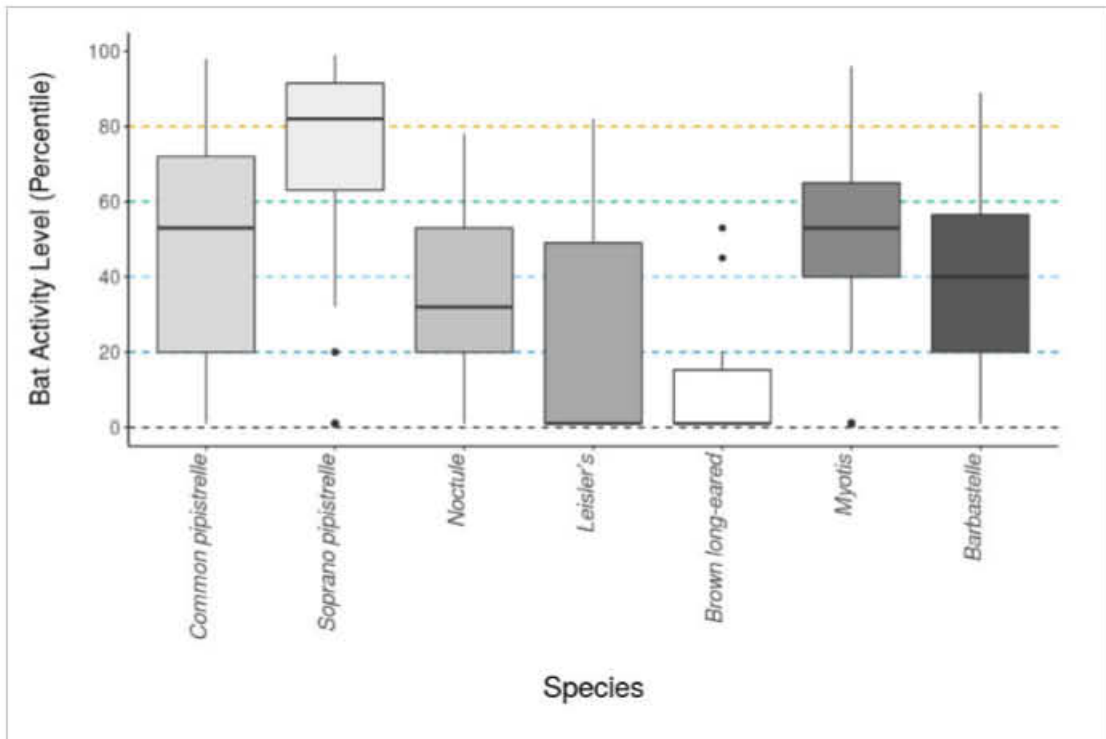


Chart 8.6. Proportion of calls per species recorded in adjacent woodland edge sample points.

The box plot shows the corresponding species composition as a percentage of the sound files recorded for each species at each adjacent woodland habitat sample point.

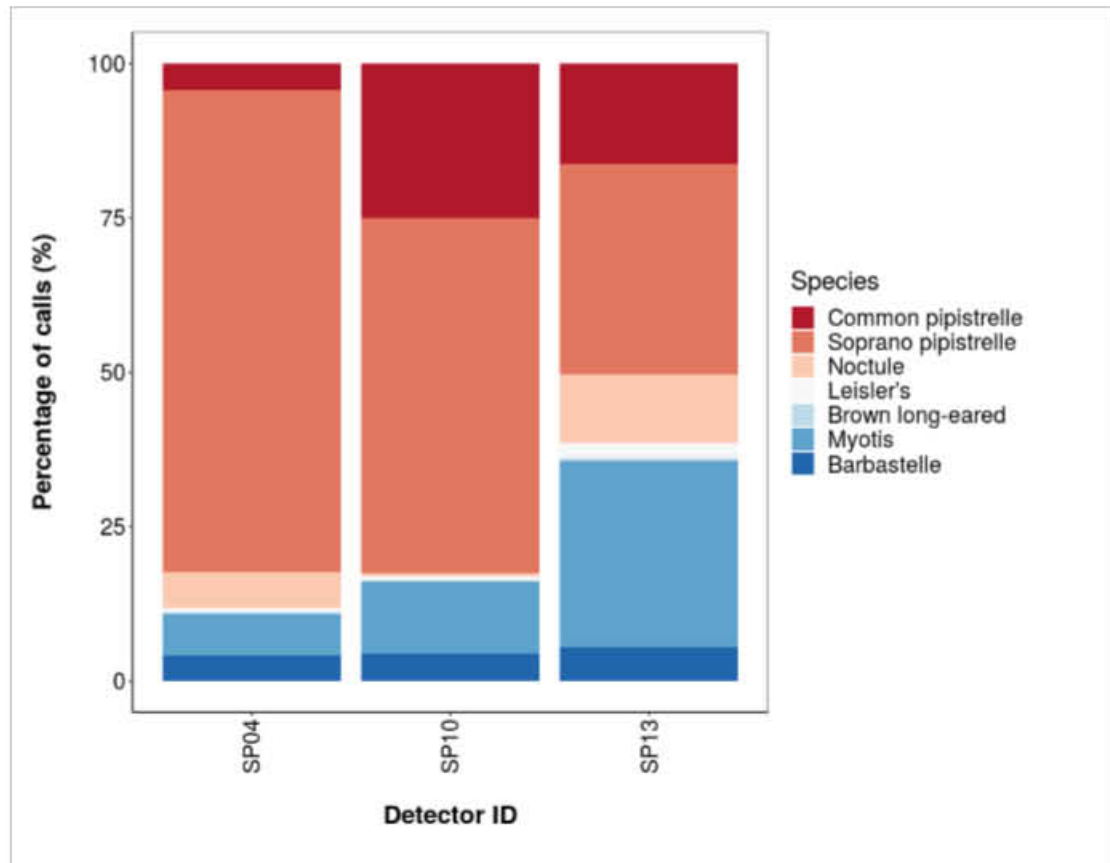


Chart 8.7. Soprano pipistrelle emergence times.

Time from 15 minutes before to 90 minutes after sunset. Soprano pipistrelle emergence time range is shown as grey bars. Bat passes overlapping grey bars or occurring earlier than this time range may potentially indicate the presence of a nearby roost.

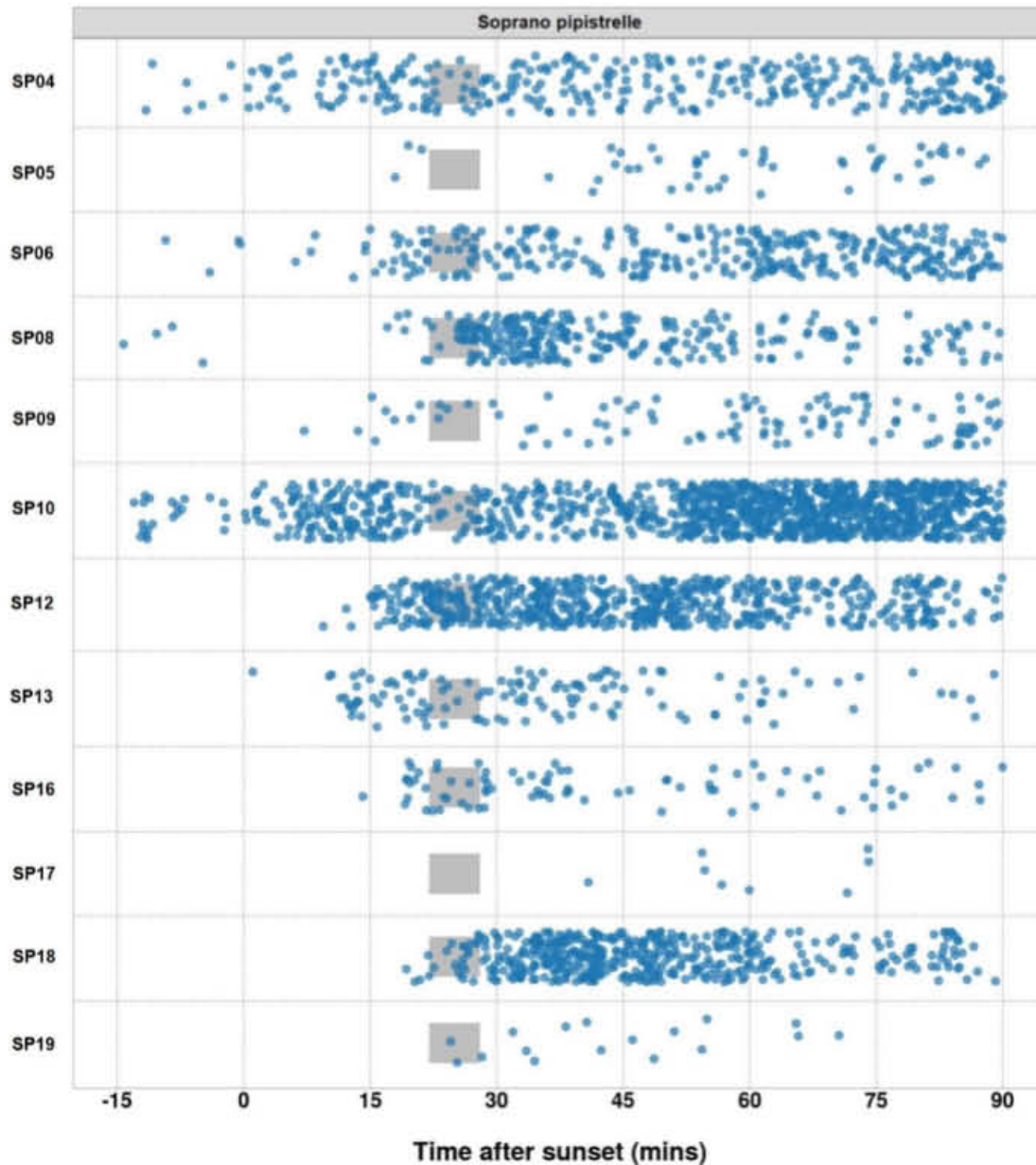


Chart 8.8. Common pipistrelle emergence times.

Time from 15 minutes before to 90 minutes after sunset. Common pipistrelle emergence time range is shown as grey bars. Bat passes overlapping grey bars or occurring earlier than this time range may potentially indicate the presence of a nearby roost.



Chart 8.9. *Myotis* emergence times.

Time from 15 minutes before to 90 minutes after sunset. *Myotis* emergence time range is shown as grey bars. Bat passes overlapping grey bars or occurring earlier than this time range may potentially indicate the presence of a nearby roost.



Chart 8.10. Barbastelle emergence times.

Time from 15 minutes before to 90 minutes after sunset. Barbastelle emergence time range is shown as grey bars. Bat passes overlapping grey bars, or occurring earlier than this time range, may potentially indicate the presence of a nearby roost.

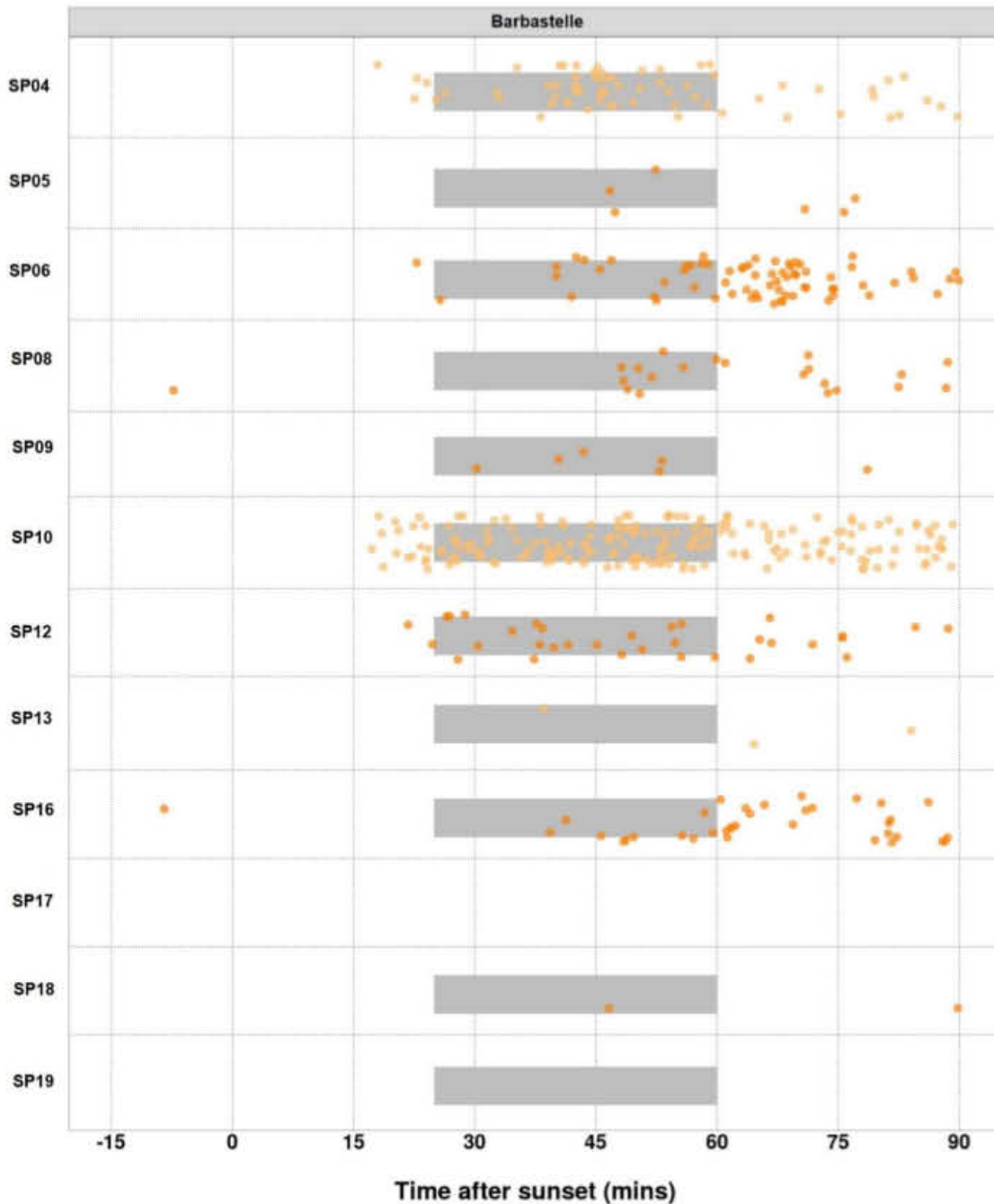


Chart 8.11. Noctule emergence times.

Time from 15 minutes before to 90 minutes after sunset. Noctule emergence time range is shown as grey bars. Bat passes overlapping grey bars or occurring earlier than this time range may potentially indicate the presence of a nearby roost.

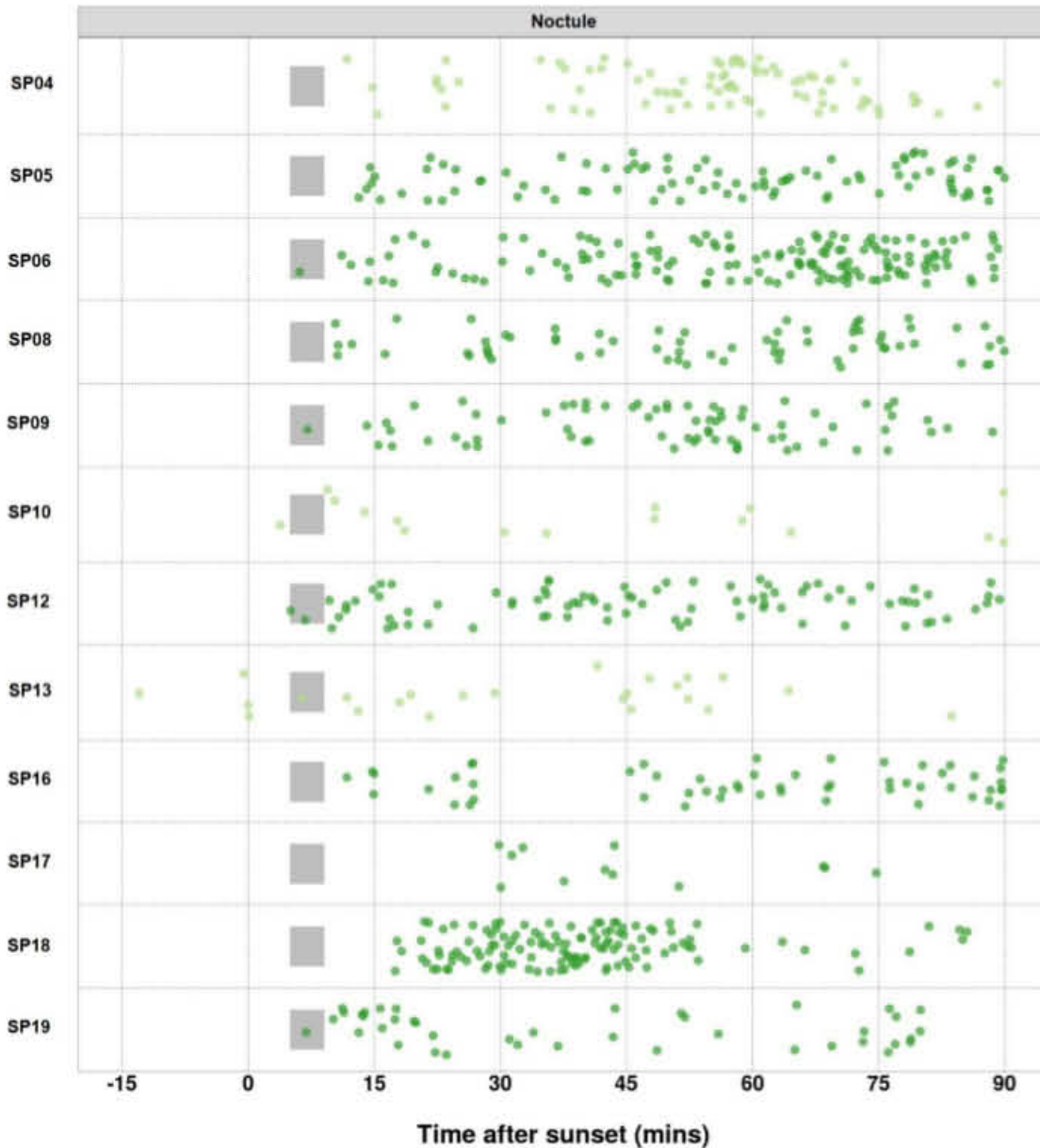
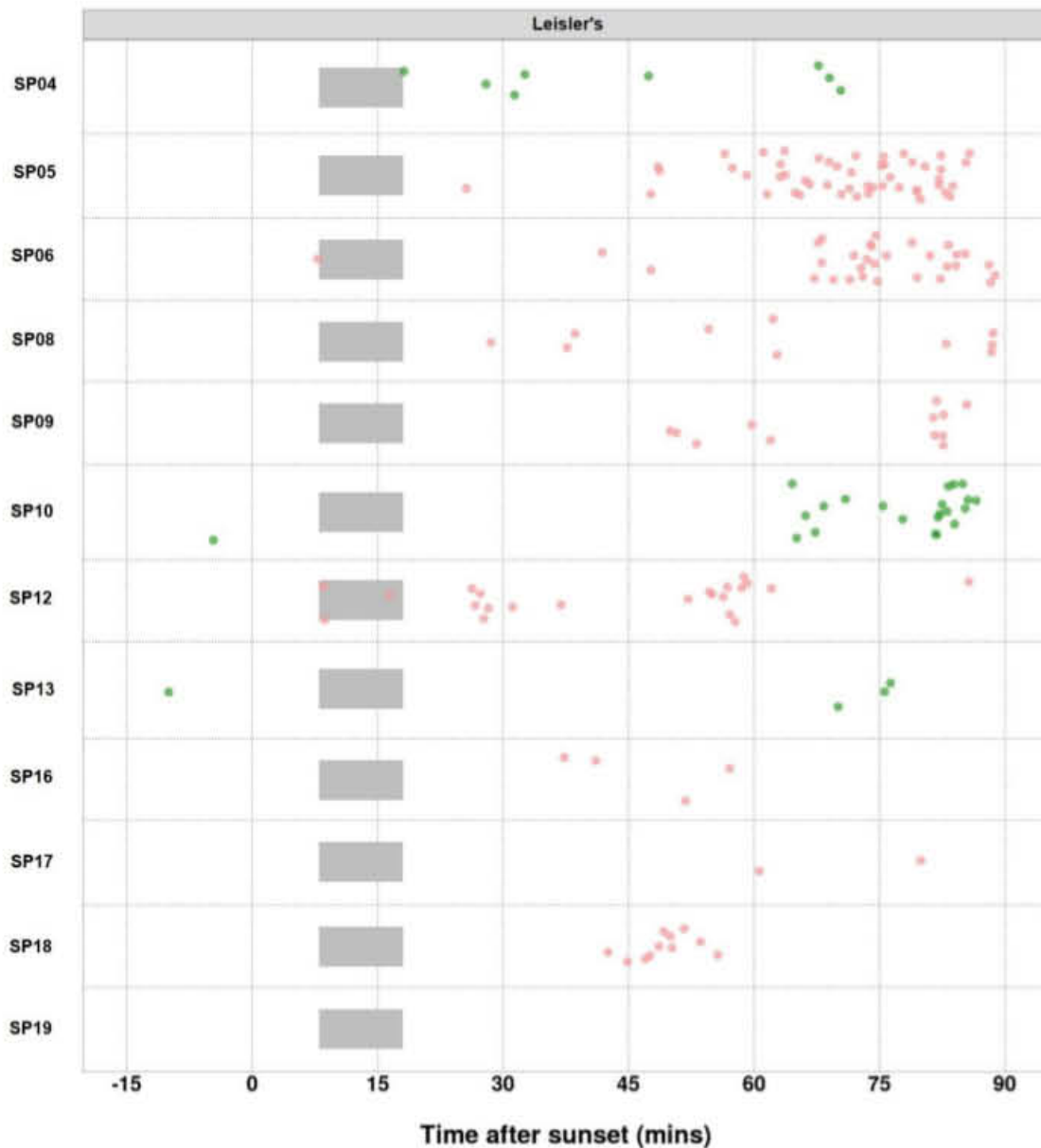


Chart 8.12. Leisler's emergence times.

Time from 15 minutes before to 90 minutes after sunset. Leisler's emergence time range is shown as grey bars. Bat passes overlapping grey bars or occurring earlier than this time range may potentially indicate the presence of a nearby roost.



9 DORMICE

9.1 INTRODUCTION

Statutory protection.

9.1.1 Dormice are given full protection under Schedule 5 of the WCA²⁹. Protection of the species is also afforded under the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations, 2019³⁰, confirming their international importance. Dormice are also an S41 species of Principal Importance.

Desk study.

9.1.2 Dormice are known to use Bedford Purlieus due to a reintroduction there some years ago (Ian White, Dormouse Officer, PTES, *pers. comm.*) but to date, there are no records from Collyweston Great Wood or Easton Hornstocks and annual box checks since 2016 as part of the EMAP monitoring of the existing ENRMF site have also found none however, recently, one was found in a box to the east of Easton Hornstocks SSSI (Dr G Hitchcock, *pers. comm.*) indicating they may be spreading west.

9.1.3 They have been naturally present in Fineshade Woods for an unknown period; the NBRC supplied 24 records within 2km of the Site and the active study group have further records even closer to the Site (Dr G Hitchcock, *pers. comm.*).

9.2 METHODS

9.2.1 Suitable habitat for this species is very restricted on the Site so this was targeted, together with some selected areas in adjacent land. Surveys for the presence/presumed absence of dormice are carried out using Natural England

²⁹Wildlife and Countryside Act, 1981 (and as amended). Available [online] at <https://www.legislation.gov.uk/ukpga/1981/69>

³⁰The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations, 2019.

standing advice (Natural England, 2015³¹). In March 2020, 50 dormouse tubes were placed in these limited habitats around the proposed Western Extension and checked monthly from April to September 2020 for the presence of dormice or their typical nests.

- 9.2.2 The 25 dormouse nest boxes present within woodland immediately north of the existing ENRMF since April 2016 are normally checked at least three times a year between April and September but during 2019 and 2020, they were also checked monthly April to September.
- 9.2.3 A search for hazelnuts distinctively-chewed by dormice was also undertaken within suitable woodland adjacent to the Site during February 2020 and again in November 2020.
- 9.2.4 In March 2021, an additional 36 dormouse tubes were placed along the northwest edge habitats. All of the dormouse tubes are included within monthly checks, with the 2021 monthly checks taking place between April and September 2021. In 2021, two so far have been undertaken in April and May. The results of the remaining surveys until September 2021 will be issued as a supplementary document once they are completed.

9.3 RESULTS

- 9.3.1 No dormice (or their activity signs) have been found on or close to the Site during any of the surveys to date.

9.4 CONCLUSION

- 9.4.1 Given the absence of dormouse evidence at present, dormice are currently not strictly an ecologically important feature of the Site however, they are certainly present and considered an important feature within the BFTB project 'Roots of Rockingham' therefore, future habitat creation will target their requirements and

³¹Natural England, 2015. Online standing advice: <https://www.gov.uk/guidance/hazel-or-common-dormice-surveys-and-mitigation-for-development-projects>

it is proposed that dormice be considered an Important Ecological Feature for the zone of influence and hopefully, in future for the Site.

10 OTHER MAMMALS

10.1 DEER

10.1.1 The general vicinity of the Site, especially the large woodland areas, is a well-known haunt of deer with shooting regularly taking place to control their numbers. During the course of the ESL surveys, fallow, roe and muntjac deer have all been noted, with fallow deer probably the most numerous. As none of these species is protected as such (other than restrictions on shooting seasons), they are not considered an ecologically important feature although some control will likely be needed to prevent excessive damage to newly planted trees/shrubs as part of the habitat creation scheme for the Site.

10.2 BROWN HARES

10.2.1 Brown hares are clearly not a regularly-recorded species in the vicinity of the Site with only one post-2000 record provided from the desk study from Fineshade Woods in 2014.

10.2.2 Although no specific method has been used to survey for brown hares, they have been occasionally noted during the course of other surveys, particularly the early morning bird surveys. Most have been noted within the two arable fields of the proposed Western Extension area plus in large, off-site arable fields south of the ENRMF. Just one or two are usually recorded if present, likely indicating a small population. As brown hare is an S41 species of Principal Importance, they should be considered an important ecological feature on the Site however, with phased working/restoration and further farmland beyond the Site boundaries, it is considered likely that brown hares will be resilient to any predicted effects of the proposed scheme so are not considered further.

11 MEETINGS AND CORRESPONDENCE WITH CONSULTEES

11.1 DISCUSSION WITH SEVERAL CONSULTANTS (E-MAILS)

11.1.1 **Sent:** 07 April 2021 11:51 **Sent To:** [REDACTED] (Wildlife Trust), [REDACTED] (Natural England) [REDACTED] (Natural England) , [REDACTED] (North Northants Council) [REDACTED] (Forestry England) , [REDACTED] (Natural England

Subject: RE: ENRMF proposed Western Extension, restoration design, mitigation and enhancement

All:

We are now pinning down just what enhancement works we plan to do, mainly prior to works starting, with management continuing through the preparation and filling work on the northern field. There are some small changes to the restoration plan, some linked to engineering changes, surface water plans, etc, and it is likely that these will continue for a while yet, although the general restoration planting will probably not be greatly changed. You have all mentioned wanting to be involved in the detailed plans, and it does seem that this would be a good time to do this. For example, I've listed shrubs I'd like to see planted in the new hedge that will go in adjacent to the hedgerow /treeline linking the NW corner of The Assarts to the small woodland/grassland area on the north edge of the northern field, and I would like to get your thoughts on these. I'd also welcome some help on the (protective) deer fencing issue; the guidance I've seen gives different proscriptions, and it would be useful to know what you suggest. This fence will be inside the gcN mitigation fence, and is intended to prevent deer and badgers from falling into the void. There will also be a need to discuss deer fencing for the new woody planting, initially to protect the new hedge from browsing, but once restoration planting begins, to protect the new woodland and scrub planting also. It would be useful to have your thoughts on how serious deer browsing is on the established woodlands bordering the fields.

I'd also like to present our plans for the field/woodland edge enhancement, in terms of suitable wildflower planting (particularly for invertebrates, which it

seems are a very important group on this site), scrub planting, and so on. In time, these edges will meld with your woodlands, and you may have preferences for how open or otherwise you would prefer them to be. We also now have a firmer idea of the land that will be available as wayleaves through the fields, where they are crossed by pipelines, cables, etc, and have provided our ideas for how these are treated to provide the most ecological enhancement.

If you agree that it would be useful for you to have a chance to review and discuss this, could you all let me know whether you could find time for a Teams/Zoom meeting this month – more than one if necessary. Also, it would now be possible to visit the site, if anyone is interested. Please contact [REDACTED] [REDACTED] to arrange this.

Best wishes

[REDACTED]

11.1.2 E-mail **From:** [REDACTED], (Wildlife Trust) **Sent:** 19 April 2021 09:51

To: [REDACTED], etc

Dear [REDACTED] (and every else),

I apologise for my delayed response, I had some leave over Easter and it has taken a while to get through the emails. I hope your back is improving [REDACTED]. I would be interested in attending a Zoom/Teams call to hear about progress.

I agree with others that deer certainly can be an issue in that area. There are a lot about. We have to protect all our coppice work and new planting due to deer pressure.

Best wishes,

[REDACTED]

11.1.3 Sent by [REDACTED] [REDACTED]: 19 April 2021 10:00

Subject: RE: ENRMF proposed Western Extension, restoration design, mitigation and enhancement

Thanks [REDACTED]

█ has sent me some plans for serious deer fencing (fallow regularly cross the fields at the moment) and we've been working on how we can fit the deer, gcn fencing around the void space without affecting the RPA/CEZ zone and I think we have cracked it.

I'm currently free all next week for a Teams meeting. How is everyone else fixed?

Best wishes

█

11.1.4 NATURAL ENGLAND (NORTHANTS:) report of meeting, 2020/02/10

Location: Augean Offices, ENRMF, Northants Date and Time: 10 February 2020, 13.30-15.05

Attendees █ █ – █ (Augean), █ █ - █ and █ █ - █ (█), █ █ █ - █ and █ █ █ - █ (Natural England Northants team)

Items Discussed:

- 1 **History of the Site:** █ and █ ran through the history of the existing site from landfill operations and ecological habitat creation/monitoring perspectives respectively.
- 2 **Extension Proposals:** █ gave an outline of the proposed extension area (phased clay extraction / landfill / restoration) with potential utilities limitations in some areas and likely timeframes. The hedgerow sections to be lost were pointed out. Some broad-brush restoration ideas were discussed by all including the gapping-up of the hedgerow/tree-line along northwest boundary of the extension area, to partly compensate for the loss of the internal west-east hedgerow. This can be done at an early stage and could include blackthorn as key species due to the likely presence of a breeding colony of the rare black hairstreak butterfly at the northern end of the hedgerow.
- 3 **Ecological Surveys for the proposed Western Extension to Date:** █ gave an outline ecological surveys so far, specifically for the proposed Western

Extension, starting off with winter bird surveys during winter of 2018/19 and then a suite of surveys during 2019 but with limitations due to access, especially in relation to the NNR. Key findings such as great crested newts, reptiles, badgers, bats, and various invertebrates (especially butterflies) were discussed.

4 **Natural England response to proposed Western Extension:** ■ ran through Natural England's key responses to scheme which were:

Overall very supportive if a phased restoration scheme can be designed which eventually connects the two areas of woodland (Fineshade Wood and Collyweston Great Wood NNR) to either side of the northern part of the extension area. A final mosaic of woodland, scrub, grassland (glades, rides) and possibly ponds would be ideal. ■ very keen on natural regeneration where possible to ensure local provenance of species and a more naturalistic look. Looking at 'future-proofing' the area and the longer term view is important. ■ pleased to see that none of the extension will go back to arable production.

Main concerns will be over edge effects during construction and operation, especially effects on hydrology and the effects of aerial deposition (dust) on vegetation. They would expect to see 'best practice' in operation to counteract these effects. A buffer zone to the edge of the NNR was mentioned as being essential but no width was suggested by ■.

Regarding particular species of note in the area that ■ and ■ would like to see detailed survey information on: bats (use of extension area for foraging and movement, reptiles (especially adders), Invertebrates (especially scarcer butterflies such as black hairstreak). They understand that great crested newts have a good population in the area already and appreciate these surveys are also required. Any information on the spread of dormice locally would be of interest (they are not currently known from the NNR but are present in the wider wooded landscape).

5 **Additional information from Natural England:**

Red Kites are known to breed in the area plus a good assemblage of woodland breeding birds. Noise from the construction/operation activities may affect these (industry standards mentioned again).

The Cambridgeshire Bat Group are arranging a 'Big Bat Bash' including a visit to the NNR at the end of May 2020. This will include some mist-netting and radio tracking.

The very rare chequered skipper butterfly is subject to a reintroduction programme in Fineshade Wood and therefore could be a species that appears on site at some stage in the future. They are part of the 'Back from the Brink' project.

The flora of the margins of the NNR is not particularly notable for any rare species but further within the woodland are Mountain Melick and Violet Helleborine, both scarce species.

█ was very interested to hear that we've also had palmate newts in good numbers during our surveys due to them being a very localised species in the area.

6 **Future Working Partnership:** █ and █ were very pleased with habitat creation work done to date on existing ENRMF site (and what wildlife it was attracting) and were keen to keep in touch regarding the extension proposal, especially in relation to results of species surveys and long-term restoration proposals.

11.2 FORESTRY COMMISSION (FINESHADE WOODS)

11.2.1 Telephone conversations re a future Teams meeting

1. With █ █ Forestry England, Fineshades, 09.25

█ is not sure who should officially be consulted in █, but he would certainly like to be, as the ecologist on the ground, and he thinks their Beat Forester █ █ Will also want to discuss what we are doing and what we have planned. █ is aware that their response to the scoping doc came from █ █, the Local Partnership Advisor for Forestry Commission East and East Midlands Area Team. He will enquire whether there are any others who should be included.

I described what we are planning to [REDACTED], and he likes it. They do manage some wood pasture woodlands, and he is in favour of a more varied landscape.

2. With [REDACTED] [REDACTED] Forestry Commission (Services) 12.50

[REDACTED] is responsible for the planning side of the business, so would like to be included in a tele-conference, not so much because she expects to contribute much (she is not an ecologist) but so that she can respond to the application in due course.

She recommends that [REDACTED] [REDACTED] be involved for Forestry England, and will also enquire whether [REDACTED] [REDACTED], Regional (?) Ecologist may also wish to be included. I asked her what FC's view is on planting ash, and happily she stated that they are advising against it. If we are allowing natural regeneration ash will certainly appear but will almost certainly die (more standing dead wood!). As a replacement they are advising sycamore, but here they differ from NE, who are still apparently against it.

FC take the view that they need to consider resilience in planning future forests, and in their research, sycamore has been shown to be used by 130 invertebrate species, including some that were thought to require ash. The general advice for future resilience is to look at plant communities currently found in areas 2°C warmer than we are at present.

11.2.2 Meeting Report

Location: Teams **Date:** 2 November 2020

Attendees [REDACTED] [REDACTED] – [REDACTED] (Augean), [REDACTED] [REDACTED] - [REDACTED] and [REDACTED] [REDACTED] - [REDACTED] (ESL), [REDACTED] [REDACTED], Ecologist, [REDACTED] [REDACTED] Beat Manager and [REDACTED] [REDACTED] Environment (Forestry England)

Purpose of the Meeting: to acquaint consultees with the development, ecological findings and proposed restoration, and to seek their views on the latter.

1 Overall, the FE seemed happy with the scope of the ecology surveys and the draft restoration proposals. Within Fineshades they have a healthy adder population, known ponds with great crested newts present (including the ones we surveyed in the NE of the Assarts area) and dormice are still present. They would be pleased to see all three of these species spread onto the restored site and use it to move between the existing woodland areas. They would be pleased to see new ponds created near to existing ponds with great crested newts on their land. This would encourage dispersal and increase the population.

2 The FE have widened woodland rides and created hibernation sites (partially buried log piles) especially for adders within Fineshades. It was agreed that this is something that could be created within the buffer zones to the extension and existing site. ■ mentioned that our ecology surveys had found that the most biodiverse areas were along woodland edges, especially for reptiles, invertebrates and feeding bats. We would hope to recreate this habitat with woodland glades and rides on the restored site.

3 There are currently a lot of tree diseases within Fineshades, affecting ash, oak and elm. Some felling/re-planting is planned affecting Plantations on Ancient Woodland Sites (PAWS). FE listed a few trees they plan to plant locally including wild service, field maple, sycamore and Norway spruce. The first two of these species we will certainly be proposing to use but would need Natural England's agreement to plant sycamore especially if adjacent to their NNR. ■ remarked that a few conifer/evergreen species (yew, holly, European larch, Scot's pine) would not be a bad thing on the restored site and would increase biodiversity.

4 FE asked about the timeframe for aftercare/management of the restored site and ■ said 20 years post restoration. It would be a phased restoration scheme with parts of the existing site already completed.

5 We discussed the proposed footpath connections into Fineshades Wood and use of the restored site by the public, with a small car park proposed, possibly at the existing Site entrance. We also mentioned that Public Health England were keen on this use of the site. The FE staff seemed happy with that

but said that liaison with their land agent, would be needed (█ will follow this up). The restored site would be over a 2 mile walk from the FE visitor centre/car park at Top Lodge.

6 All three are keen on a site visit to see areas being mentioned and the restored parts/mitigation areas of ENRMF. █ said that Augean would be happy to arrange this but it would need to be once the current Covid-19 regulations have been lifted.

11.3 BACK FROM THE BRINK, ROOTS OF ROCKINGHAM

11.3.1 E-mails.

On 19 January 2021 18:59, █-█ Back from the Brink wrote:

To: █ █

Subject: RE: Fineshades Wood reptiles

Hi █

Sorry for the delay in getting these to you. I've attached a map and records from 2018-20 of Adder around the proposed extension site. These records are sensitive so are not for general distribution. Some of the sightings are from walkover surveys, whilst others are from refuge arrays that we've had out. If you need any more detail or further info please let me know. I believe that you've been carrying out reptile surveys in the area – both in the proposed extension area, but also possibly on the restored sections of the existing site? We'd be grateful for any records that you could share with us as it will improve our picture of Adder in the project area.

Thank you

█-█ Rockingham Forest Project Officer - Back from the Brink

On 19 January 2021 20:42, █ █ wrote:

Subject: RE: Fineshades Wood reptiles

Thanks █, this is tremendous, and expands our understanding of the adder distribution greatly. We shall be undertaking surveys again this summer,

and this will help us target likely spots, perhaps including some where they haven't yet been found. I'd like to ring you about survey methods used to date, if I may, since I'm currently writing the first draft of the EclA, and this is important additional information.

Do you happen to know anything about the dormice population? I understand that there is believed to be a relict population in Fineshades Wood, but no regular surveys; is this correct? If so, would it assist if we could expand our regular dormouse box/tube surveys to Fineshades? [REDACTED] has a dormouse survey licence, and we also use footprint traps here in the Bardney Limewoods.

Best wishes,

[REDACTED]

From: [REDACTED] [REDACTED], Back from the Brink **Sent:** 20 January 2021 09:36

Subject: RE: Fineshades Wood survey results

Hi [REDACTED]

Happy to chat on the phone. I am in meetings this morning but available most of the rest of the week outside that. I'm working from home at the moment so my mobile number (below) is the best to reach me on.

I don't know have much detail on the dormouse population I'm afraid as it's not one of the species we've been working on. The Wildlife Trust have been doing surveys at Fineshade for a few years I believe with dormouse boxes and I think they started to use footprint traps last year – [REDACTED]-[REDACTED] at FE may have more detail on this, or [REDACTED]-[REDACTED] at The Wildlife Trust who leads on this work.

Best wishes

[REDACTED]-[REDACTED]—Rockingham Forest Project Officer - Back from the Brink

11.3.2 Report on telephone conversation, 20 January 2021.

[REDACTED] [REDACTED] with: [REDACTED] [REDACTED]

[REDACTED] was very happy to chat, and to provide information. I explained that on the data we have, we don't believe there will be either loss of connectivity of any habitat, or severance of habitat used by the population of any species; she

broadly concurred. We discussed the species we know use the site, and what records we have of them. I mentioned particularly adder and dormouse, since these were the only species actually named (with generalised 'invertebrates') by consultees.

On adder I said we had records of at least one female, found gravid under a tin in 2016 in woodland between the ENRMF site and Collyweston Great Wood, then a year or two later a single female under the same tin for three consecutive summers but none since, and had also found a single male under a tin at the western end of the central hedgerow, but had no knowledge of what adders had been found at Fineshades.

She said she has the map of adder findings for the last three seasons, and will send us a copy. (Since received, and adding greatly to our understanding of the species distribution.) On where they tended to be found, she said that the only locations she knew were on grassland around glades and the edges of rides; so it's possible we lost 'ours' because the area has become more shaded over the years. She has been trying to persuade NE to open rides and glades in the NNR, since adders use the road verges on their eastern boundary.

On dormice she has no survey information but passed on that the dormouse surveys are run by the Northants Wildlife Trust, managed by (■) ■■■■■ ■■■■■, and she is sure ■■■■■ will be pleased to provide records. (I now have ■■■■■ email address & mobile phone number, and understand that both she and ■■■■■ ■■■■■ (NWT C.O) are licensed to handle dormice. They have boxes, and recently have been using footprint tubes.

On bats, their target species are barbastelle and brown long-eared bat (both primary targets) plus soprano pipistrelle and noctule (secondary targets). I told her we had the first three using our boxes but not noctules, though we have had Leisler's bat. They had static recorders out at five spots for periods of three months in 2020 (3 in the NW hedge and 2 in the central hedge). She had already sent us the first two months data, but the third is still being analysed, and should be available any day (since received).

We then went over the planned protection and mitigation measures, and she was particularly pleased with the NW hedge, which they all regard as important

for improving connectivity, more quickly than our aftercare measures. She would like to be more involved later, when we are planning actual mitigation; she was also relieved to hear that we are not planning total tree cover, since many species need the sheltered grassland of glades and rides, and I assured her that is what we shall be providing. I invited her to visit the site, when it is possible, and she is keen to do this.

Since she was clearly interested in butterfly habitats I asked if BFTB have any other target species we could provide for and she was very pleased! They are in the third year of a chequered skipper release, and are keen to get more habitat for this species in an effort to tempt it to spread, and they would also be very pleased to have habitat for dingy and grizzled skipper. They have both of these, the former more common than the latter in Fineshades

11.4 WILDLIFE TRUST FOR BEDS, CAMBS AND NORTHANTS

11.4.1 E-mails.

From: [REDACTED] [REDACTED] **Sent:** 21 January 2021 14:14

To: [REDACTED] [REDACTED] Wildlife Trust BCN

Subject: EMAP for current ENRMF site

Hi [REDACTED]

Attached as promised, the original management plan for the active site. Happy to answer any questions on it, and I will look out a copy of one of the annual reports. (My connection to the ESL office docs is chancy at best; If I want anything specific, I usually ring and ask somebody to email it to me. I understand, since I'm not the only one who lives at the back of beyond, that this is being remedied, but I haven't been told it is live yet.)

Best wishes,

[REDACTED]

From: [REDACTED] [REDACTED] **Sent:** 10 February 2021 21:26

To: [REDACTED], Wildlife Trust BCN **Cc:** [REDACTED] Wildlife Trust BCN

Subject: dormouse records at Fineshade Woods, post 2017

Hi [REDACTED]

We currently have the dormouse records supplied by NBRC which date to 2017; eight of these date to pre-2000 (1997 and 1998) with four each from 2015 and 2017. The most recent of these are apparently all in the hectare square SP994997, in the 2017 survey season. I've been trying to talk to you since I understand that you are now recording them regularly, and (via [REDACTED] at FE) that you found a box with a nest last year quite a lot closer to the proposed Western Extension area. In order to assess potential impacts on this population I'd be very grateful for the more recent records, but also (as a dormouse surveyor for the Bardney Limewoods NNR, where I live) I'd be very interested also to compare notes on what size population you have, and how far they have spread? Our mice were (re-introduced) in 2002, just 16 pairs (soft-released) originally, but one male and one female were found dead very shortly after the cages were opened. (We suspect a cat took the female, and that the male got into a fight with another male.) Since then they have spread to three adjacent woods, about a mile in two different directions. The furthest movement, confirmed only last summer, involve crossing a road and quite a fast-flowing stream and working their way up a hedge to reach a Lincs WildlifeTrust reserve. (We have had tubes in the hedge and boxes in the wood for some years, once they began moving in that direction, but this year the survey team found a female and nest in a box, which was a cause of great celebration!) Unfortunately we were constrained by FE Covid regulations last summer, so although we have at least six licenced surveyors, we could only use 'bubbled pairs' (either married pairs or in one case a mother and son). We are all hoping that this summer, by which time quite a few Dormouse Group members should have been vaccinated, we can do a full survey again.

Anyway, if we do get a chance to compare notes, I'd be really interested in how your mice are doing. We are in regular touch with the Notts DG – who have even more mice than we have, all in Notts WT reserves – and we hear from

time to time how the Bedford Purlieus mice are getting on, but until starting the ENRMF project, I didn't realise that you had dormice in Fineshade Woods.

Best wishes, [REDACTED]

From: [REDACTED] Wildlife Trust BCN **Sent:** 11 February 2021 12:40

Subject: RE: dormouse records at Fineshade Woods, post 2017

Hi [REDACTED],

Apologies, how have you been trying to reach me? I've not had any answer phone notifications on my phone... I'll be popping for lunch shortly but will then be around until 4pm this afternoon (my hours are usually 8-4) if you'd like to give me a ring then? I'm not working this Friday but am around most of next week (few meetings scattered & I'm out on site on Wednesday). It would be good to have a quick chat about this project and dormice in general.

As a summary for Fineshade

We usually find evidence of dormice each year since we've been surveying the boxes in Fineshade, interestingly we've found them on all three transects through North Spinney but only ever on one transect each year which implies the population is widespread throughout the wood but at low density. It also suggests to me that they are not reliant on using artificial nest boxes/tubes which makes monitoring them more difficult.

October 2015: Nest with adult female dormouse at SP995998

August 2016: Dormouse nest at SP994992

May-Sept 2017: Dormouse nest in a single box for several months at SP994997

September 2019: Dormouse nest at SP997993

August 2020: Adult male dormouse (then unoccupied nest in this box in October) at SP995995

We've not yet looked at the hedges surrounding Fineshade as we haven't had the resources to do so but I would be surprised if they aren't using them, at least in good breeding years. We have done some monitoring of hedgerows around Bedford Purlieus (to investigate if dormice are dispersing towards one

of our nature reserves nearby) and whilst they usually stay fairly near Bedford Purlieus in 2016 we found a dormouse nest at TF027000 very close to Easton Hornstocks NNR. The ultimate aim would be to improve connectivity between these woods and Fineshade to allow for a robust metapopulation of dormice in the region which is where your project could be so important.

Hope this is of some help?

Best wishes,

██████

11.5 OTHER CONSULTTEES

11.5.1 E-mails.

With: █████ █████ Conservation Director, Amphibian & Reptile Conservation

On 11 March 2021 18:32 █████ █████ wrote;

Subject: Extension of the East Northants Resource Management Facility

Dear █████

I've just tried to ring you and tried both numbers. I've left a message on your mobile, and if you'd like to ring me back to discuss this, that would be fine. You responded to the invitation with the PEIR document, and you've raised a number of issues, to which I thought it would be worth responding.

Firstly, the fields to the south of the ENRMF are not, and as I understand, never have been, available for sale. So the option of extending the ENRMF to the south has never existed and both of the fields to the west will be used for the landfill.. However, this is NOT at the expense of using them for mitigation, which is most definitely part of the plan.

I would concur entirely with your first paragraph and of course, our first action on starting work was to contact the NERC and other bodies, for all the relevant information they hold. With regard to adders I've also spoken several times to █████ █████ (Butterfly Conservation/Back from the Brink), who has been most helpful, and passed on to us all the more recent survey information

available, covering 2018-2020. ESL have also been responsible, for some years, for monitoring and wildlife habitat management on the existing ENRMF site, so we are aware that the Rockingham Forest area has all four of the common reptiles, and all five of the common amphibians. Since 2018 we have surveyed the entire field margin of the western fields for reptiles annually, and have already begun this year's adder surveys. We carry out both tinning (metal and corrugated roofing material) and direct observation transects, and find low numbers of common lizards and slow worms, and the occasional grass snake on all margins, particularly the Collyweston Great Wood margin on the east side of the northern field; this margin is wider and is in sunshine for much of the day. We have never found an adder anywhere along this margin, but in 2019, a male adder was found on three consecutive surveys in grassland under the hedge which partly links the two sides of the field, at the very western end. Please rest assured that creation of new reptile habitat will be a priority: environmental net gain has most definitely been included in our proposals.

On your second point, the proposal will not affect any existing woodland habitats, and far from fragmenting them, the restoration plan is to join them. Neither Collyweston Great Wood nor Fineshade Wood will be directly or indirectly affected; the works will affect only the arable. There will be a 10m wide fenced stand-off from the site boundary around the whole field – a distance greater than that required to protect the root zone. No vehicles will be allowed on the woodland side of this margin, which will be managed to provide new amphibian and reptile habitat throughout. The fence is protective, aimed to prevent animals from coming to harm by falling into the void.

I also agree totally that at present these arable fields create a barrier to movement for smaller animals, and I've taken the liberty of quoting your views on arable field as reptile habitat in the Ecological Impact Assessment. The working plan for the site is that as soon as the fence is in place (this will require a licence since great crested newts are present in the wood, and though they will lose neither aquatic nor terrestrial habitat – arable fields being no more suitable for newts than they are for adders – the working will be within 250m of known newt pond so we must provide protection, technically via an exclusion fence) we shall begin enhancing the field margin outside the site for amphibians

and reptiles. Invertebrate surveys have shown that both margins, particularly the wider, warmer, eastern side have a good saproxylic invertebrate fauna, using the flowers for nectar and pollen. We shall improve the wildflower grassland, hopefully using green hay from rides and glades inside the wood and use any available logs or rubble to build hibernacula and basking areas. Working will start at the north end, and only the northern field will initially be fenced. Some of the central hedge must be removed to allow plant and agricultural vehicles through (farming will continue until work needs to start on a new cell), but the western half at least will be retained and the grassland improved, so that it is available for adders. The remainder of this hedge will remain until work is completed in the northern cells, at which point another wildlife corridor, 20m wide, flower grassland with a double hedge on a small bank on each side, has been created and planted up not far to the north of it. The works will then move into the south field, where two further hedged grass tracks will be created, as wayleaves over pipes and cables. The ENRMF western hedge will also be removed once restoration on that side is completed, since this new habitat links into what will be created on the western fields.

The whole site is planned to be worked and restored continually. The current projection is that the first, northernmost, cell will be filled, capped and restored in around 5 years from the start. By this time, work on the second cell will be underway, the fences will have been removed from around the north end and moved south to fence off the next cell, and the whole of the top third of the field will be growing grassland and scrub, with young trees, fully open to wildlife. The overall plan is to create initially something between woodland and wood pasture, since a lot of our target species, including reptiles, need grassland, and we have to consider deer protection. We are discussing planting with both Natural England and the Forestry Commission, who both have an interest in the linking habitat, and the choice of trees; natural regeneration will also play a part. We are also planning to have footpaths and hedges, so that in due course there will be public access. We are inviting anyone with particular interests to discuss habitat creation with us, and we would very much like to hear from you if you would like to get involved.

I hope this information has answered some of your doubts, but if there is any other information you would like, please do let me know.

Best wishes

■

From: ■■■■■ - Conservation Director, Amphibian & Reptile Conservation
Sent: 12 March 2021 08:06
Subject: Re: Extension of the East Northants Resource Management Facility

Dear ■■■■■

Many thanks for this, and sorry you couldn't reach me yesterday. I will look through your helpful message and get back to you with some comments, though likely to be toward the end of this month as I'm about to go on leave for a while.

best wishes,

■

11.5.2 Discussions with ■■■■■ ■■■■■, Friends of Fineshade.

Report on Zoom meeting Date and Time: 12 February 2020 Time: 10.30-11.45

Attendees: ■■■■■ ■■■■■, Augean, ■■■■■ ■■■■■, ESL, ■■■■■ ■■■■■, Friends of Fineshade

After introductions, ■■■■■ explained that there was a misunderstanding about using the field to the south of the current ENRMF for an extension (brought up in ■■■■■ consultation response). This had never been a real option, since the landowner was not prepared to sell it. ■■■■■ then asked me whether ESL had carried out a PEA on the field (and described what would be required) and if so, how did the potential impacts on wildlife and habitats compare with using the two fields to the west? I explained that we had not done this, since it would

have required the landowner's permission, and this would not be forthcoming since he was not going to sell.

(At various points █████ questioned whether I thought this would be a better site to develop, since it would mean that the two woodlands bordering the northern field could be connected sooner than 25 years in the future, and whether this wouldn't be, ecologically, the more desirable option. I told him that this question didn't arise, that I thought we could provide a very important ecological aftercare solution, which would be available in less than 25 years – as █████ backed up - but he returned to this more than once. He also repeated several times that there is an aim to reconnect the whole of Rockingham Forest, formerly much larger, now fragmented.)

We then discussed the question of connectivity; I explained that in terms of impact assessment we had certainly looked at the question of habitat severance, and were quite sure that this didn't arise. Our surveys have shown that the only species using the fields currently are deer and badgers, with bats flying across it.

Before describing the other species, I asked if he had further information that we could have, specifically for adders and dormice, since the fuller the picture, the better we can assess any impact. He then explained that he is not an ecologist, and hasn't carried out any surveys, but the people to ask would be █████–█████ (Back from the Brink) or the Amphibian and Reptile Conservation Trust, █████ said he assumed that species were crossing the field and that connectivity was important because it was in the 25 year environment plan. I then described our reasons for considering that no species territories would be severed, based on our surveys of the existing site for 10 years, for the habitats on the Collyweston side of the field for 2 years and Fineshade Woods side for 1 year (we had no permission to visit these woods in 2019). We have three species of reptiles but no adders, good amphibian populations, several species of bats, but no dormice. He mentioned the 2020 dormouse record, so I asked him if they had had a reintroduction, and if so, who was the licensed surveyor running it? However, it seems he is only aware of a relict population, but there has been no reinforcement, and he is unaware that anybody is surveying them.

On adders I told him that we had recorded one male on three visits to the western end of the central hedge, but no others. He is aware that adders are found in the open wayleave at the end of the pipeline which enters the extension field at this position, since he was with someone who tried to pick one up and was bitten, but no more than this. He is also aware that there are dormice in Bedford Purlieus woods, but knows of none nearer. On bats he was aware that [REDACTED] had had static detectors in both the hedge across the two fields, and the hedge along the NW portion of the field, but didn't have the results. He also asked about invertebrates, and whether it was possible that some species, such as ground beetles could be present on both sides. I explained that we had important invertebrate records from the Collyweston side, particularly dead wood species, which also used the richer grassland on the eastern edge. The populations on the western edge currently appear to be poorer, probably due to the lack of dead wood in The Assarts, and also the narrower and less species-rich grassland strip along this edge.

We then discussed the mitigation plans, stressing particularly that there would be a 10m stand-off between the wood edge and the amphibian protection fence, all the way around the active area. Also that working would likely start from the north, moving south, and that as each cell was completed, capped and restored it would be planted up, and the protective fence would then be moved to the new active boundary, to allow wildlife species to use the planted area – and connect the two woods. He was also interested in the north-west hedge, and when I said this would not be removed, since we are aware of its importance for white-letter and black hairstreaks, but would have a second hedge, of mixed species – including hazel, for dormice –planted parallel to it, he asked whether we would be interested in using elm seeds, which they have been collecting, to bulk up the hedge. I emphasised that we would very much like this, and that when it came to planning the immediate mitigation, including the creation of richer habitat within the stand-off zone, we would be keen to discuss this with BFTB and the Friends of Fineshades. [REDACTED] quizzed [REDACTED] on the number and size of the cells in the north field, and how soon the first would be completed, [REDACTED] said the phasing scheme was still being developed and that once that was

agreed the timings for the filling and restoration of the northern area of the site would become clearer.

In the end [REDACTED] reverted to his original position; accepting that we had a very nice mitigation and habitat creation plan, but he still felt that the field to the south would be better, that Augean should re-open discussions about buying it with the land owner, use the south-west field for stockpiling – he referred to the Matterhorn on the current site, this was confirmed to be stockpiling of material awaiting placement in the new cell – and carry out the proposed mitigation works on the north-west field.

To the suggestions that the owner is a farmer, and makes a living from the arable fields, he returned to the theme that this was only temporary, and under the new Environment bill area-based subsidies would disappear, and the farmer would be happy to plant trees. (When I mentioned that there were people who would be unhappy to see the current site extend to the south he opined that this is last century thinking, and in the new century people rank wildlife and biodiversity much more highly than landform.)

We agreed to hold the proposed seminar and asked [REDACTED] to let us know if there were specific topics/questions he would like addressed at that.

E-mails with [REDACTED] [REDACTED],

On 20February 2021 15:45 [REDACTED] wrote:

Subject: Augean expansion plans

Dear [REDACTED]

It was very good to be able to speak to you on Monday about the plan to expand the Augean site between Fineshade Wood and Collyweston Great Wood. Thank you for giving up your time.

You asked me to let you have details of those involved with Dormice. Below are details of two people you could contact. You might also like to look at this page

of our website, which describes our monitoring plans within Fineshade <https://www.fineshade.org.uk/dormice>

Firstly [REDACTED] [REDACTED] organises surveys in the entire Rockingham Forest Area and produces yearly.

[REDACTED] Senior Monitoring & Research Officer The Wildlife Trust for Bedfordshire, Cambridgeshire & Northamptonshire

Secondly [REDACTED] of PTES who knows the area well and was involved with the nearby re-introduction that I guess you will know about?

I know [REDACTED] and probably [REDACTED] have sent detailed responses to Augean's pre-application consultation. Do you not get to see these comments? - I'd have hoped that you would. There have been a very large number that have been addressing the woodland connectivity issue and these include invertebrate specialists as well.

During our conversation on Monday I was most struck by your statement that Augean's plans are the best opportunity to eventually reconnect those woodlands and that if this doesn't happen the only other possibility is that the fields will continue to be farmed. I would suggest that there are at least two alternatives, one of which is that the farmer will convert to tree production in the light of the huge woodland creation grants and the likely move away from arable inspired by ELMS and other government initiatives.

I'd be very happy to discuss any of this or provide further information if you wish.

Best wishes

[REDACTED]

On 6 Apr 2021, at 14:02, [REDACTED] [REDACTED] wrote:

Hi [REDACTED]

On one of our conversations you mentioned that you have collected elm seeds for future planting, and offered us some should we want to use them. I'm sure I responded enthusiastically at that time, but I'm now looking at the possibility

of creating a tree nursery for the purpose of growing on particularly significant species, and I would love to have some elms seeds – or seedlings, if you have got that far. We do have oak in the Bardney Limewoods NNR, but since we and all of the consultees with whom this has been discussed are keen to see natural regeneration, use of local seed is a very good start. I see that we have recorded both English elm and wych elm in the adjacent woods, so either/both would be lovely.

Best wishes,

██████

From: ████████-Friends of Fineshade **Sent:** 13 April 2021 20:56

To: █████ █████

Subject: Re: Elm seeds/seedlings

Hi █████ - good to hear from you.

I'm afraid all last year's seeds and seedlings have now gone but we may well be collecting some more seed this spring and you would be welcome to come and join us. Details of what we've done so far and the various species are here on our website: <https://www.fineshade.org.uk/elms>.

Of course you'd be able to collect Huntingdon Elm samaras from the trees alongside Augean's proposed extension! - see the picture at the top of our webpage

You might also be interested in Wild Service for your nursery? see <https://www.fineshade.org.uk/wild-service>

Best wishes

██████

Friends of Fineshade

From: █████ █████ **Sent:** 14 April 2021 13:10

To: █████ █████ Friends of Fineshade

Subject: Re: Elm seeds/seedlings

Thanks [REDACTED],

We will definitely be collecting some this year I suspect, of a number of species. And Wild Service will definitely be amongst them - it's my favourite tree! I have one in my own garden, grown from a cutting taken from a tree in the Limewoods, as are the majority of trees in my growing woodland. Interestingly, it's one of the trees suggested by Natural England as a replacement for ash (which we are very happy to do: we won't be planting ash, though all parties are agreed that what arrives naturally will be accepted).

I'd like to think that a large proportion of the trees we actually plant will have very local provenance, hence the idea of our own nursery.

Best wishes

[REDACTED]

11.5.3 Report of telephone conversation with [REDACTED], Dormouse Officer, Peoples Trust for Endangered Species Date: 2021.02.26 Time: 15.00

As soon as I gave [REDACTED] my name he asked if this was work, and about Northamptonshire*. He agreed that he had been prompted by the Friends of Fineshade Woods to write in response to the invitation, but had discussed the application first with the Wildlife Trust, and had also spoken to [REDACTED]. As a result, he had tried to keep his letter factual, while not wanting to upset any local volunteers. He also said that he hadn't known at that time that I was involved, and as soon as he did, he relaxed, and knew that the dormice would be properly looked after! (I have known [REDACTED] for many years, since I managed a dormouse re-introduction to a wood in Lincolnshire in 2002, and we meet regularly.)

We then discussed the real application, particularly the fact that the land to the south was not and is not for sale, so moving the application to that field was never an option. I described that we very much want to connect the Fineshade dormice with those in Bedford Purlieus, which is certainly a hope of his, and that we were working with the Wildlife Trust dormouse team, and the Back from the Brink project 'Roots of Rockingham' who are fully behind our plans. He

assured me that he certainly wouldn't be objecting to the application, and was pleased to hear what was planned.

11.5.4 E-mails with [REDACTED], Northants Diptera Recorder.

On 31 March 2021 17:05, [REDACTED] wrote

Subject: Your concerns with the proposed Western Extension of the ENRMF

Hello [REDACTED]

I'm writing to hopefully reassure you over the issues you raised in your response to the PEIR at the end of last year. Firstly, apologies for how long it has taken to contact you; I was under the (mistaken) impression that one of my colleagues was already in touch with you.,

As far as your concerns go, I can assure you that no part of either Collyweston Great Wood or Fineshade Woods will be impacted by the proposed works in any way, and that the proposed restoration plan, which has been discussed with both Natural England and the Forestry Commission, as well as the County Ecologist and the Wildlife Trust, is to provide linking woodland habitat between the woods. Initially this is likely to be something more like wood pasture, with grassland, hedges, patches of scrub and small areas of planted trees, since both NE and FC are keen to see natural regeneration on this site. Ideally this will blend the eventual woodland in better with the existing woods, although we intend there to be a fair amount of grassland – as rides, glades, footpaths – not least because we will be aiming to provide habitat for invertebrates, especially the Back from the Brink target butterflies.

The entomologist who undertakes most of our surveys is [REDACTED], whom you may know. We asked him initially to carry out a scoping survey of the site, and from this he obviously identified the woodland margins as having major importance. Following on from this we commissioned him first to undertake a more detailed survey of this habitat, and the following year, to similarly make a detailed survey of the adjoining woodlands (with permission from NE and FC) and to provide us with his considered view of the importance of the site edges, and recommendations for management of them. Briefly, his view is that the woodland margins, adjacent grassland and flowering plants, are important for invertebrates in their own right, and further that they are likely to be critically

important to the invertebrate communities of the adjacent woodlands, especially to the saproxylic fauna. This fitted in very well with the results of our other surveys, including herpetofauna and bats, as well as the Arboricultural investigation, as a result of which we shall be extending the width of the current margins to protect both the trees and the flora and fauna of this marginal zone. The work to enhance this zone – which will also provide a RPA/CEZ – will begin immediately the DCO is granted. In addition, habitat restoration, starting from the north of the northern site, will begin once the first cell is filled, capped and top-soiled, so we are expecting to have a (young!) woodland link between the two woods in around six years from starting on the site, with other cells following on.

So far as we are aware, from 3 years of surveys and discussions with many consultees, the interest in the site lies in the edges; at present there is minimal connectivity between the two woodlands other than the central hedgerow, and we have found no significant evidence that this is actually used, other than by small numbers of bats. We are therefore prioritising enhancing the edge habitat for all the important species, so that as soon as there is significant linking habitat they will be able to use it.

If there is anything else you would like to discuss, please feel free to contact me. If you have any advice or comments on our enhancement plans I would very much like to hear them.

Best wishes,

██████████

On 31 March 2021 17:19 ██████████ wrote

Subject: Re: Your concerns with the proposed Western Extension of the ENRMF

Dear ██████████,

Thank you for your reply and detailed answer. I do know ██████████ and respect his knowledge and skills. The restoration you are envisaging seems the right approach to me, given the disposal site will go ahead.

Kind regards,



12 SPECIES RECORDED ON THE APPLICATION SITE, 2018-2021

These tables list the species recorded on the proposed Western Extension, mainly during surveys carried out in 2018, 2019 and 2020. During 2021, the surveys were directed towards completing work that was not possible in 2020, due to the Covid-19 regulations. Where additional species were noted during these surveys, they have been added to the table but no general species recording was carried out in 2021.

Table 12.1 records all the plants found and Table 12.2 gives all the animal species, including common invertebrates. Further invertebrate records from the surveys described in Appendix 1-3 are given in Tables 12.3 and 12.4.

12.1 PLANT SPECIES RECORDED 2018-2021

English name	Scientific name	Location in main habitats on Site (with DAFOR score)					
		Arable	Woods	Grassland	Ruderal	Wetland	Hedgerow /Scrub
agrimony	<i>Agrimonia eupatoria</i>			R			R
alsike clover	<i>Trifolium hybridum</i>	R		R			
annual beard-grass	<i>Polypogon monspeliensis</i>				R		
annual meadow-grass	<i>Poa annua</i>	F		O	F		
ash	<i>Fraxinus excelsior</i>		O				R

English name	Scientific name	Location in main habitats on Site (with DAFOR score)					
		Arable	Woods	Grassland	Ruderal	Wetland	Hedgerow /Scrub
barren brome	<i>Anisantha sterilis</i>	F		R	O		O
bee orchid	<i>Ophrys apifera</i>			R			
bittersweet	<i>Solanum dulcamara</i>		R			R	
black bryony	<i>Tamus communis</i>		R				O
black-bindweed	<i>Fallopia convolvulus</i>	R			R		
black horehound	<i>Ballota nigra</i>						R
black medick	<i>Medicago lupulina</i>				F		
black mustard	<i>Brassica nigra</i>				R		
blackthorn	<i>Prunus spinosa</i>		O	R			F
bracken	<i>Pteridium aquilinum</i>		R				
bramble	<i>Rubus fruticosus</i>		F	O	R		F
branched bur-reed	<i>Sparganium erectum</i>					R	
bristly oxtongue	<i>Helminthotheca echioides</i>	O		R	F		
broad-leaved dock	<i>Rumex obtusifolius</i>	O	R	O	O		O
broad-leaved pondweed	<i>Potamogeton natans</i>					R	

English name	Scientific name	Location in main habitats on Site (with DAFOR score)					
		Arable	Woods	Grassland	Ruderal	Wetland	Hedgerow /Scrub
broad-leaved willowherb	<i>Epilobium montanum</i>		R				
brooklime	<i>Veronica beccabunga</i>					R	
buckthorn	<i>Rhamnus cathartica</i>		R				R
bulrush	<i>Typha latifolia</i>					O	
celery-leaved buttercup	<i>Ranunculus sceleratus</i>					R	
charlock	<i>Sinapis arvensis</i>	R			R		
cleavers	<i>Galium aparine</i>	O	F	O	O		F
clustered dock	<i>Rumex conglomeratus</i>	O	R	R	O	R	R
cock's-foot	<i>Dactylis glomerata</i>	R	O	F	O		F
coltsfoot	<i>Tussilago farfara</i>				F		
common bent	<i>Agrostis capillaris</i>			O			R
common bird's-foot-trefoil	<i>Lotus corniculatus</i>			O	R		
common cat's-ear	<i>Hypochaeris radicata</i>			R			
common centaury	<i>Centaureum erythraea</i>			O	R		

English name	Scientific name	Location in main habitats on Site (with DAFOR score)					
		Arable	Woods	Grassland	Ruderal	Wetland	Hedgerow /Scrub
common club-rush	<i>Schoenoplectus lacustris</i>					R	
common couch	<i>Elytrigia repens</i>	R	R	O			O
common dog-violet	<i>Viola riviniana</i>		R				R
common field-speedwell	<i>Veronica persica</i>	O			O		
common fleabane	<i>Pulicaria dysenterica</i>			R		O	
common gromwell	<i>Lithospermum officinale</i>		R				
common knapweed	<i>Centaurea nigra</i>			O			R
common mallow	<i>Malva sylvestris</i>	R			R		
common marsh-bedstraw	<i>Galium palustre</i>					R	
common mouse-ear	<i>Cerastium fontanum</i>	R		O	R		
common nettle	<i>Urtica dioica</i>	R	A	O	O		A
common orache	<i>Atriplex patula</i>	R			R		
common toadflax	<i>Linaria vulgaris</i>			R			R
common ragwort	<i>Senecio jacobaea</i>			R	R		
common reed	<i>Phragmites australis</i>					R	

English name	Scientific name	Location in main habitats on Site (with DAFOR score)					
		Arable	Woods	Grassland	Ruderal	Wetland	Hedgerow /Scrub
common spike-rush	<i>Eleocharis palustris</i>					R	
common spotted orchid	<i>Dactylorhiza fuchsii</i>			R		R	
common vetch	<i>Vicia sativa</i>	R		O	R		
common water-plantain	<i>Alisma plantago-aquatica</i>					R	
compact rush	<i>Juncus conglomeratus</i>					R	
corn mint	<i>Mentha arvensis</i>	R					
cow parsley	<i>Anthriscus sylvestris</i>		F	O			F
creeping bent	<i>Agrostis stolonifera</i>	F	O	F	F	F	O
creeping buttercup	<i>Ranunculus repens</i>	O	O	F	O	O	R
creeping cinquefoil	<i>Potentilla reptans</i>	R		R	R		
creeping thistle	<i>Cirsium arvense</i>	O	R	O	O		R
crested dog's-tail	<i>Cynosurus cristatus</i>			R			
curled dock	<i>Rumex crispus</i>	R			R	R	
cut-leaved crane's-bill	<i>Geranium dissectum</i>	O		R	O		
daisy	<i>Bellis perennis</i>	R		O	R		

English name	Scientific name	Location in main habitats on Site (with DAFOR score)					
		Arable	Woods	Grassland	Ruderal	Wetland	Hedgerow /Scrub
dandelion	<i>Taraxacum officinale agg.</i>	O		F	O		
deadly nightshade	<i>Atropa belladonna</i>		R				R
dewberry	<i>Rubus caesius</i>						R
dog-rose	<i>Rosa canina</i>		O				O
dog's mercury	<i>Mercurialis perennis</i>		O				
dogwood	<i>Cornus sanguinea</i>		R				R
dove's-foot crane's-bill	<i>Geranium molle</i>	R		O	R		
dwarf elder	<i>Sambucus ebulus</i>				R		
dwarf spurge	<i>Euphorbia exigua</i>	R					
early dog-violet	<i>Viola reichenbachiana</i>			R			
elder	<i>Sambucus nigra</i>		O				O
enchanter's-nightshade	<i>Circaea lutetiana</i>		R				
fairy flax	<i>Linum catharticum</i>			R			
false brome	<i>Brachypodium sylvaticum</i>		O	R			R
false fox-sedge	<i>Carex otrubae</i>					R	

English name	Scientific name	Location in main habitats on Site (with DAFOR score)					
		Arable	Woods	Grassland	Ruderal	Wetland	Hedgerow /Scrub
false oat-grass	<i>Arrhenatherum elatius</i>	R	R	F	R		O
fat-hen	<i>Chenopodium album</i>	O			R		
fern-grass	<i>Catapodium rigidum</i>				R		
field bindweed	<i>Convolvulus arvensis</i>	O			R		
field forget-me-not	<i>Myosotis arvensis</i>	O	R		R		
field horsetail	<i>Equisetum arvense</i>	R		O	R	R	R
field madder	<i>Sherardia arvensis</i>	O					
field maple	<i>Acer campestre</i>		R				R
field pansy	<i>Viola arvensis</i>	O			R		
field woundwort	<i>Stachys arvensis</i>	R					
floating sweet-grass	<i>Glyceria fluitans</i>					R	
fool's parsley	<i>Aethusa cynapium</i>	O					
fool's-water-cress	<i>Apium nodiflorum</i>					R	
foxglove	<i>Digitalis purpurea</i>			R			R
garlic mustard	<i>Alliaria petiolata</i>	R	O				O

English name	Scientific name	Location in main habitats on Site (with DAFOR score)					
		Arable	Woods	Grassland	Ruderal	Wetland	Hedgerow /Scrub
germander speedwell	<i>Veronica chamaedrys</i>	R	R	O			R
giant fescue	<i>Festuca gigantea</i>		R				
glaucous sedge	<i>Carex flacca</i>			O		R	
goat's beard	<i>Tragopogon pratensis</i>			R			
goat willow	<i>Salix caprea</i>		O			O	O
gorse	<i>Ulex europaeus</i>						R
great willowherb	<i>Epilobium hirsutum</i>	R	R	R	O	O	
greater bird's-foot-trefoil	<i>Lotus pedunculatus</i>			R		R	R
greater plantain	<i>Plantago major</i>	R		R	O		
Greek dock	<i>Rumex cristatus</i>				R		
grey club-rush	<i>Schoenoplectus tabernaemontani</i>					R	
grey field-speedwell	<i>Veronica polita</i>	R					
grey willow	<i>Salix cinerea</i>		O	R	R	O	R
ground-ivy	<i>Glechoma hederacea</i>	R	F	R	R		O
hairy bittercress	<i>Cardamine hirsuta</i>	R			R		

English name	Scientific name	Location in main habitats on Site (with DAFOR score)					
		Arable	Woods	Grassland	Ruderal	Wetland	Hedgerow /Scrub
hairy St John's-wort	<i>Hypericum hirsutum</i>		R	R			R
hard rush	<i>Juncus inflexus</i>			R		O	
hard shield-fern	<i>Polystichum aculeatum</i>		R				
hawthorn	<i>Crataegus monogyna</i>		F	O			A
hawkweed oxtongue	<i>Picris hieracioides</i>				O		
hazel	<i>Corylus avellana</i>		O				R
hedgerow bedstraw	<i>Galium album</i>						R
hedgerow mustard	<i>Sisymbrium officinale</i>	R			R		R
hedgerow woundwort	<i>Stachys sylvatica</i>		R	R			O
hedgerow crane's-bill	<i>Geranium pyrenaicum</i>						R
henbit dead-nettle	<i>Lamium amplexicaule</i>	O			R		
herb-Robert	<i>Geranium robertianum</i>	R	R				R
hoary ragwort	<i>Senecio erucifolius</i>			O	R		R
hoary willowherb	<i>Epilobium parviflorum</i>				R	O	
hogweed	<i>Heracleum sphondylium</i>	R	O	O	R		F

English name	Scientific name	Location in main habitats on Site (with DAFOR score)					
		Arable	Woods	Grassland	Ruderal	Wetland	Hedgerow /Scrub
hop trefoil	<i>Trifolium campestre</i>			R			
ivy	<i>Hedera helix</i>		O				O
Japanese knotweed	<i>Fallopia japonica</i>				R		
jointed rush	<i>Juncus articulatus</i>					R	
knotgrass	<i>Polygonum aviculare</i>	O			R		
large bindweed	<i>Calystegia silvatica</i>						R
lesser burdock	<i>Arctium minus</i>		R	R			R
lesser stitchwort	<i>Stellaria graminea</i>			O			R
lesser trefoil	<i>Trifolium dubium</i>			O	R		
male-fern	<i>Dryopteris filix-mas</i>		R				R
many-seeded goosefoot	<i>Chenopodium polyspermum</i>	R					
maple-leaved goosefoot	<i>Chenopodium hybridum</i>	R					
marsh thistle	<i>Cirsium palustre</i>			R		R	
marsh woundwort	<i>Stachys palustris</i>					R	
meadow buttercup	<i>Ranunculus acris</i>			O			R

English name	Scientific name	Location in main habitats on Site (with DAFOR score)					
		Arable	Woods	Grassland	Ruderal	Wetland	Hedgerow /Scrub
meadow fescue	<i>Festuca pratensis</i>			R			
meadow foxtail	<i>Alopecurus pratensis</i>	R		R		R	R
meadow vetchling	<i>Lathyrus pratensis</i>			O		R	
mugwort	<i>Artemisia vulgaris</i>				R		
musk-mallow	<i>Malva moschata</i>			R			R
narrow-leaved bird's-foot-trefoil	<i>Lotus tenuis</i>			R	R		
nipplewort	<i>Lapsana communis</i>	R	R		R		R
opium poppy	<i>Papaver somniferum</i>	R			R		
oxeye daisy	<i>Leucanthemum vulgare</i>			R	R		R
pale persicaria	<i>Persicaria lapathifolia</i>	R			R	R	
parsley-piert	<i>Aphanes arvensis</i> agg	O			R		
pedunculat e oak	<i>Quercus robur</i>		R				R
pendulous sedge	<i>Carex pendula</i>			R		R	
perennial rye-grass	<i>Lolium perenne</i>	R		F	O		R
perennial sow-thistle	<i>Sonchus arvensis</i>	O		R	R		R

English name	Scientific name	Location in main habitats on Site (with DAFOR score)					
		Arable	Woods	Grassland	Ruderal	Wetland	Hedgerow /Scrub
perforate St. John's-wort	<i>Hypericum perforatum</i>			R			R
pineapple weed	<i>Matricaria discoidea</i>	O			O		
pink water-speedwell	<i>Veronica catenata</i>					R	
prickly lettuce	<i>Lactuca serriola</i>				O		
prickly sow-thistle	<i>Sonchus asper</i>	O			O		
purple loosestrife	<i>Lythrum salicaria</i>					R	
red bartsia	<i>Odontites vernus</i>	R		R	R		
red campion	<i>Silene dioica</i>		R		R		R
red clover	<i>Trifolium pratense</i>			O	R		
red dead-nettle	<i>Lamium purpureum</i>	O			O		
red fescue	<i>Festuca rubra</i>	R		A	R		R
red goosefoot	<i>Chenopodium rubrum</i>	R					
redshank	<i>Persicaria maculosa</i>	O			R	R	
remote sedge	<i>Carex remota</i>		R			R	
ribbed melilot	<i>Melilotus officinalis</i>				O		

English name	Scientific name	Location in main habitats on Site (with DAFOR score)					
		Arable	Woods	Grassland	Ruderal	Wetland	Hedgerow /Scrub
ribwort plantain	<i>Plantago lanceolata</i>	R		A	O		
rough chervil	<i>Chaerophyllum temulum</i>		R	R			R
rough hawkbit	<i>Leontodon hispidus</i>			R			
rough meadow-grass	<i>Poa trivialis</i>	R	O	O	R		O
round-leaved fluellen	<i>Kickxia spuria</i>	R					
salad burnet	<i>Sanguisorba minor</i>			R			
sanicle	<i>Sanicula europaea</i>		R				
scarlet pimpernel	<i>Anagallis arvensis</i>	O			O		
scentless mayweed	<i>Tripleurospermum inodorum</i>	F			F		
selfheal	<i>Prunella vulgaris</i>			O	R		
sharp-flowered rush	<i>Juncus acutiflorus</i>					R	
sharp-leaved fluellen	<i>Kickxia elatine</i>	R					
shepherd's-purse	<i>Capsella bursa-pastoris</i>	O			O		
silver birch	<i>Betula pendula</i>		R	R			R

English name	Scientific name	Location in main habitats on Site (with DAFOR score)					
		Arable	Woods	Grassland	Ruderal	Wetland	Hedgerow /Scrub
silverweed	<i>Potentilla anserina</i>				R	R	
small-flowered crane's-bill	<i>Geranium pusillum</i>	R			R		
small pondweed	<i>Potamogeton berchtoldii</i>					R	
smooth meadow-grass	<i>Poa pratensis</i>	O	R	F	O		R
smooth tare	<i>Vicia tetrasperma</i>			O	R		R
soft-brome	<i>Bromus hordeaceus</i>	F		O	O		R
soft-rush	<i>Juncus effusus</i>					O	
spear thistle	<i>Cirsium vulgare</i>	O	R	O	O		R
spear-leaved orache	<i>Atriplex prostrata</i>	R			R		
spiked sedge	<i>Carex spicata</i>			R			
spindle	<i>Euonymus europaeus</i>		R				R
stone parsley	<i>Sison amomum</i>				R		R
sun spurge	<i>Euphorbia helioscopia</i>	R			R		
swine-cress	<i>Lepidium squamatum</i>	R			R		

English name	Scientific name	Location in main habitats on Site (with DAFOR score)					
		Arable	Woods	Grassland	Ruderal	Wetland	Hedgerow /Scrub
sycamore	<i>Acer pseudoplatanus</i>		R				R
tall fescue	<i>Schedonorus arundinaceus</i>			O			R
tansy	<i>Tanacetum vulgare</i>			R			R
thyme-leaved sandwort	<i>Arenaria serpyllifolia</i>	R			R		
thyme-leaved speedwell	<i>Veronica serpyllifolia</i>	R	R	R	R		
timothy	<i>Phleum pratense</i>			O			R
tor-grass	<i>Brachypodium pinnatum</i>		R	O			R
traveller's-joy	<i>Clematis vitalba</i>		O				O
tufted hair-grass	<i>Deschampsia cespitosa</i>		R	O		O	R
tufted forget-me-not	<i>Myosotis laxa</i>					R	
tufted vetch	<i>Vicia cracca</i>			R			R
upright hedge-parsley	<i>Torilis japonica</i>	R		O			O
water figwort	<i>Scrophularia auriculata</i>					R	

English name	Scientific name	Location in main habitats on Site (with DAFOR score)					
		Arable	Woods	Grassland	Ruderal	Wetland	Hedgerow /Scrub
water forget-me-not	<i>Myosotis scorpioides</i>					R	
water mint	<i>Mentha aquatica</i>					R	
wayfaring tree	<i>Viburnum lantana</i>						R
welted thistle	<i>Carduus crispus</i>	R		R			
white bryony	<i>Bryonia dioica</i>		R				R
white campion	<i>Silene latifolia</i>	O		R	R		R
white clover	<i>Trifolium repens</i>	R		F	O		R
white dead-nettle	<i>Lamium album</i>	R	R	R	R		R
white melilot	<i>Melilotus albus</i>				R		
wild angelica	<i>Angelica sylvestris</i>		R	R		R	R
wild arum	<i>Arum maculatum</i>		R				
wild basil	<i>Clinopodium vulgare</i>			R			
wild clematis	<i>Clematis vitalba</i>						R
wild parsnip	<i>Pastinaca sativa</i>			O			R
wild privet	<i>Ligustrum vulgare</i>		O				O

English name	Scientific name	Location in main habitats on Site (with DAFOR score)					
		Arable	Woods	Grassland	Ruderal	Wetland	Hedgerow /Scrub
wild-oat	<i>Avena fatua</i>	O					
wild teasel	<i>Dipsacus fullonum</i>			R	R		R
wood avens	<i>Geum urbanum</i>	R	O		R		O
wood dock	<i>Rumex sanguineus</i>		O				R
wood small-reed	<i>Calamagrostis epigejos</i>		R	O		O	R
wood-sedge	<i>Carex sylvatica</i>		O	O			R
wormwood	<i>Artemisia absinthium</i>				R		
wych elm	<i>Ulmus glabra</i>		R				R
yarrow	<i>Achillea millefolium</i>			R	R		
yellow iris	<i>Iris pseudacorus</i>					R	
yellow-wort	<i>Blackstonia perfoliata</i>			R	R		
Yorkshire-fog	<i>Holcus lanatus</i>	O	R	A	O	R	O

KEY TO DAFOR (An estimate of plant relative abundance at a site)

D	Dominant
A	Abundant
F	Frequent
O	Occasional
R	Rare

12.2 ANIMAL SPECIES

English name	Scientific name	USE OF MAIN HABITATS ON SITE DURING SURVEYS					
		Arable	Woods	Grassland	Ruderal	Wetland	Hedgerow /Scrub
Birds							
Greylag Goose	<i>Anser anser</i>	✓					
Mandarin duck	<i>Aix galericulata</i>					✓	
Mallard	<i>Anas platyrhynchos</i>					✓	
Tufted Duck	<i>Aythya fuligula</i>					✓	
Red-legged Partridge	<i>Alectoris rufa</i>	✓		✓	✓		✓
Pheasant	<i>Phasianus colchicus</i>	✓	✓	✓	✓		✓
Red Kite	<i>Milvus milvus</i>	✓	✓		✓		
Goshawk	<i>Accipiter gentilis</i>		✓				
Sparrowhawk	<i>Accipiter nisus</i>		✓				✓
Common Buzzard	<i>Buteo buteo</i>	✓	✓				
Kestrel	<i>Falco tinnunculus</i>	✓		✓	✓		✓
Hobby	<i>Falco subbuteo</i>	✓				✓	
Peregrine Falcon	<i>Falco peregrinus</i>	✓					✓

English name	Scientific name	USE OF MAIN HABITATS ON SITE DURING SURVEYS					
		Arable	Woods	Grassland	Ruderal	Wetland	Hedgerow /Scrub
Moorhen	<i>Gallinula chloropus</i>					✓	
Little Ringed Plover	<i>Charadrius dubius</i>				✓	✓	
Woodcock	<i>Scolopax rusticola</i>		✓				✓
Stock Dove	<i>Columba oenas</i>	✓	✓				✓
Woodpigeon	<i>Columba palumbus</i>	✓	✓				✓
Collared Dove	<i>Streptopelia decaocto</i>	✓					✓
Cuckoo	<i>Cuculus canorus</i>	✓					✓
Tawny Owl	<i>Strix aluco</i>		✓				✓
Green Woodpecker	<i>Picus viridis</i>		✓	✓			✓
Great Spotted Woodpecker	<i>Dendrocopos major</i>		✓				✓
Skylark	<i>Alauda arvensis</i>	✓		✓	✓		
Swallow	<i>Hirundo rustica</i>	✓		✓	✓	✓	
House Martin	<i>Delichon urbicum</i>	✓		✓	✓		
Meadow Pipit	<i>Anthus pratensis</i>	✓		✓	✓		
Yellow Wagtail	<i>Motacilla flava</i>	✓			✓	✓	

English name	Scientific name	USE OF MAIN HABITATS ON SITE DURING SURVEYS					
		Arable	Woods	Grassland	Ruderal	Wetland	Hedgerow /Scrub
Pied Wagtail	<i>Motacilla alba</i>	✓		✓	✓	✓	
Grey Wagtail	<i>Motacilla cinerea</i>					✓	
Wren	<i>Troglodytes troglodytes</i>		✓				✓
Dunnock	<i>Prunella modularis</i>		✓				✓
Robin	<i>Erithacus rubecula</i>		✓				✓
Wheatear	<i>Oenanthe oenanthe</i>				✓		
Blackbird	<i>Turdus merula</i>	✓	✓	✓			✓
Fieldfare	<i>Turdus pilaris</i>	✓		✓			✓
Song Thrush	<i>Turdus philomelos</i>	✓	✓	✓			✓
Redwing	<i>Turdus iliacus</i>	✓	✓	✓			✓
Mistle Thrush	<i>Turdus viscivorus</i>	✓	✓	✓			✓
Blackcap	<i>Sylvia atricapilla</i>		✓				✓
Garden Warbler	<i>Sylvia borin</i>		✓				✓
Lesser Whitethroat	<i>Sylvia curruca</i>						✓
Whitethroat	<i>Sylvia communis</i>						✓

English name	Scientific name	USE OF MAIN HABITATS ON SITE DURING SURVEYS					
		Arable	Woods	Grassland	Ruderal	Wetland	Hedgerow /Scrub
Chiffchaff	<i>Phylloscopus collybita</i>		✓			✓	✓
Willow Warbler	<i>Phylloscopus trochilus</i>		✓			✓	✓
Goldcrest	<i>Regulus regulus</i>		✓				
Long-tailed Tit	<i>Aegithalos caudatus</i>		✓				✓
Blue Tit	<i>Cyanistes caeruleus</i>		✓				✓
Great Tit	<i>Parus major</i>		✓				✓
Coal Tit	<i>Parus ater</i>		✓				
Marsh Tit	<i>Poecile palustris</i>		✓				✓
Treecreeper	<i>Certhia familiaris</i>		✓				✓
Jay	<i>Garrulus glandarius</i>		✓				
Magpie	<i>Pica pica</i>	✓	✓		✓		✓
Jackdaw	<i>Corvus monedula</i>	✓	✓		✓		
Rook	<i>Corvus frugilegus</i>	✓			✓		
Carrion Crow	<i>Corvus corone</i>	✓		✓	✓		
Starling	<i>Sturnus vulgaris</i>	✓		✓	✓		
House Sparrow	<i>Passer domesticus</i>	✓					✓
Chaffinch	<i>Fringilla coelebs</i>	✓	✓		✓		✓

English name	Scientific name	USE OF MAIN HABITATS ON SITE DURING SURVEYS					
		Arable	Woods	Grassland	Ruderal	Wetland	Hedgerow /Scrub
Greenfinch	<i>Carduelis chloris</i>	✓					✓
Goldfinch	<i>Carduelis carduelis</i>	✓			✓		
Siskin	<i>Carduelis spinus</i>		✓				
Linnet	<i>Carduelis cannabina</i>	✓		✓	✓		✓
Lesser Redpoll	<i>Carduelis cabaret</i>		✓				
Bullfinch	<i>Pyrrhula pyrrhula</i>		✓				✓
Yellowhammer	<i>Emberiza citrinella</i>	✓			✓		✓
Reed Bunting	<i>Emberiza schoeniclus</i>	✓			✓		✓
Amphibians and reptiles							
great crested newt	<i>Triturus cristatus</i>					✓	
palmate newt	<i>Lissotriton helveticus</i>					✓	
smooth newt	<i>Lissotriton vulgaris</i>					✓	
common toad	<i>Bufo bufo</i>			✓		✓	✓
common frog	<i>Rana temporaria</i>					✓	
slow-worm	<i>Anguis fragilis</i>			✓			✓

English name	Scientific name	USE OF MAIN HABITATS ON SITE DURING SURVEYS					
		Arable	Woods	Grassland	Ruderal	Wetland	Hedgerow /Scrub
common lizard	<i>Zootoca vivipara</i>			✓			✓
grass snake	<i>Natrix natrix</i>					✓	✓
adder	<i>Vipera berus</i>						✓
Mammals							
mole	<i>Talpa europaea</i>	✓	✓	✓			
common shrew	<i>Sorex araneus</i>		✓	✓			✓
pygmy shrew	<i>Sorex minutus</i>		✓	✓			✓
Natterer's bat	<i>Myotis natteri</i>						
Daubenton's bat	<i>Myotis daubentoni</i>						
serotine	<i>Eptesicus serotinus</i>						✓
noctule	<i>Nyctalus noctula</i>	✓	✓	✓			✓
Leisler's bat	<i>Nyctalus leisleri</i>	✓	✓	✓			✓
common pipistrelle	<i>Pipistrellus pipistrellus</i>	✓	✓	✓		✓	✓
soprano pipistrelle	<i>Pipistrellus pygmaeus</i>	✓	✓	✓		✓	✓
Nathusius pipistrelle	<i>Pipistrellus nathusii</i>	✓					✓
barbastelle	<i>Barbastella barbastellus</i>		✓				✓

English name	Scientific name	USE OF MAIN HABITATS ON SITE DURING SURVEYS					
		Arable	Woods	Grassland	Ruderal	Wetland	Hedgerow /Scrub
brown long-eared bat	<i>Plecotus auritus</i>		✓				✓
rabbit	<i>Oryctolagus cuniculus</i>	✓	✓	✓	✓		✓
brown hare	<i>Lepus europaeus</i>	✓		✓			
grey squirrel	<i>Sciurus carolinensis</i>		✓				✓
bank vole	<i>Myodes glareolus</i>	✓	✓	✓			✓
field vole	<i>Microtus agrestis</i>	✓		✓			✓
wood mouse	<i>Apodemus sylvaticus</i>	✓	✓	✓			✓
brown rat	<i>Rattus norvegicus</i>	✓	✓	✓	✓	✓	✓
fox	<i>Vulpes vulpes</i>	✓	✓	✓	✓		✓
stoat	<i>Mustela erminea</i>			✓			✓
badger	<i>Meles meles</i>	✓	✓	✓			✓
fallow deer	<i>Dama dama</i>	✓	✓	✓			
roe deer	<i>Capreolus capreolus</i>	✓	✓	✓			
muntjac deer	<i>Muntiacus reevesi</i>		✓				✓
Butterflies							
small skipper	<i>Thymelicus sylvestris</i>			✓	✓		✓
large skipper	<i>Ochlodes venata</i>			✓	✓		✓

English name	Scientific name	USE OF MAIN HABITATS ON SITE DURING SURVEYS					
		Arable	Woods	Grassland	Ruderal	Wetland	Hedgerow /Scrub
dingy skipper	<i>Erynnis tages</i>			✓	✓		
brimstone	<i>Gonepteryx rhamni</i>		✓	✓			✓
large white	<i>Pieris brassicae</i>	✓		✓	✓		✓
small white	<i>Pieris rapae</i>	✓		✓	✓		✓
green-veined white	<i>Pieris napi</i>	✓		✓	✓		✓
orange tip	<i>Anthocharis cardamines</i>		✓	✓		✓	✓
black hairstreak	<i>Strymonidia pruni</i>		✓				✓
green hairstreak	<i>Callophrys rubi</i>		✓				✓
purple hairstreak	<i>Quercusia quercus</i>		✓				✓
brown argus	<i>Aricia agestis</i>	✓		✓	✓		✓
common blue	<i>Polyommatus icarus</i>			✓	✓		✓
painted lady	<i>Cynthia cardui</i>			✓	✓		
small tortoiseshell	<i>Aglais urticae</i>			✓	✓		✓
red admiral	<i>Vanessa atalanta</i>			✓	✓		✓
peacock	<i>Inachis io</i>			✓	✓		✓
comma	<i>Polygonia c-album</i>		✓				✓

English name	Scientific name	USE OF MAIN HABITATS ON SITE DURING SURVEYS					
		Arable	Woods	Grassland	Ruderal	Wetland	Hedgerow /Scrub
dark green fritillary	<i>Argynnis aglaja</i>		✓	✓			✓
silver-washed fritillary	<i>Argynnis paphia</i>		✓				✓
speckled wood	<i>Pararge aegeria</i>		✓				✓
gatekeeper	<i>Pyronia tithonus</i>		✓	✓			✓
marbled white	<i>Melanargia galathea</i>			✓			
meadow brown	<i>Maniola jurtina</i>			✓	✓		✓
ringlet	<i>Aphantopus hyperantus</i>			✓	✓		✓
small heath	<i>Coenonympha pamphilus</i>	✓		✓	✓		✓
Moths							
cinnabar	<i>Tyria jacobaeae</i>			✓	✓		
silver Y	<i>Autographa gamma</i>			✓	✓		
mother of pearl	<i>Pleuroptya ruralis</i>			✓	✓		✓
mother shipton	<i>Euclidia mi</i>			✓	✓		
snout moth	<i>Hypena proboscidalis</i>			✓	✓		✓
lesser yellow underwing	<i>Noctua comes</i>		✓	✓	✓		✓

English name	Scientific name	USE OF MAIN HABITATS ON SITE DURING SURVEYS					
		Arable	Woods	Grassland	Ruderal	Wetland	Hedgerow /Scrub
shaded broad-bar	<i>Scotopteryx chenopodiata</i>		✓	✓			✓
common quaker	<i>Orthosia cerasi</i>	✓		✓			✓
yellow shell	<i>Camptogramma bilineata</i>		✓	✓	✓		✓
burnet companion	<i>Euclidia glyphica</i>			✓	✓		
ghost moth	<i>Hepialus humuli</i>			✓			
common swift	<i>Korscheltellus lupulina</i>		✓	✓			✓
orange underwing	<i>Archiearis parthenias</i>		✓				✓
brimstone	<i>Opisthocraptis luteolata</i>		✓	✓	✓		✓
orange footman	<i>Eilema sororcula</i>		✓				
red twin-spot carpet	<i>Xanthorhoe spadicearia</i>	✓	✓	✓	✓		✓
brindled pug	<i>Eupithecia abbreviata</i>		✓				✓
pale tussock	<i>Calliteara pudibunda</i>		✓				✓
nut-tree tussock	<i>Colocasia coryli</i>		✓				
winter moth	<i>Operophtera fagata</i>		✓				✓
six-spot burnet	<i>Zygaena filipendulae</i>			✓	✓		

English name	Scientific name	USE OF MAIN HABITATS ON SITE DURING SURVEYS					
		Arable	Woods	Grassland	Ruderal	Wetland	Hedgerow /Scrub
green oak tortrix	<i>Tortrix viridana</i>		✓				✓
green longhorn	<i>Adela reaumurella</i>		✓				✓
large longhorn	<i>Nematopogon swammerdamella</i>		✓				✓
vetch piercer	<i>Grapholita jungiella</i>		✓		✓		✓
blood-vein	<i>Timandra comae</i>		✓	✓	✓		✓
white-shouldered house moth	<i>Endrosis sarcitrella</i>		✓		✓		
knot-grass	<i>Acronicta menyanthidis</i>		✓	✓	✓		✓
hebrew character	<i>Orthosia gothica</i>	✓	✓	✓	✓		✓
Dragonflies							
common blue damselfly	<i>Enallagma cyathigerum</i>	✓		✓		✓	✓
large red damselfly	<i>Pyrrhosoma nymphula</i>			✓		✓	
blue-tailed damselfly	<i>Ischnura elegans</i>			✓		✓	✓
variable damselfly	<i>Coenagrion pulchellum</i>					✓	
emerald damselfly	<i>Lestes sponsa</i>					✓	

English name	Scientific name	USE OF MAIN HABITATS ON SITE DURING SURVEYS					
		Arable	Woods	Grassland	Ruderal	Wetland	Hedgerow /Scrub
banded demoiselle	<i>Calopteryx splendens</i>					✓	
hairy dragonfly	<i>Brachytron pratense</i>			✓		✓	✓
southern hawker	<i>Aeshna cyanea</i>		✓	✓		✓	✓
brown hawker	<i>Aeshna grandis</i>		✓	✓		✓	✓
migrant hawker	<i>Aeshna mixta</i>		✓			✓	✓
emperor dragonfly	<i>Anax imperator</i>					✓	
black-tailed skimmer	<i>Orthetrum cancellatum</i>					✓	✓
broad-bodied chaser	<i>Libellula depressa</i>					✓	✓
four-spotted chaser	<i>Libellula quadrimaculata</i>					✓	
ruddy darter	<i>Sympetrum sanguineum</i>			✓		✓	
common darter	<i>Sympetrum striolatum</i>	✓	✓	✓		✓	✓
Other Inverts							
Roesel's bush-cricket	<i>Metriopectera roeselii</i>			✓	✓		✓
dark bush-cricket	<i>Pholidoptera griseoaptera</i>		✓				✓

English name	Scientific name	USE OF MAIN HABITATS ON SITE DURING SURVEYS					
		Arable	Woods	Grassland	Ruderal	Wetland	Hedgerow /Scrub
lesser marsh grasshopper	<i>Chorthippus albomarginatus</i>			✓		✓	✓
dock bug	<i>Coreus marginatus</i>	✓		✓	✓		✓
green shieldbug	<i>Palomena prasina</i>		✓	✓			✓
forest shieldbug	<i>Pentatoma rufipes</i>		✓				✓
red-and-black froghopper	<i>Cercopis vulnerata</i>		✓	✓	✓		✓
common carderbee	<i>Bombus pascuorum</i>	✓		✓	✓		✓
white-tailed bumblebee	<i>Bombus lucorum</i>	✓		✓	✓		✓
red-tailed bumblebee	<i>Bombus lapidarius</i>	✓		✓	✓		✓
buff-tailed bumblebee	<i>Bombus terrestris</i>	✓		✓	✓		✓
tree bumblebee	<i>Bombus hypnorum</i>		✓	✓			✓
ashy mining bee	<i>Andrena cineraria</i>			✓	✓		
European hornet	<i>Vespa crabro</i>		✓				✓

English name	Scientific name	USE OF MAIN HABITATS ON SITE DURING SURVEYS					
		Arable	Woods	Grassland	Ruderal	Wetland	Hedgerow /Scrub
dark-edged bee-fly	<i>Bombylius major</i>			✓			✓
hornet hoverfly	<i>Volucella zonaria</i>		✓	✓		✓	✓
harlequin ladybird	<i>Harmonia axyridis</i>	✓	✓	✓	✓		✓
2-spot ladybird	<i>Adalia bipunctata</i>	✓		✓	✓		✓
7-spot ladybird	<i>Coccinella septempunctata</i>	✓	✓	✓	✓		✓
22-spot ladybird	<i>Psyllobora vigintiduopunctata</i>	✓		✓	✓		✓
rufous-shouldered longhorn beetle	<i>Anaglyptus mysticus</i>		✓	✓			✓
red-headed cardinal beetle	<i>Pyrochroa serraticornis</i>	✓		✓	✓		✓
black-headed cardinal beetle	<i>Pyrochroa coccinea</i>		✓				✓
great diving beetle	<i>Dytiscus marginalis</i>					✓	
common red soldier beetle	<i>Rhagonycha fulva</i>	✓		✓	✓		✓

12.3 INVERTEBRATE SPECIES RECORDED ON THE SITE IN 2019

Scientific name	Genus/family name	Order	Date first recorded	National Status
<i>Abax parallelepipedus</i>	<i>Carabidae</i>	<i>Coleoptera</i>	15-May-19	
<i>Acanthosoma haemorrhoidale</i>	<i>Acanthosomatidae</i>	<i>Hemiptera</i>	15-May-19	
<i>Acupalpus meridianus</i>	<i>Carabidae</i>	<i>Coleoptera</i>	15-May-19	
<i>Adalia decempunctata</i>	<i>Coccinellidae</i>	<i>Coleoptera</i>	21-Jun-19	
<i>Aelia acuminata</i>	<i>Pentatomidae</i>	<i>Hemiptera</i>	15-May-19	
<i>Aeshna grandis</i>	<i>Aeshnidae</i>	<i>Odonata</i>	11-Jul-19	
<i>Aeshna mixta</i>	<i>Aeshnidae</i>	<i>Odonata</i>	13-Aug-19	
<i>Agapanthia villosviridescens</i>	<i>Cerambycidae</i>	<i>Coleoptera</i>	21-Jun-19	
<i>Aglais io</i>	<i>Nymphalidae</i>	<i>Lepidoptera</i>	21-Jun-19	
<i>Aglais urticae</i>	<i>Nymphalidae</i>	<i>Lepidoptera</i>	21-Jun-19	
<i>Agrilus (Anambus) laticornis</i>	<i>Buprestidae</i>	<i>Coleoptera</i>	11-Jul-19	
<i>Agriotes acuminatus</i>	<i>Elateridae</i>	<i>Coleoptera</i>	15-May-19	
<i>Agriotes lineatus</i>	<i>Elateridae</i>	<i>Coleoptera</i>	11-Jul-19	
<i>Agriotes obscurus</i>	<i>Elateridae</i>	<i>Coleoptera</i>	21-Jun-19	
<i>Agriotes pallidulus</i>	<i>Elateridae</i>	<i>Coleoptera</i>	21-Jun-19	
<i>Aleochara (Coprochara) bilineata</i>	<i>Staphylinidae</i>	<i>Coleoptera</i>	11-Jul-19	
<i>Aleochara (Coprochara) bipustulata</i>	<i>Staphylinidae</i>	<i>Coleoptera</i>	21-Jun-19	

Scientific name	Genus/family name	Order	Date first recorded	National Status
<i>Alosterna tabacicolor</i>	<i>Cerambycidae</i>	<i>Coleoptera</i>	21-Jun-19	
<i>Amara communis</i> (Amara)	<i>Carabidae</i>	<i>Coleoptera</i>	11-Jul-19	
<i>Amara lunicollis</i> (Amara)	<i>Carabidae</i>	<i>Coleoptera</i>	13-Aug-19	
<i>Amara similata</i> (Amara)	<i>Carabidae</i>	<i>Coleoptera</i>	21-Jun-19	
<i>Ampedus quercicola</i>	<i>Elateridae</i>	<i>Coleoptera</i>	12-Jun-19	Notable b
<i>Anaglyptus mysticus</i>	<i>Cerambycidae</i>	<i>Coleoptera</i>	15-May-19	Notable b
<i>Anaspis frontalis</i> (Anaspis)	<i>Scraptiidae</i>	<i>Coleoptera</i>	21-Jun-19	
<i>Anaspis pulicaria</i> (Anaspis)	<i>Scraptiidae</i>	<i>Coleoptera</i>	21-Jun-19	
<i>Ancistrocerus parietum</i>	<i>Vespidae</i>	<i>Hymenoptera</i>	11-Jul-19	
<i>Andrena praecox</i> (Andrena)	<i>Andrenidae</i>	<i>Hymenoptera</i>	13-Aug-19	
<i>Andrena bicolor</i> (Euandrena)	<i>Andrenidae</i>	<i>Hymenoptera</i>	15-May-19	
<i>Andrena labialis</i> (Holandrena)	<i>Andrenidae</i>	<i>Hymenoptera</i>	21-Jun-19	
<i>Andrena (Hoplandrena) scotica</i>	<i>Andrenidae</i>	<i>Hymenoptera</i>	21-Jun-19	
<i>Andrena cineraria</i> (Melandrena)	<i>Andrenidae</i>	<i>Hymenoptera</i>	21-Jun-19	
<i>Andrena minutula</i> (Micrandrena)	<i>Andrenidae</i>	<i>Hymenoptera</i>	15-May-19	
<i>Andrena chrysosceles</i> (Notandrena)	<i>Andrenidae</i>	<i>Hymenoptera</i>	15-May-19	
<i>Andrena wilkella</i> (Taeniandrena)	<i>Andrenidae</i>	<i>Hymenoptera</i>	21-Jun-19	

Scientific name	Genus/family name	Order	Date first recorded	National Status
<i>Anomoia purmunda</i>	<i>Tephritidae</i>	<i>Diptera</i>	11-Jul-19	
<i>Anoplius (Anoplius) nigerrimus</i>	<i>Pompilidae</i>	<i>Hymenoptera</i>	21-Jun-19	
<i>Anotylus rugosus</i>	<i>Staphylinidae</i>	<i>Coleoptera</i>	15-May-19	
<i>Anthicus antherinus</i>	<i>Anthicidae</i>	<i>Coleoptera</i>	15-May-19	
<i>Anthocharis cardamines</i>	<i>Pieridae</i>	<i>Lepidoptera</i>	15-May-19	
<i>Anthophora (Anthophora) plumipes</i>	<i>Apidae</i>	<i>Hymenoptera</i>	15-May-19	
<i>Apatura iris</i>	<i>Nymphalidae</i>	<i>Lepidoptera</i>	11-Jul-19	Nat Scarce
<i>Aphantopus hyperantus</i>	<i>Nymphalidae</i>	<i>Lepidoptera</i>	11-Jul-19	
<i>Argogorytes fargeii</i>	<i>Crabronidae</i>	<i>Hymenoptera</i>	21-Jun-19	Notable a
<i>Argynnis aglaja</i>	<i>Nymphalidae</i>	<i>Lepidoptera</i>	21-Jun-19	
<i>Argynnis paphia</i>	<i>Nymphalidae</i>	<i>Lepidoptera</i>	11-Jul-19	
<i>Armadillidium vulgare</i>	<i>Armadillidiidae</i>	<i>Isopoda</i>	11-Jul-19	
<i>Athous (Athous) haemorrhoidalis</i>	<i>Elateridae</i>	<i>Coleoptera</i>	21-Jun-19	
<i>Barypeithes (Exomias) pellucidus</i>	<i>Curculionidae</i>	<i>Coleoptera</i>	11-Jul-19	
<i>Bembidion (Bembidion) quadrimaculatum</i>			15-May-19	
<i>Bembidion (Philochthus) guttula</i>	<i>Carabidae</i>	<i>Coleoptera</i>	15-May-19	
<i>Bembidion (Philochthus) lunulatum</i>	<i>Carabidae</i>	<i>Coleoptera</i>	15-May-19	
<i>Bombus hortorum</i>	<i>Apidae</i>	<i>Hymenoptera</i>	11-Jul-19	
<i>Bombus pascuorum</i>	<i>Apidae</i>	<i>Hymenoptera</i>	15-May-19	

Scientific name	Genus/family name	Order	Date first recorded	National Status
<i>Bombus rupestris</i>	<i>Apidae</i>	<i>Hymenoptera</i>	21-Jun-19	
<i>Bombus sylvestris</i>	<i>Apidae</i>	<i>Hymenoptera</i>	21-Jun-19	
<i>Bombylius major</i>	<i>Bombyliidae</i>	<i>Diptera</i>	15-May-19	
<i>Brachytron pratense</i>	<i>Aeshnidae</i>	<i>Odonata</i>	15-May-19	
<i>Bruchus rufimanus</i>	<i>Chrysomelidae</i>	<i>Coleoptera</i>	11-Jul-19	
<i>Byrrhus pilula</i>	<i>Byrrhidae</i>	<i>Coleoptera</i>	11-Jul-19	
<i>Byturus ochraceus</i>	<i>Byturidae</i>	<i>Coleoptera</i>	15-May-19	
<i>Caliadurgus fasciatellus</i>	<i>Pompilidae</i>	<i>Hymenoptera</i>	11-Jul-19	
<i>Calliopum aeneum</i>	<i>Lauxaniidae</i>	<i>Diptera</i>	21-Jun-19	
<i>Calliphora vomitoria</i>	<i>Calliphoridae</i>	<i>Diptera</i>	21-Jun-19	
<i>Calvia quattuordecimguttata</i>	<i>Coccinellidae</i>	<i>Coleoptera</i>	15-May-19	
<i>Cantharis figurata</i>	<i>Cantharidae</i>	<i>Coleoptera</i>	15-May-19	
<i>Cantharis nigra</i>	<i>Cantharidae</i>	<i>Coleoptera</i>	21-Jun-19	
<i>Cantharis nigricans</i>	<i>Cantharidae</i>	<i>Coleoptera</i>	15-May-19	
<i>Cantharis pellucida</i>	<i>Cantharidae</i>	<i>Coleoptera</i>	15-May-19	
<i>Cantharis rufa</i>	<i>Cantharidae</i>	<i>Coleoptera</i>	21-Jun-19	
<i>Cantharis rustica</i>	<i>Cantharidae</i>	<i>Coleoptera</i>	15-May-19	
<i>Capsus ater</i>	<i>Miridae</i>	<i>Hemiptera</i>	21-Jun-19	

Scientific name	Genus/family name	Order	Date first recorded	National Status
<i>Celastrina argiolus</i>	<i>Lycaenidae</i>	<i>Lepidoptera</i>	15-May-19	
<i>Centrotus cornutus</i>	<i>Membracidae</i>	<i>Hemiptera</i>	21-Jun-19	
<i>Cercopis vulnerata</i>	<i>Cercopidae</i>	<i>Hemiptera</i>	15-May-19	
<i>Ceutorhynchus obstrictus</i>	<i>Curculionidae</i>	<i>Coleoptera</i>	15-May-19	
<i>Chaetorellia jaceae</i>	<i>Tephritidae</i>	<i>Diptera</i>	13-Aug-19	
<i>Chamaepsila nigricornis</i>	<i>Psilidae</i>	<i>Diptera</i>	15-May-19	
<i>Cheilosia soror</i>	<i>Syrphidae</i>	<i>Diptera</i>	21-Jun-19	
<i>Chloromyia formosa</i>	<i>Stratiomyidae</i>	<i>Diptera</i>	21-Jun-19	
<i>Choerades marginatus</i>	<i>Asilidae</i>	<i>Diptera</i>	21-Jun-19	
<i>Chorisops tibialis</i>	<i>Stratiomyidae</i>	<i>Diptera</i>	11-Jul-19	
<i>Chorthippus brunneus</i>	<i>Acrididae</i>	<i>Orthoptera</i>	11-Jul-19	
<i>Chrysis rutiliventris</i>	<i>Chrysididae</i>	<i>Hymenoptera</i>	21-Jun-19	
<i>Chrysogaster solstitialis</i>	<i>Syrphidae</i>	<i>Diptera</i>	21-Jun-19	
<i>Chrysops caecutiens</i>	<i>Tabanidae</i>	<i>Diptera</i>	21-Jun-19	
<i>Chrysops relictus</i>	<i>Tabanidae</i>	<i>Diptera</i>	11-Jul-19	
<i>Chrysotoxum bicinctum</i>	<i>Syrphidae</i>	<i>Diptera</i>	21-Jun-19	
<i>Cistogaster globosa</i>	<i>Tachinidae</i>	<i>Diptera</i>	21-Jun-19	RDB 1*
<i>Closterotomus trivialis</i>	<i>Miridae</i>	<i>Hemiptera</i>	21-Jun-19	
<i>Clytus arietis</i>	<i>Cerambycidae</i>	<i>Coleoptera</i>	15-May-19	

Scientific name	Genus/family name	Order	Date first recorded	National Status
<i>Coelositona cambricus</i>	<i>Curculionidae</i>	<i>Coleoptera</i>	21-Jun-19	
<i>Coenagrion puella</i>	<i>Coenagrionidae</i>	<i>Odonata</i>	21-Jun-19	
<i>Coenonympha pamphilus</i>	<i>Nymphalidae</i>	<i>Lepidoptera</i>	15-May-19	S 41 Species
<i>Colletes (Colletes) similis</i>	<i>Colletidae</i>	<i>Hymenoptera</i>	11-Jul-19	
<i>Coremacera marginata</i>	<i>Sciomyzidae</i>	<i>Diptera</i>	13-Aug-19	
<i>Coreus marginatus</i>	<i>Coreidae</i>	<i>Hemiptera</i>	15-May-19	
<i>Coriomeris denticulatus</i>	<i>Coreidae</i>	<i>Hemiptera</i>	21-Jun-19	
<i>Crossocerus (Blepharipus) cetratus</i>	<i>Crabronidae</i>	<i>Hymenoptera</i>	21-Jun-19	
<i>Crossocerus (Blepharipus) nigritus</i>	<i>Crabronidae</i>	<i>Hymenoptera</i>	21-Jun-19	
<i>Curtonotus aulicus</i>	<i>Carabidae</i>	<i>Coleoptera</i>	13-Aug-19	
<i>Dasysyrphus albostriatus</i>	<i>Syrphidae</i>	<i>Diptera</i>	15-May-19	
<i>Dasytes aeratus</i>	<i>Dasytidae</i>	<i>Coleoptera</i>	15-May-19	
<i>Demetrias (Demetrias) atricapillus</i>	<i>Carabidae</i>	<i>Coleoptera</i>	15-May-19	
<i>Deraeocoris (Deraeocoris) flavilinea</i>	<i>Miridae</i>	<i>Hemiptera</i>	11-Jul-19	
<i>Dinaraea angustula</i>	<i>Staphylinidae</i>	<i>Coleoptera</i>	21-Jun-19	
<i>Dolycoris baccarum</i>	<i>Pentatomidae</i>	<i>Hemiptera</i>	15-May-19	
<i>Drusilla canaliculata</i>	<i>Staphylinidae</i>	<i>Coleoptera</i>	11-Jul-19	
<i>Drymus (Sylvadrymus) sylvaticus</i>	<i>Lygaeidae</i>	<i>Hemiptera</i>	21-Jun-19	

Scientific name	Genus/family name	Order	Date first recorded	National Status
<i>Empis stercorea</i>	<i>Empididae</i>	<i>Diptera</i>	15-May-19	
<i>Empis tessellata</i>	<i>Empididae</i>	<i>Diptera</i>	15-May-19	
<i>Empis trigramma</i>	<i>Empididae</i>	<i>Diptera</i>	15-May-19	
<i>Epistrophe eligans</i>	<i>Syrphidae</i>	<i>Diptera</i>	15-May-19	
<i>Eriothrix rufomaculata</i>	<i>Tachinidae</i>	<i>Diptera</i>	13-Aug-19	
<i>Eristalis tenax</i>	<i>Syrphidae</i>	<i>Diptera</i>	15-May-19	
<i>Eumerus strigatus</i>	<i>Syrphidae</i>	<i>Diptera</i>	21-Jun-19	
<i>Eurygaster testudinaria</i>	<i>Scutelleridae</i>	<i>Hemiptera</i>	11-Jul-19	
<i>Eutrichapion (Cnemapion) vorax</i>	<i>Apionidae</i>	<i>Coleoptera</i>	15-May-19	
<i>Favonius quercus</i>	<i>Lycaenidae</i>	<i>Lepidoptera</i>	11-Jul-19	
<i>Ferdinandea cuprea</i>	<i>Syrphidae</i>	<i>Diptera</i>	21-Jun-19	
<i>Forficula auricularia</i>	<i>Forficulidae</i>	<i>Dermaptera</i>	21-Jun-19	
<i>Formica fusca</i>	<i>Formicidae</i>	<i>Hymenoptera</i>	15-May-19	
<i>Geomyza tripunctata</i>	<i>Opomyzidae</i>	<i>Diptera</i>	15-May-19	
<i>Gonepteryx rhamni</i>	<i>Pieridae</i>	<i>Lepidoptera</i>	15-May-19	
<i>Grammoptera abdominalis</i>	<i>Cerambycidae</i>	<i>Coleoptera</i>	15-May-19	Notable a
<i>Grammoptera ruficornis</i>	<i>Cerambycidae</i>	<i>Coleoptera</i>	15-May-19	
<i>Grypocoris (Lophyromiris) stysi</i>	<i>Miridae</i>	<i>Hemiptera</i>	21-Jun-19	

Scientific name	Genus/family name	Order	Date first recorded	National Status
<i>Haematopota pluvialis</i>	<i>Tabanidae</i>	<i>Diptera</i>	21-Jun-19	
<i>Halictus (Seladonia) tumulorum</i>	<i>Halictidae</i>	<i>Hymenoptera</i>	15-May-19	
<i>Harmonia axyridis</i>	<i>Coccinellidae</i>	<i>Coleoptera</i>	15-May-19	
<i>Harpalus (Harpalus) affinis</i>	<i>Carabidae</i>	<i>Coleoptera</i>	11-Jul-19	
<i>Harpalus (Harpalus) rubripes</i>	<i>Carabidae</i>	<i>Coleoptera</i>	11-Jul-19	
<i>Harpalus (Pseudoophonus) rufipes</i>	<i>Carabidae</i>	<i>Coleoptera</i>	13-Aug-19	
<i>Harpocera thoracica</i>	<i>Miridae</i>	<i>Hemiptera</i>	15-May-19	
<i>Helophilus pendulus</i>	<i>Syrphidae</i>	<i>Diptera</i>	21-Jun-19	
<i>Hercostomus germanus</i>	<i>Dolichopodidae</i>	<i>Diptera</i>	11-Jul-19	
<i>Herina lugubris</i>	<i>Ulidiidae</i>	<i>Diptera</i>	13-Aug-19	
<i>Heterogaster urticae</i>	<i>Lygaeidae</i>	<i>Hemiptera</i>	11-Jul-19	
<i>Himacerus (Aptus) mirmicoides</i>	<i>Nabidae</i>	<i>Hemiptera</i>	11-Jul-19	
<i>Himacerus (Himacerus) apterus</i>	<i>Nabidae</i>	<i>Hemiptera</i>	11-Jul-19	
<i>Hoplitis (Alcidamea) claviventris</i>	<i>Megachilidae</i>	<i>Hymenoptera</i>	15-May-19	
<i>Hybos grossipes</i>	<i>Hybotidae</i>	<i>Diptera</i>	13-Aug-19	
<i>Hylaeus (Hylaeus) communis</i>	<i>Colletidae</i>	<i>Hymenoptera</i>	21-Jun-19	
<i>Hylaeus (Prosopis) confusus</i>	<i>Colletidae</i>	<i>Hymenoptera</i>	21-Jun-19	

Scientific name	Genus/family name	Order	Date first recorded	National Status
<i>Hypera (Dapalinus) meles</i>	<i>Curculionidae</i>	<i>Coleoptera</i>	15-May-19	Notable b
<i>Lagria hirta</i>	<i>Tenebrionidae</i>	<i>Coleoptera</i>	13-Aug-19	
<i>Lasioglossum (Dialictus) morio</i>	<i>Halictidae</i>	<i>Hymenoptera</i>	13-Aug-19	
<i>Lasioglossum (Evyllaëus) albipes</i>	<i>Halictidae</i>	<i>Hymenoptera</i>	15-May-19	
<i>Lasioglossum (Evyllaëus) malachurum</i>	<i>Halictidae</i>	<i>Hymenoptera</i>	11-Jul-19	Notable b*
<i>Lasioglossum (Evyllaëus) pauxillum</i>	<i>Halictidae</i>	<i>Hymenoptera</i>	15-May-19	Notable a*
<i>Legnotus limbosus</i>	<i>Cydnidae</i>	<i>Hemiptera</i>	15-May-19	
<i>Leptogaster cylindrica</i>	<i>Asilidae</i>	<i>Diptera</i>	11-Jul-19	
<i>Leptophyes punctatissima</i>	<i>Phaneropteridae</i>	<i>Orthoptera</i>	21-Jun-19	
<i>Leptopterna dolabrata</i>	<i>Miridae</i>	<i>Hemiptera</i>	21-Jun-19	
<i>Leptothorax acervorum</i>	<i>Formicidae</i>	<i>Hymenoptera</i>	21-Jun-19	
<i>Libellula depressa</i>	<i>Libellulidae</i>	<i>Odonata</i>	11-Jul-19	
<i>Limonia nigropunctata</i>	<i>Limoniidae</i>	<i>Diptera</i>	21-Jun-19	
<i>Limonia phragmitidis</i>	<i>Limoniidae</i>	<i>Diptera</i>	15-May-19	
<i>Linnaemya tessellans</i>	<i>Tachinidae</i>	<i>Diptera</i>	15-May-19	
<i>Liophloeus tessulatus</i>	<i>Curculionidae</i>	<i>Coleoptera</i>	15-May-19	
<i>Loricera pilicornis</i>	<i>Carabidae</i>	<i>Coleoptera</i>	11-Jul-19	
<i>Loxocera albiseta</i>	<i>Psilidae</i>	<i>Diptera</i>	15-May-19	

Scientific name	Genus/family name	Order	Date first recorded	National Status
<i>Lucilia sericata</i>	<i>Calliphoridae</i>	<i>Diptera</i>	13-Aug-19	
<i>Lucilia silvarum</i>	<i>Calliphoridae</i>	<i>Diptera</i>	13-Aug-19	
<i>Machimus atricapillus</i>			11-Jul-19	
<i>Magdalis (Odontomagdalis) armigera</i>	<i>Curculionidae</i>	<i>Coleoptera</i>	21-Jun-19	
<i>Malachius bipustulatus</i>	<i>Malachiidae</i>	<i>Coleoptera</i>	11-Jul-19	
<i>Malacosoma neustria</i>	<i>Lasiocampidae</i>	<i>Lepidoptera</i>	21-Jun-19	S41Species – research only
<i>Malthodes minimus</i>	<i>Cantharidae</i>	<i>Coleoptera</i>	15-May-19	
<i>Maniola jurtina</i>	<i>Nymphalidae</i>	<i>Lepidoptera</i>	15-May-19	
<i>Mecinus pascuorum</i>	<i>Curculionidae</i>	<i>Coleoptera</i>	21-Jun-19	
<i>Meconema thalassinum</i>	<i>Meconematidae</i>	<i>Orthoptera</i>	21-Jun-19	
<i>Megachile (Megachile) versicolor</i>	<i>Megachilidae</i>	<i>Hymenoptera</i>	11-Jul-19	
<i>Megaloceroea recticornis</i>	<i>Miridae</i>	<i>Hemiptera</i>	21-Jun-19	
<i>Megamerina dolium</i>	<i>Megamerinidae</i>	<i>Diptera</i>	21-Jun-19	Provisionally Nat Scarce
<i>Melanargia galathea</i>	<i>Nymphalidae</i>	<i>Lepidoptera</i>	21-Jun-19	
<i>Meligethes aeneus</i>	<i>Nitidulidae</i>	<i>Coleoptera</i>	11-Jul-19	
<i>Meligethes atratus</i>	<i>Nitidulidae</i>	<i>Coleoptera</i>	21-Jun-19	
<i>Merzomyia westermanni</i>	<i>Tephritidae</i>	<i>Diptera</i>	11-Jul-19	Notable*
<i>Metrioptera roeselii</i>	<i>Tettigoniidae</i>	<i>Orthoptera</i>	15-May-19	

Scientific name	Genus/family name	Order	Date first recorded	National Status
<i>Microlestes minutulus</i>	<i>Carabidae</i>	<i>Coleoptera</i>	11-Jul-19	
<i>Minettia fasciata</i>	<i>Lauxaniidae</i>	<i>Diptera</i>	21-Jun-19	
<i>Minettia longipennis</i>	<i>Lauxaniidae</i>	<i>Diptera</i>	21-Jun-19	
<i>Monosapyga clavicornis</i>	<i>Sapygidae</i>	<i>Hymenoptera</i>	13-Aug-19	Notable b
<i>Mordellochroa abdominalis</i>	<i>Mordellidae</i>	<i>Coleoptera</i>	21-Jun-19	
<i>Musca autumnalis</i>	<i>Muscidae</i>	<i>Diptera</i>	21-Jun-19	
<i>Myathropa florea</i>	<i>Syrphidae</i>	<i>Diptera</i>	13-Aug-19	
<i>Nabis (Dolichonabis) limbatus</i>	<i>Nabidae</i>	<i>Hemiptera</i>	13-Aug-19	
<i>Nabis (Nabis) rugosus</i>	<i>Nabidae</i>	<i>Hemiptera</i>	13-Aug-19	
<i>Neocoenorrhinus aequatus</i>	<i>Rhynchitidae</i>	<i>Coleoptera</i>	15-May-19	
<i>Neocrepidodera transversa</i>	<i>Chrysomelidae</i>	<i>Coleoptera</i>	13-Aug-19	
<i>Nephrotoma appendiculata</i>	<i>Tipulidae</i>	<i>Diptera</i>	15-May-19	
<i>Nephrotoma flavescens</i>	<i>Tipulidae</i>	<i>Diptera</i>	21-Jun-19	
<i>Nomada flava</i>	<i>Apidae</i>	<i>Hymenoptera</i>	15-May-19	
<i>Nomada flavoguttata</i>	<i>Apidae</i>	<i>Hymenoptera</i>	15-May-19	
<i>Nomada goodeniana</i>	<i>Apidae</i>	<i>Hymenoptera</i>	15-May-19	
<i>Notiophilus biguttatus</i>	<i>Carabidae</i>	<i>Coleoptera</i>	15-May-19	
<i>Nowickia ferox</i>			13-Aug-19	

Scientific name	Genus/family name	Order	Date first recorded	National Status
<i>Nysson trimaculatus</i>	<i>Crabronidae</i>	<i>Hymenoptera</i>	11-Jul-19	Notable b*
<i>Ochlodes sylvanus</i>	<i>Hesperiidae</i>	<i>Lepidoptera</i>	21-Jun-19	
<i>Oedemera</i> (<i>Oedemera</i>) <i>lurida</i>	<i>Oedemeridae</i>	<i>Coleoptera</i>	21-Jun-19	
<i>Oedemera</i> (<i>Oedemera</i>) <i>nobilis</i>	<i>Oedemeridae</i>	<i>Coleoptera</i>	15-May-19	
<i>Oncotylus</i> (<i>Oncotylus</i>) <i>viridiflavus</i>	<i>Miridae</i>	<i>Hemiptera</i>	13-Aug-19	
<i>Osmia</i> (<i>Chalcosmia</i>) <i>leaiana</i>	<i>Megachilidae</i>	<i>Hymenoptera</i>	21-Jun-19	
<i>Oulema melanopus</i> s.str.	<i>Chrysomelidae</i>	<i>Coleoptera</i>	13-Aug-19	
<i>Oxyna nebulosa</i>	<i>Tephritidae</i>	<i>Diptera</i>	21-Jun-19	RDB 3*
<i>Pachygaster atra</i>	<i>Stratiomyidae</i>	<i>Diptera</i>	11-Jul-19	
<i>Palloptera ustulata</i>	<i>Pallopteridae</i>	<i>Diptera</i>	11-Jul-19	
<i>Palomena prasina</i>	<i>Pentatomidae</i>	<i>Hemiptera</i>	21-Jun-19	
<i>Panorpa communis</i>	<i>Panorpidae</i>	<i>Mecoptera</i>	13-Aug-19	
<i>Paradromius linearis</i>	<i>Carabidae</i>	<i>Coleoptera</i>	15-May-19	
<i>Paragus haemorrhous</i>	<i>Syrphidae</i>	<i>Diptera</i>	15-May-19	
<i>Pararge aegeria</i>	<i>Nymphalidae</i>	<i>Lepidoptera</i>	15-May-19	
<i>Passaloecus eremita</i>	<i>Crabronidae</i>	<i>Hymenoptera</i>	21-Jun-19	
<i>Passaloecus singularis</i>	<i>Crabronidae</i>	<i>Hymenoptera</i>	11-Jul-19	
<i>Pentatoma rufipes</i>	<i>Pentatomidae</i>	<i>Hemiptera</i>	21-Jun-19	
<i>Phaonia pallida</i>	<i>Muscidae</i>	<i>Diptera</i>	11-Jul-19	

Scientific name	Genus/family name	Order	Date first recorded	National Status
<i>Phasia obesa</i>	<i>Tachinidae</i>	<i>Diptera</i>	13-Aug-19	
<i>Phasia pusilla</i>	<i>Tachinidae</i>	<i>Diptera</i>	13-Aug-19	
<i>Philonthus decorus</i>	<i>Staphylinidae</i>	<i>Coleoptera</i>	11-Jul-19	
<i>Pholidoptera griseoptera</i>	<i>Tettigoniidae</i>	<i>Orthoptera</i>	15-May-19	
<i>Phyllobius (Parnemoicus) roboretanus</i>	<i>Curculionidae</i>	<i>Coleoptera</i>	21-Jun-19	
<i>Phyllotreta nigripes</i>	<i>Chrysomelidae</i>	<i>Coleoptera</i>	15-May-19	
<i>Physocephala rufipes</i>	<i>Conopidae</i>	<i>Diptera</i>	11-Jul-19	
<i>Phytoecia cylindrica</i>	<i>Cerambycidae</i>	<i>Coleoptera</i>	15-May-19	Notable b
<i>Pieris brassicae</i>	<i>Pieridae</i>	<i>Lepidoptera</i>	11-Jul-19	
<i>Pipiza austriaca</i>	<i>Syrphidae</i>	<i>Diptera</i>	21-Jun-19	
<i>Pipizella viduata</i>	<i>Syrphidae</i>	<i>Diptera</i>	21-Jun-19	
<i>Podops inuncta</i>	<i>Pentatomidae</i>	<i>Hemiptera</i>	15-May-19	
<i>Poecilium alni</i>	<i>Cerambycidae</i>	<i>Coleoptera</i>	15-May-19	Notable b
<i>Poecilus cupreus</i>	<i>Carabidae</i>	<i>Coleoptera</i>	11-Jul-19	
<i>Poecilus versicolor</i>	<i>Carabidae</i>	<i>Coleoptera</i>	13-Aug-19	
<i>Polyommatus icarus</i>	<i>Lycaenidae</i>	<i>Lepidoptera</i>	21-Jun-19	
<i>Priocnemis (Priocnemis) schioedtei</i>	<i>Pompilidae</i>	<i>Hymenoptera</i>	13-Aug-19	Notable b
<i>Propylea quattuordecimpunctata</i>	<i>Coccinellidae</i>	<i>Coleoptera</i>	11-Jul-19	
<i>Psenulus pallipes</i>	<i>Crabronidae</i>	<i>Hymenoptera</i>	11-Jul-19	

Scientific name	Genus/family name	Order	Date first recorded	National Status
<i>Pseudovadonia livida</i>	<i>Cerambycidae</i>	<i>Coleoptera</i>	11-Jul-19	
<i>Psylliodes chrysocephala</i>	<i>Chrysomelidae</i>	<i>Coleoptera</i>	13-Aug-19	
<i>Pterostichus (Adelosia) macer</i>	<i>Carabidae</i>	<i>Coleoptera</i>	21-Jun-19	
<i>Pterostichus (Argutor) strenuus</i>	<i>Carabidae</i>	<i>Coleoptera</i>	13-Aug-19	
<i>Pterostichus (Omaseus) melanarius</i>	<i>Carabidae</i>	<i>Coleoptera</i>	13-Aug-19	
<i>Pterostichus (Pediis) longicollis</i>	<i>Carabidae</i>	<i>Coleoptera</i>	11-Jul-19	Nat. Scarce
<i>Pterostichus (Platysma) niger</i>	<i>Carabidae</i>	<i>Coleoptera</i>	11-Jul-19	
<i>Pterostichus (Steropus) madidus</i>	<i>Carabidae</i>	<i>Coleoptera</i>	21-Jun-19	
<i>Ptomaphagus subvillosus</i>	<i>Leiodidae</i>	<i>Coleoptera</i>	11-Jul-19	
<i>Pyrochroa serraticornis</i>	<i>Pyrochroidae</i>	<i>Coleoptera</i>	15-May-19	
<i>Pyronia tithonus</i>	<i>Nymphalidae</i>	<i>Lepidoptera</i>	13-Aug-19	
<i>Pyrrhosoma nymphula</i>	<i>Coenagrionidae</i>	<i>Odonata</i>	15-May-19	
<i>Quedius (Quedius) levicollis</i>	<i>Staphylinidae</i>	<i>Coleoptera</i>	13-Aug-19	
<i>Quedius (Raphirus) picipes</i>	<i>Staphylinidae</i>	<i>Coleoptera</i>	13-Aug-19	
<i>Rhagonycha fulva</i>	<i>Cantharidae</i>	<i>Coleoptera</i>	21-Jun-19	
<i>Rhagonycha lignosa</i>	<i>Cantharidae</i>	<i>Coleoptera</i>	15-May-19	
<i>Rhagonycha limbata</i>	<i>Cantharidae</i>	<i>Coleoptera</i>	21-Jun-19	
<i>Rhopalus (Rhopalus) subrufus</i>	<i>Rhopalidae</i>	<i>Hemiptera</i>	15-May-19	

Scientific name	Genus/family name	Order	Date first recorded	National Status
<i>Rhyzobius litura</i>	<i>Coccinellidae</i>	<i>Coleoptera</i>	21-Jun-19	
<i>Rutpela maculata</i>	<i>Cerambycidae</i>	<i>Coleoptera</i>	21-Jun-19	
<i>Sapromyza quadripunctata</i>	<i>Lauxaniidae</i>	<i>Diptera</i>	21-Jun-19	
<i>Sarcophaga haemorrhoea</i>	<i>Sarcophagidae</i>	<i>Diptera</i>	21-Jun-19	
<i>Satyrrium pruni</i>	<i>Lycaenidae</i>	<i>Lepidoptera</i>	21-Jun-19	Endangered
<i>Satyrrium w-album</i>	<i>Lycaenidae</i>	<i>Lepidoptera</i>	11-Jul-19	S41 Species
<i>Scolopostethus affinis</i>	<i>Lygaeidae</i>	<i>Hemiptera</i>	21-Jun-19	
<i>Scolytus scolytus</i>	<i>Curculionidae</i>	<i>Coleoptera</i>	15-May-19	
<i>Sehirus luctuosus</i>	<i>Cydnidae</i>	<i>Hemiptera</i>	21-Jun-19	
<i>Sicus ferrugineus</i>	<i>Conopidae</i>	<i>Diptera</i>	11-Jul-19	
<i>Silpha atrata</i>	<i>Silphidae</i>	<i>Coleoptera</i>	13-Aug-19	
<i>Sitona lepidus</i>	<i>Curculionidae</i>	<i>Coleoptera</i>	21-Jun-19	
<i>Sitona lineatus</i>	<i>Curculionidae</i>	<i>Coleoptera</i>	15-May-19	
<i>Sphaerophoria scripta</i>	<i>Syrphidae</i>	<i>Diptera</i>	21-Jun-19	
<i>Sphecodes geoffrellus</i>	<i>Halictidae</i>	<i>Hymenoptera</i>	21-Jun-19	
<i>Stenocorus meridianus</i>	<i>Cerambycidae</i>	<i>Coleoptera</i>	21-Jun-19	
<i>Stenodema (Stenodema) laevigata</i>	<i>Miridae</i>	<i>Hemiptera</i>	15-May-19	
<i>Stenotus binotatus</i>	<i>Miridae</i>	<i>Hemiptera</i>	21-Jun-19	

Scientific name	Genus/family name	Order	Date first recorded	National Status
<i>Stenus (Stenus) clavicornis</i>	<i>Staphylinidae</i>	<i>Coleoptera</i>	11-Jul-19	
<i>Sympetrum striolatum</i>	<i>Libellulidae</i>	<i>Odonata</i>	13-Aug-19	
<i>Syrphus ribesii</i>	<i>Syrphidae</i>	<i>Diptera</i>	15-May-19	
<i>Syrphus torvus</i>	<i>Syrphidae</i>	<i>Diptera</i>	21-Jun-19	
<i>Tachina fera</i>	<i>Tachinidae</i>	<i>Diptera</i>	21-Jun-19	
<i>Tachina lurida</i>	<i>Tachinidae</i>	<i>Diptera</i>	21-Jun-19	
<i>Tachyporus hypnorum</i>	<i>Staphylinidae</i>	<i>Coleoptera</i>	11-Jul-19	
<i>Tanymecus palliatus</i>	<i>Curculionidae</i>	<i>Coleoptera</i>	11-Jul-19	Notable b
<i>Tephritis formosa</i>	<i>Tephritidae</i>	<i>Diptera</i>	15-May-19	
<i>Tephritis neesii</i>	<i>Tephritidae</i>	<i>Diptera</i>	13-Aug-19	
<i>Tetrops praeustus</i>	<i>Cerambycidae</i>	<i>Coleoptera</i>	15-May-19	
<i>Thymelicus sylvestris</i>	<i>Hesperiidae</i>	<i>Lepidoptera</i>	11-Jul-19	
<i>Tipula fascipennis</i>	<i>Tipulidae</i>	<i>Diptera</i>	21-Jun-19	
<i>Tipula lunata</i>	<i>Tipulidae</i>	<i>Diptera</i>	21-Jun-19	
<i>Tipula vernalis</i>	<i>Tipulidae</i>	<i>Diptera</i>	15-May-19	
<i>Trichrysis cyanea</i>	<i>Chrysididae</i>	<i>Hymenoptera</i>	21-Jun-19	
<i>Tricyphona immaculata</i>	<i>Pediciidae</i>	<i>Diptera</i>	21-Jun-19	
<i>Trypoxylon attenuatum</i>	<i>Crabronidae</i>	<i>Hymenoptera</i>	21-Jun-19	

Scientific name	Genus/family name	Order	Date first recorded	National Status
<i>Tyria jacobaeae</i>	<i>Erebidae</i>	<i>Lepidoptera</i>	15-May-19	S41 Species – research only
<i>Tytthaspis sedecimpunctata</i>	<i>Coccinellidae</i>	<i>Coleoptera</i>	15-May-19	
<i>Vanessa atalanta</i>	<i>Nymphalidae</i>	<i>Lepidoptera</i>	21-Jun-19	
<i>Vanessa cardui</i>	<i>Nymphalidae</i>	<i>Lepidoptera</i>	21-Jun-19	
<i>Vespa crabro</i>	<i>Vespidae</i>	<i>Hymenoptera</i>	15-May-19	
<i>Vespula (Paravespula) germanica</i>	<i>Vespidae</i>	<i>Hymenoptera</i>	21-Jun-19	
<i>Volucella bombylans</i>	<i>Syrphidae</i>	<i>Diptera</i>	11-Jul-19	
<i>Volucella inanis</i>	<i>Syrphidae</i>	<i>Diptera</i>	13-Aug-19	
<i>Volucella inflata</i>	<i>Syrphidae</i>	<i>Diptera</i>	21-Jun-19	
<i>Volucella pellucens</i>	<i>Syrphidae</i>	<i>Diptera</i>	21-Jun-19	
<i>Xantholinus (Xantholinus) longiventris</i>	<i>Staphylinidae</i>	<i>Coleoptera</i>	15-May-19	
<i>Xylota segnis</i>	<i>Syrphidae</i>	<i>Diptera</i>	21-Jun-19	
<i>Xylota sylvarum</i>	<i>Syrphidae</i>	<i>Diptera</i>	21-Jun-19	

*Widely accepted as being much more common than this status suggests; likely to be downgraded.

12.4 INVERTEBRATES RECORDED IN THE ASSARTS, FINESHADE WOOD, IN 2020

Species	Family	Order	Conservation status
<i>Acupalpus dubius</i>	<i>Carabidae</i>	<i>Coleoptera</i>	

Species	Family	Order	Conservation status
<i>Aeshna grandis</i>	<i>Aeshnidae</i>	<i>Odonata</i>	
<i>Aeshna mixta</i>	<i>Aeshnidae</i>	<i>Odonata</i>	
<i>Agrilus cyanescens</i>	<i>Buprestidae</i>	<i>Coleoptera</i>	
<i>Agrilus laticornis</i>	<i>Buprestidae</i>	<i>Coleoptera</i>	
<i>Agriotes acuminatus</i>	<i>Elateridae</i>	<i>Coleoptera</i>	
<i>Agriotes lineatus</i>	<i>Elateridae</i>	<i>Coleoptera</i>	
<i>Agriotes obscurus</i>	<i>Elateridae</i>	<i>Coleoptera</i>	
<i>Aleochara curtula</i>	<i>Staphylinidae</i>	<i>Coleoptera</i>	
<i>Alosterna tabacicolor</i>	<i>Cerambycidae</i>	<i>Coleoptera</i>	
<i>Amara lunicollis</i>	<i>Carabidae</i>	<i>Coleoptera</i>	
<i>Anaglyptus mysticus</i>	<i>Cerambycidae</i>	<i>Coleoptera</i>	Notable b
<i>Anaspis frontalis</i>	<i>Scraptiidae</i>	<i>Coleoptera</i>	
<i>Anaspis maculata</i>	<i>Scraptiidae</i>	<i>Coleoptera</i>	
<i>Anax imperator</i>	<i>Aeshnidae</i>	<i>Odonata</i>	
<i>Ancistrocerus gazella</i>	<i>Vespidae</i>	<i>Hymenoptera</i>	
<i>Andrena nitida</i>	<i>Andrenidae</i>	<i>Hymenoptera</i>	
<i>Anomoia purmunda</i>	<i>Tephritidae</i>	<i>Diptera</i>	
<i>Aphantopus hyperantus</i>	<i>Nymphalidae</i>	<i>Lepidoptera</i>	
<i>Argynnis paphia</i>	<i>Nymphalidae</i>	<i>Lepidoptera</i>	
<i>Argyra leucocephala</i>	<i>Dolichopodidae</i>	<i>Diptera</i>	
<i>Aspidapion radiolus</i>	<i>Apionidae</i>	<i>Coleoptera</i>	
<i>Athous haemorrhoidalis</i>	<i>Elateridae</i>	<i>Coleoptera</i>	
<i>Atractotomus mali</i>	<i>Miridae</i>	<i>Hemiptera</i>	
<i>Baccha elongata</i>	<i>Syrphidae</i>	<i>Diptera</i>	
<i>Bicellaria sulcata</i>	<i>Hybotidae</i>	<i>Diptera</i>	
<i>Bombus (Thoracobombus) pascuorum</i>	<i>Apidae</i>	<i>Hymenoptera</i>	
<i>Bombus hypnorum</i>	<i>Apidae</i>	<i>Hymenoptera</i>	

Species	Family	Order	Conservation status
<i>Brachytron pratense</i>	<i>Aeshnidae</i>	<i>Odonata</i>	
<i>Bruchus rufimanus</i>	<i>Chrysomelidae</i>	<i>Coleoptera</i>	
<i>Calliopum aeneum</i>	<i>Lauxaniidae</i>	<i>Diptera</i>	
<i>Cantharis figurata</i>	<i>Cantharidae</i>	<i>Coleoptera</i>	
<i>Cantharis nigricans</i>	<i>Cantharidae</i>	<i>Coleoptera</i>	
<i>Cantharis pellucida</i>	<i>Cantharidae</i>	<i>Coleoptera</i>	
<i>Cantharis rustica</i>	<i>Cantharidae</i>	<i>Coleoptera</i>	
<i>Capsus ater</i>	<i>Miridae</i>	<i>Hemiptera</i>	
<i>Carabus nemoralis</i>	<i>Carabidae</i>	<i>Coleoptera</i>	
<i>Centrotus cornutus</i>	<i>Membracidae</i>	<i>Hemiptera</i>	
<i>Cercopis vulnerata</i>	<i>Cercopidae</i>	<i>Hemiptera</i>	
<i>Cheilosia bergenstammi</i>	<i>Syrphidae</i>	<i>Diptera</i>	
<i>Cheilosia latifrons</i>	<i>Syrphidae</i>	<i>Diptera</i>	
<i>Cheilosia pagana</i>	<i>Syrphidae</i>	<i>Diptera</i>	
<i>Cheilosia proxima</i>	<i>Syrphidae</i>	<i>Diptera</i>	
<i>Cheilosia scutellata</i>	<i>Syrphidae</i>	<i>Diptera</i>	
<i>Cheilosia soror</i>	<i>Syrphidae</i>	<i>Diptera</i>	
<i>Choerades marginatus</i>	<i>Asilidae</i>	<i>Diptera</i>	
<i>Chorthippus brunneus</i>	<i>Acrididae</i>	<i>Orthoptera</i>	
<i>Chrysogaster solstitialis</i>	<i>Syrphidae</i>	<i>Diptera</i>	
<i>Chrysopilus asiliformis</i>	<i>Rhagionidae</i>	<i>Diptera</i>	
<i>Chrysops relictus</i>	<i>Tabanidae</i>	<i>Diptera</i>	
<i>Chrysotoxum bicinctum</i>	<i>Syrphidae</i>	<i>Diptera</i>	
<i>Closterotomus trivialis</i>	<i>Miridae</i>	<i>Hemiptera</i>	
<i>Clytus arietis</i>	<i>Cerambycidae</i>	<i>Coleoptera</i>	
<i>Cordilura albipes</i>	<i>Scathophagidae</i>	<i>Diptera</i>	
<i>Coremacera marginata</i>	<i>Sciomyzidae</i>	<i>Diptera</i>	

Species	Family	Order	Conservation status
<i>Coreus marginatus</i>	Coreidae	Hemiptera	
<i>Corizus hyoscyami</i>	Rhopalidae	Hemiptera	
<i>Criorhina berberina</i>	Syrphidae	Diptera	
<i>Crossocerus megacephalus</i>	Crabronidae	Hymenoptera	
<i>Curtonotus aulicus</i>	Carabidae	Coleoptera	
<i>Dasytes aeratus</i>	Dasytidae	Coleoptera	
<i>Deraeocoris</i> (<i>Deraeocoris</i>) <i>ruber</i>	Miridae	Hemiptera	
<i>Derocrepis rufipes</i>	Chrysomelidae	Coleoptera	
<i>Diogma glabrata</i>	Cylindrotomidae	Diptera	Notable
<i>Dolichopus festivus</i>	Dolichopodidae	Diptera	
<i>Dolichopus griseipennis</i>	Dolichopodidae	Diptera	
<i>Dolichovespula sylvestris</i>	Vespidae	Hymenoptera	
<i>Empis livida</i>	Empididae	Diptera	
<i>Empis nigritarsis</i>	Empididae	Diptera	
<i>Empis nuntia</i>	Empididae	Diptera	
<i>Empis opaca</i>	Empididae	Diptera	
<i>Empis stercorea</i>	Empididae	Diptera	
<i>Empis tessellata</i>	Empididae	Diptera	
<i>Empis trigramma</i>	Empididae	Diptera	
<i>Epistrophe eligans</i>	Syrphidae	Diptera	
<i>Eristalis arbustorum</i>	Syrphidae	Diptera	
<i>Eristalis horticola</i>	Syrphidae	Diptera	
<i>Eristalis nemorum</i>	Syrphidae	Diptera	
<i>Eumerus ornatus</i>	Syrphidae	Diptera	
<i>Eysarcoris venustissimus</i>	Pentatomidae	Hemiptera	
<i>Favonius quercus</i>	Lycaenidae	Lepidoptera	

Species	Family	Order	Conservation status
<i>Ferdinandea cuprea</i>	<i>Syrphidae</i>	<i>Diptera</i>	
<i>Formica fusca</i>	<i>Formicidae</i>	<i>Hymenoptera</i>	
<i>Glischrochilus hortensis</i>	<i>Nitidulidae</i>	<i>Coleoptera</i>	
<i>Gonepteryx rhamni</i>	<i>Pieridae</i>	<i>Lepidoptera</i>	
<i>Grammoptera ruficornis</i>	<i>Cerambycidae</i>	<i>Coleoptera</i>	
<i>Graphomya maculata</i>	<i>Muscidae</i>	<i>Diptera</i>	
<i>Halictus rubicundus</i>	<i>Halictidae</i>	<i>Hymenoptera</i>	
<i>Harmonia axyridis</i>	<i>Coccinellidae</i>	<i>Coleoptera</i>	
<i>Harpalus rubripes</i>	<i>Carabidae</i>	<i>Coleoptera</i>	
<i>Harpalus rufipalpis</i>	<i>Carabidae</i>	<i>Coleoptera</i>	
<i>Harpalus rufipes</i>	<i>Carabidae</i>	<i>Coleoptera</i>	
<i>Harpocera thoracica</i>	<i>Miridae</i>	<i>Hemiptera</i>	
<i>Helophilus pendulus</i>	<i>Syrphidae</i>	<i>Diptera</i>	
<i>Helophilus trivittatus</i>	<i>Syrphidae</i>	<i>Diptera</i>	
<i>Herina lugubris</i>	<i>Ulidiidae</i>	<i>Diptera</i>	
<i>Heterotoma planicornis</i>	<i>Miridae</i>	<i>Hemiptera</i>	
<i>Hilara lugubris</i>	<i>Empididae</i>	<i>Diptera</i>	Locally Rare*; Nationally Scarce
<i>Himacerus (Aptus) mirmicoides</i>	<i>Nabidae</i>	<i>Hemiptera</i>	
<i>Homalenotus quadridentatus</i>	<i>Phalangidae</i>	<i>Opiliones</i>	
<i>Hybos culiciformis</i>	<i>Hybotidae</i>	<i>Diptera</i>	
<i>Hybos femoratus</i>	<i>Hybotidae</i>	<i>Diptera</i>	
<i>Hylaeus communis</i>	<i>Colletidae</i>	<i>Hymenoptera</i>	
<i>Hylaeus confusus</i>	<i>Colletidae</i>	<i>Hymenoptera</i>	
<i>Imantimyia fulviventris</i>	<i>Psilidae</i>	<i>Diptera</i>	

Species	Family	Order	Conservation status
<i>Lasioglossum fulvicorne</i>	Halictidae	Hymenoptera	
<i>Lasiosomus enervis</i>	Lygaeidae	Hemiptera	Notable b
<i>Lasius niger</i>	Formicidae	Hymenoptera	
<i>Leptogaster cylindrica</i>	Asilidae	Diptera	
<i>Leptophyes punctatissima</i>	Phaneropteridae	Orthoptera	
<i>Leptopterna dolabrata</i>	Miridae	Hemiptera	
<i>Leptura quadrifasciata</i>	Cerambycidae	Coleoptera	
<i>Limenitis camilla</i>	Nymphalidae	Lepidoptera	S41 Species
<i>Limnia unguicornis</i>	Sciomyzidae	Diptera	
<i>Limonia nubeculosa</i>	Limoniidae	Diptera	
<i>Limonia phragmitidis</i>	Limoniidae	Diptera	
<i>Linnaemya picta</i>	Tachinidae	Diptera	
<i>Liocoris tripustulatus</i>	Miridae	Hemiptera	
<i>Machimus atricapillus</i>	Asilidae	Diptera	
<i>Macquartia pubiceps</i>	Tachinidae	Diptera	
<i>Malachus bipustulatus</i>	Malachiidae	Coleoptera	
<i>Malacosoma neustria</i>	Lasiocampidae	Lepidoptera	S41 Species – research only
<i>Maniola jurtina</i>	Nymphalidae	Lepidoptera	
<i>Meconema thalassinum</i>	Meconematidae	Orthoptera	
<i>Megachile ligniseca</i>	Megachilidae	Hymenoptera	
<i>Megachile versicolor</i>	Megachilidae	Hymenoptera	
<i>Megaloceroea relicticornis</i>	Miridae	Hemiptera	
<i>Meiosimyza rorida</i>	Lauxaniidae	Diptera	
<i>Melanargia galathea</i>	Nymphalidae	Lepidoptera	
<i>Melangyna labiatarum</i>	Syrphidae	Diptera	

Species	Family	Order	Conservation status
<i>Melanostoma mellinum</i>	Syrphidae	Diptera	
<i>Melanostoma scalare</i>	Syrphidae	Diptera	
<i>Meligethes aeneus</i>	Nitidulidae	Coleoptera	
<i>Meligethes atratus</i>	Nitidulidae	Coleoptera	
<i>Meliscaeva cinctella</i>	Syrphidae	Diptera	
<i>Merzomyia westermanni</i>	Tephritidae	Diptera	Notable*; Notable
<i>Metrioptera roeselii</i>	Tettigoniidae	Orthoptera	
<i>Microchrysa polita</i>	Stratiomyidae	Diptera	
<i>Minettia longipennis</i>	Lauxaniidae	Diptera	
<i>Miris striatus</i>	Miridae	Hemiptera	
<i>Molorchus minor</i>	Cerambycidae	Coleoptera	
<i>Mordellistena humeralis</i>	Mordellidae	Coleoptera	Nationally Scarce
<i>Mordellochroa abdominalis</i>	Mordellidae	Coleoptera	
<i>Musca autumnalis</i>	Muscidae	Diptera	
<i>Myathropa florea</i>	Syrphidae	Diptera	
<i>Myolepta dubia</i>	Syrphidae	Diptera	Nationally Scarce
<i>Nabis (Dolichonabis) limbatus</i>	Nabidae	Hemiptera	
<i>Nabis (Nabicula) flavomarginatus</i>	Nabidae	Hemiptera	
<i>Nebria brevicollis</i>	Carabidae	Coleoptera	
<i>Neocoenorrhinus aequatus</i>	Rhynchitidae	Coleoptera	
<i>Nephrotoma flavipalpis</i>	Tipulidae	Diptera	
<i>Nephrotoma quadrifaria</i>	Tipulidae	Diptera	
<i>Nowickia ferox</i>	Tachinidae	Diptera	
<i>Ochlodes sylvanus</i>	Hesperiidae	Lepidoptera	

Species	Family	Order	Conservation status
<i>Ocydromia glabricula</i>	<i>Hybotidae</i>	<i>Diptera</i>	
<i>Oedemera nobilis</i>	<i>Oedemeridae</i>	<i>Coleoptera</i>	
<i>Oncotylus (Oncotylus) viridiflavus</i>	<i>Miridae</i>	<i>Hemiptera</i>	
<i>Ophonus rufibarbis</i>	<i>Carabidae</i>	<i>Coleoptera</i>	
<i>Orgyia antiqua</i>	<i>Erebidae</i>	<i>Lepidoptera</i>	
<i>Orthetrum cancellatum</i>	<i>Libellulidae</i>	<i>Odonata</i>	
<i>Orthops (Orthops) basalis</i>	<i>Miridae</i>	<i>Hemiptera</i>	
<i>Oxystoma cerdo</i>	<i>Apionidae</i>	<i>Coleoptera</i>	Notable b*
<i>Panorpa communis</i>	<i>Panorpidae</i>	<i>Mecoptera</i>	
<i>Pararge aegeria</i>	<i>Nymphalidae</i>	<i>Lepidoptera</i>	
<i>Passaloecus singularis</i>	<i>Crabronidae</i>	<i>Hymenoptera</i>	
<i>Pentatoma rufipes</i>	<i>Pentatomidae</i>	<i>Hemiptera</i>	
<i>Phaonia subventa</i>	<i>Muscidae</i>	<i>Diptera</i>	
<i>Phasia pusilla</i>	<i>Tachinidae</i>	<i>Diptera</i>	
<i>Philonthus succicola</i>	<i>Staphylinidae</i>	<i>Coleoptera</i>	
<i>Pholidoptera griseoptera</i>	<i>Tettigoniidae</i>	<i>Orthoptera</i>	
<i>Phorocera obscura</i>	<i>Tachinidae</i>	<i>Diptera</i>	
<i>Phylus (Phylus) coryli</i>	<i>Miridae</i>	<i>Hemiptera</i>	
<i>Phytocoris (Ktenocoris) ulmi</i>	<i>Miridae</i>	<i>Hemiptera</i>	
<i>Pieris brassicae</i>	<i>Pieridae</i>	<i>Lepidoptera</i>	
<i>Pieris napi</i>	<i>Pieridae</i>	<i>Lepidoptera</i>	
<i>Pipizella viduata</i>	<i>Syrphidae</i>	<i>Diptera</i>	
<i>Plagiognathus (Plagiognathus) arbustorum</i>	<i>Miridae</i>	<i>Hemiptera</i>	
<i>Platycheirus albimanus</i>	<i>Syrphidae</i>	<i>Diptera</i>	
<i>Platydracus latebricola</i>	<i>Staphylinidae</i>	<i>Coleoptera</i>	Notable b

Species	Family	Order	Conservation status
<i>Poecilus cupreus</i>	<i>Carabidae</i>	<i>Coleoptera</i>	
<i>Polydrusus pterygomalis</i>	<i>Curculionidae</i>	<i>Coleoptera</i>	
<i>Polygonia c-album</i>	<i>Nymphalidae</i>	<i>Lepidoptera</i>	
<i>Polymerus (Polymerus) nigrita</i>	<i>Miridae</i>	<i>Hemiptera</i>	
<i>Polyommatus icarus</i>	<i>Lycaenidae</i>	<i>Lepidoptera</i>	
<i>Propylea quattuordecimpunctata</i>	<i>Coccinellidae</i>	<i>Coleoptera</i>	
<i>Psallus (Hylopsallus) perrisi</i>	<i>Miridae</i>	<i>Hemiptera</i>	
<i>Psenulus pallipes</i>	<i>Crabronidae</i>	<i>Hymenoptera</i>	
<i>Pterostichus macer</i>	<i>Carabidae</i>	<i>Coleoptera</i>	
<i>Pterostichus madidus</i>	<i>Carabidae</i>	<i>Coleoptera</i>	
<i>Pterostichus niger</i>	<i>Carabidae</i>	<i>Coleoptera</i>	
<i>Pyrochroa serraticornis</i>	<i>Pyrochroidae</i>	<i>Coleoptera</i>	
<i>Pyronia tithonus</i>	<i>Nymphalidae</i>	<i>Lepidoptera</i>	
<i>Rhagio scolopaceus</i>	<i>Rhagionidae</i>	<i>Diptera</i>	
<i>Rhagio tringarius</i>	<i>Rhagionidae</i>	<i>Diptera</i>	
<i>Rhagonycha testacea</i>	<i>Cantharidae</i>	<i>Coleoptera</i>	
<i>Rhamphomyia crassirostris</i>	<i>Empididae</i>	<i>Diptera</i>	
<i>Rhamphomyia maculipennis</i>	<i>Empididae</i>	<i>Diptera</i>	
<i>Rhingia rostrata</i>	<i>Syrphidae</i>	<i>Diptera</i>	
<i>Rutpela maculata</i>	<i>Cerambycidae</i>	<i>Coleoptera</i>	
<i>Sicus ferrugineus</i>	<i>Conopidae</i>	<i>Diptera</i>	
<i>Silpha atrata</i>	<i>Silphidae</i>	<i>Coleoptera</i>	
<i>Siphona cristata</i>	<i>Tachinidae</i>	<i>Diptera</i>	
<i>Sitona lineatus</i>	<i>Curculionidae</i>	<i>Coleoptera</i>	
<i>Speyeria aglaja</i>	<i>Nymphalidae</i>	<i>Lepidoptera</i>	

Species	Family	Order	Conservation status
<i>Sphaerophoria scripta</i>	Syrphidae	Diptera	
<i>Stenocorus meridianus</i>	Cerambycidae	Coleoptera	
<i>Stenodema</i> (<i>Stenodema</i>) <i>laevigata</i>	Miridae	Hemiptera	
<i>Stenotus binotatus</i>	Miridae	Hemiptera	
<i>Stenurella melanura</i>	Cerambycidae	Coleoptera	
<i>Stenus binotatus</i>	Staphylinidae	Coleoptera	
<i>Stictoleptura rubra</i>	Cerambycidae	Coleoptera	
<i>Subcoccinella vigintiquattuor punctata</i>	Coccinellidae	Coleoptera	
<i>Symmorphus bifasciatus</i>	Vespidae	Hymenoptera	
<i>Sympetrum striolatum</i>	Libellulidae	Odonata	
<i>Sympetrum striolatum</i>	Libellulidae	Odonata	
<i>Synanthedon myopaeformis</i>	Sesiidae	Lepidoptera	
<i>Syritta pipiens</i>	Syrphidae	Diptera	
<i>Syrphus torvus</i>	Syrphidae	Diptera	
<i>Tachina fera</i>	Tachinidae	Diptera	
<i>Tasgius morsitans</i>	Staphylinidae	Coleoptera	
<i>Tephritis formosa</i>	Tephritidae	Diptera	
<i>Thanatophilus sinuatus</i>	Silphidae	Coleoptera	
<i>Thymelicus lineola</i>	Hesperiidae	Lepidoptera	
<i>Tipula fascipennis</i>	Tipulidae	Diptera	
<i>Tipula lunata</i>	Tipulidae	Diptera	
<i>Tipula paludosa</i>	Tipulidae	Diptera	
<i>Tyria jacobaeae</i>	Erebidae	Lepidoptera	S41 Species – research only
<i>Urophora jaceana</i>	Tephritidae	Diptera	
<i>Vanessa atalanta</i>	Nymphalidae	Lepidoptera	

Species	Family	Order	Conservation status
<i>Variimorda villosa</i>	<i>Mordellidae</i>	<i>Coleoptera</i>	Nationally Scarce
<i>Vespa crabro</i>	<i>Vespidae</i>	<i>Hymenoptera</i>	
<i>Vespula germanica</i>	<i>Vespidae</i>	<i>Hymenoptera</i>	
<i>Vespula vulgaris</i>	<i>Vespidae</i>	<i>Hymenoptera</i>	
<i>Volucella bombylans</i>	<i>Syrphidae</i>	<i>Diptera</i>	
<i>Volucella pellucens</i>	<i>Syrphidae</i>	<i>Diptera</i>	
<i>Xanthandrus comtus</i>	<i>Syrphidae</i>	<i>Diptera</i>	
<i>Xylota segnis</i>	<i>Syrphidae</i>	<i>Diptera</i>	
<i>Xylota sylvarum</i>	<i>Syrphidae</i>	<i>Diptera</i>	
<i>Zaenaga geranii</i>	<i>Curculionidae</i>	<i>Coleoptera</i>	

*Widely accepted as being much more common than this status suggests; likely to be downgraded.

Table 12.3. Invertebrates recorded in Collyweston Great Wood in 2020.

Species	Family	Order	Conservation status
<i>Acanthosoma haemorrhoidale</i>	<i>Acanthosomatidae</i>	<i>Hemiptera</i>	
<i>Adalia decempunctata</i>	<i>Coccinellidae</i>	<i>Coleoptera</i>	
<i>Agrilus sulcicollis</i>	<i>Buprestidae</i>	<i>Coleoptera</i>	
<i>Agriotes obscurus</i>	<i>Elateridae</i>	<i>Coleoptera</i>	
<i>Agriotes pallidulus</i>	<i>Elateridae</i>	<i>Coleoptera</i>	
<i>Ampedus quercicola</i>	<i>Elateridae</i>	<i>Coleoptera</i>	Notable b
<i>Anaglyptus mysticus</i>	<i>Cerambycidae</i>	<i>Coleoptera</i>	Notable b
<i>Anax imperator</i>	<i>Aeshnidae</i>	<i>Odonata</i>	
<i>Andrena bicolor</i>	<i>Andrenidae</i>	<i>Hymenoptera</i>	
<i>Andrena cineraria</i>	<i>Andrenidae</i>	<i>Hymenoptera</i>	
<i>Andrena minutula</i>	<i>Andrenidae</i>	<i>Hymenoptera</i>	
<i>Anomoia purmunda</i>	<i>Tephritidae</i>	<i>Diptera</i>	
<i>Antherophagus pallens</i>	<i>Cryptophagidae</i>	<i>Coleoptera</i>	
<i>Anthonomus rubi</i>	<i>Curculionidae</i>	<i>Coleoptera</i>	

Species	Family	Order	Conservation status
<i>Aphantopus hyperantus</i>	<i>Nymphalidae</i>	<i>Lepidoptera</i>	
<i>Apteropeda orbiculata</i>	<i>Chrysomelidae</i>	<i>Coleoptera</i>	
<i>Arachnospila spissa</i>	<i>Pompilidae</i>	<i>Hymenoptera</i>	
<i>Argynnis paphia</i>	<i>Nymphalidae</i>	<i>Lepidoptera</i>	
<i>Argyra argentina</i>	<i>Dolichopodidae</i>	<i>Diptera</i>	
<i>Argyra atriceps</i>	<i>Dolichopodidae</i>	<i>Diptera</i>	Nationally Scarce
<i>Aspidiphorus orbiculatus</i>	<i>Sphindidae</i>	<i>Coleoptera</i>	
<i>Athous bicolor</i>	<i>Elateridae</i>	<i>Coleoptera</i>	
<i>Athous haemorrhoidalis</i>	<i>Elateridae</i>	<i>Coleoptera</i>	
<i>Attelabus nitens</i>	<i>Attelabidae</i>	<i>Coleoptera</i>	
<i>Auplopus carbonarius</i>	<i>Pompilidae</i>	<i>Hymenoptera</i>	Notable b
<i>Baccha elongata</i>	<i>Syrphidae</i>	<i>Diptera</i>	
<i>Bicellaria nigra</i>	<i>Hybotidae</i>	<i>Diptera</i>	
<i>Bombus sylvestris</i>	<i>Apidae</i>	<i>Hymenoptera</i>	
<i>Caliadurgus fasciatellus</i>	<i>Pompilidae</i>	<i>Hymenoptera</i>	
<i>Calliopum geniculatum</i>	<i>Lauxaniidae</i>	<i>Diptera</i>	
<i>Cantharis rustica</i>	<i>Cantharidae</i>	<i>Coleoptera</i>	
<i>Carabus nemoralis</i>	<i>Carabidae</i>	<i>Coleoptera</i>	
<i>Ceutorhynchus obstrictus</i>	<i>Curculionidae</i>	<i>Coleoptera</i>	
<i>Chaetocnema picipes</i>	<i>Chrysomelidae</i>	<i>Coleoptera</i>	
<i>Cheilosia variabilis</i>	<i>Syrphidae</i>	<i>Diptera</i>	
<i>Chilocorus renipustulatus</i>	<i>Coccinellidae</i>	<i>Coleoptera</i>	
<i>Choerades marginatus</i>	<i>Asilidae</i>	<i>Diptera</i>	
<i>Chorisops tibialis</i>	<i>Stratiomyidae</i>	<i>Diptera</i>	
<i>Chrysopilus asiliformis</i>	<i>Rhagionidae</i>	<i>Diptera</i>	

Species	Family	Order	Conservation status
<i>Chrysops relictus</i>	<i>Tabanidae</i>	<i>Diptera</i>	
<i>Chrysotoxum bicinctum</i>	<i>Syrphidae</i>	<i>Diptera</i>	
<i>Chrysotoxum verralli</i>	<i>Syrphidae</i>	<i>Diptera</i>	
<i>Clivina fossor</i>	<i>Carabidae</i>	<i>Coleoptera</i>	
<i>Closterotomus fulvomaculatus</i>	<i>Miridae</i>	<i>Hemiptera</i>	
<i>Closterotomus trivialis</i>	<i>Miridae</i>	<i>Hemiptera</i>	
<i>Clytus arietis</i>	<i>Cerambycidae</i>	<i>Coleoptera</i>	
<i>Coelioxys elongata</i>	<i>Megachilidae</i>	<i>Hymenoptera</i>	
<i>Coenagrion puella</i>	<i>Coenagrionidae</i>	<i>Odonata</i>	
<i>Colias croceus</i>	<i>Pieridae</i>	<i>Lepidoptera</i>	
<i>Corizus hyoscyami</i>	<i>Rhopalidae</i>	<i>Hemiptera</i>	
<i>Crepidodera aurea</i>	<i>Chrysomelidae</i>	<i>Coleoptera</i>	
<i>Crossocerus cetratus</i>	<i>Crabronidae</i>	<i>Hymenoptera</i>	
<i>Crossocerus megacephalus</i>	<i>Crabronidae</i>	<i>Hymenoptera</i>	
<i>Cyphon ochraceus</i>	<i>Scirtidae</i>	<i>Coleoptera</i>	
<i>Dalopius marginatus</i>	<i>Elateridae</i>	<i>Coleoptera</i>	
<i>Denticollis linearis</i>	<i>Elateridae</i>	<i>Coleoptera</i>	
<i>Deraeocoris (Deraeocoris) ruber</i>	<i>Miridae</i>	<i>Hemiptera</i>	
<i>Dictya umbrarum</i>	<i>Sciomyzidae</i>	<i>Diptera</i>	Notable
<i>Dioctria linearis</i>	<i>Asilidae</i>	<i>Diptera</i>	
<i>Diodontus minutus</i>	<i>Crabronidae</i>	<i>Hymenoptera</i>	
<i>Diogma glabrata</i>	<i>Cylindrotomidae</i>	<i>Diptera</i>	Notable
<i>Dipogon subintermedius</i>	<i>Pompilidae</i>	<i>Hymenoptera</i>	
<i>Dolichopus festivus</i>	<i>Dolichopodidae</i>	<i>Diptera</i>	
<i>Dolichopus griseipennis</i>	<i>Dolichopodidae</i>	<i>Diptera</i>	

Species	Family	Order	Conservation status
<i>Dolichopus simplex</i>	<i>Dolichopodidae</i>	<i>Diptera</i>	
<i>Dolichopus trivialis</i>	<i>Dolichopodidae</i>	<i>Diptera</i>	
<i>Dolichopus wahlbergi</i>	<i>Dolichopodidae</i>	<i>Diptera</i>	
<i>Dorcatoma dresdensis</i>	<i>Anobiidae</i>	<i>Coleoptera</i>	Nationally Scarce
<i>Ectemnius cavifrons</i>	<i>Crabronidae</i>	<i>Hymenoptera</i>	
<i>Ectemnius continuus</i>	<i>Crabronidae</i>	<i>Hymenoptera</i>	
<i>Empis livida</i>	<i>Empididae</i>	<i>Diptera</i>	
<i>Empis lutea</i>	<i>Empididae</i>	<i>Diptera</i>	
<i>Empis nigritarsis</i>	<i>Empididae</i>	<i>Diptera</i>	
<i>Empis tessellata</i>	<i>Empididae</i>	<i>Diptera</i>	
<i>Empis trigramma</i>	<i>Empididae</i>	<i>Diptera</i>	
<i>Epiphragma ocellare</i>	<i>Limoniidae</i>	<i>Diptera</i>	
<i>Eriothrix rufomaculata</i>	<i>Tachinidae</i>	<i>Diptera</i>	
<i>Eristalis pertinax</i>	<i>Syrphidae</i>	<i>Diptera</i>	
<i>Eurithia anthophila</i>	<i>Tachinidae</i>	<i>Diptera</i>	
<i>Eurydema (Eurydema) oleracea</i>	<i>Pentatomidae</i>	<i>Hemiptera</i>	
<i>Formica fusca</i>	<i>Formicidae</i>	<i>Hymenoptera</i>	
<i>Gauropterus fulgidus</i>	<i>Staphylinidae</i>	<i>Coleoptera</i>	
<i>Glischrochilus hortensis</i>	<i>Nitidulidae</i>	<i>Coleoptera</i>	
<i>Gnathoncus buyssoni</i>	<i>Histeridae</i>	<i>Coleoptera</i>	Nationally Scarce
<i>Gonepteryx rhamni</i>	<i>Pieridae</i>	<i>Lepidoptera</i>	
<i>Grammoptera ruficornis</i>	<i>Cerambycidae</i>	<i>Coleoptera</i>	
<i>Grypocoris (Lophyromiris) stysi</i>	<i>Miridae</i>	<i>Hemiptera</i>	
<i>Halictus rubicundus</i>	<i>Halictidae</i>	<i>Hymenoptera</i>	
<i>Haploglossa gentilis</i>	<i>Staphylinidae</i>	<i>Coleoptera</i>	

Species	Family	Order	Conservation status
<i>Helophilus pendulus</i>	<i>Syrphidae</i>	<i>Diptera</i>	
<i>Herina lugubris</i>	<i>Ulidiidae</i>	<i>Diptera</i>	
<i>Hilara lugubris</i>	<i>Empididae</i>	<i>Diptera</i>	Locally Rare*; NS
<i>Himacerus</i> (<i>Himacerus</i>) <i>apterus</i>	<i>Nabidae</i>	<i>Hemiptera</i>	
<i>Hybomitra bimaculata</i>	<i>Tabanidae</i>	<i>Diptera</i>	
<i>Hybos femoratus</i>	<i>Hybotidae</i>	<i>Diptera</i>	
<i>Hybos grossipes</i>	<i>Hybotidae</i>	<i>Diptera</i>	
<i>Hylaeus confusus</i>	<i>Colletidae</i>	<i>Hymenoptera</i>	
<i>Hylaeus hyalinatus</i>	<i>Colletidae</i>	<i>Hymenoptera</i>	
<i>Hylesinus toranio</i>	<i>Curculionidae</i>	<i>Coleoptera</i>	
<i>Imantimyia fulviventris</i>	<i>Psilidae</i>	<i>Diptera</i>	
<i>Kleidocerys resedae</i>	<i>Lygaeidae</i>	<i>Hemiptera</i>	
<i>Lasioglossum calceatum</i>	<i>Halictidae</i>	<i>Hymenoptera</i>	
<i>Lasioglossum fulvicorne</i>	<i>Halictidae</i>	<i>Hymenoptera</i>	
<i>Leptogaster cylindrica</i>	<i>Asilidae</i>	<i>Diptera</i>	
<i>Leptophyes punctatissima</i>	<i>Phaneropteridae</i>	<i>Orthoptera</i>	
<i>Leptura quadrifasciata</i>	<i>Cerambycidae</i>	<i>Coleoptera</i>	
<i>Libellula quadrimaculata</i>	<i>Libellulidae</i>	<i>Odonata</i>	
<i>Limenitis camilla</i>	<i>Nymphalidae</i>	<i>Lepidoptera</i>	S41 Species; VU
<i>Limonia nubeculosa</i>	<i>Limoniidae</i>	<i>Diptera</i>	
<i>Limonia phragmitidis</i>	<i>Limoniidae</i>	<i>Diptera</i>	
<i>Longitarsus parvulus</i>	<i>Chrysomelidae</i>	<i>Coleoptera</i>	
<i>Lucilia silvarum</i>	<i>Calliphoridae</i>	<i>Diptera</i>	
<i>Lydella stabulans</i>	<i>Tachinidae</i>	<i>Diptera</i>	
<i>Machimus cingulatus</i>	<i>Asilidae</i>	<i>Diptera</i>	

Species	Family	Order	Conservation status
<i>Malachius bipustulatus</i>	<i>Malachiidae</i>	<i>Coleoptera</i>	
<i>Malthinus seriepunctatus</i>	<i>Cantharidae</i>	<i>Coleoptera</i>	
<i>Maniola jurtina</i>	<i>Nymphalidae</i>	<i>Lepidoptera</i>	
<i>Meconema thalassinum</i>	<i>Meconematidae</i>	<i>Orthoptera</i>	
<i>Megachile ligniseca</i>	<i>Megachilidae</i>	<i>Hymenoptera</i>	
<i>Megaloceroea recticornis</i>	<i>Miridae</i>	<i>Hemiptera</i>	
<i>Megamerina dolium</i>	<i>Megamerinidae</i>	<i>Diptera</i>	Provisionally Nationally Scarce
<i>Meiosimyza rorida</i>	<i>Lauxaniidae</i>	<i>Diptera</i>	
<i>Melandrya caraboides</i>	<i>Melandryidae</i>	<i>Coleoptera</i>	
<i>Melanostoma mellinum</i>	<i>Syrphidae</i>	<i>Diptera</i>	
<i>Melanostoma scalare</i>	<i>Syrphidae</i>	<i>Diptera</i>	
<i>Melanotus villosus</i>	<i>Elateridae</i>	<i>Coleoptera</i>	
<i>Meligethes aeneus</i>	<i>Nitidulidae</i>	<i>Coleoptera</i>	
<i>Metatropis rufescens</i>	<i>Berytidae</i>	<i>Hemiptera</i>	
<i>Microcara testacea</i>	<i>Scirtidae</i>	<i>Coleoptera</i>	
<i>Minettia fasciata</i>	<i>Lauxaniidae</i>	<i>Diptera</i>	
<i>Minettia longipennis</i>	<i>Lauxaniidae</i>	<i>Diptera</i>	
<i>Musca autumnalis</i>	<i>Muscidae</i>	<i>Diptera</i>	
<i>Myathropa florea</i>	<i>Syrphidae</i>	<i>Diptera</i>	
<i>Mycetophagus quadripustulatus</i>	<i>Mycetophagidae</i>	<i>Coleoptera</i>	
<i>Nabis (Nabis) ferus</i>	<i>Nabidae</i>	<i>Hemiptera</i>	
<i>Nabis (Nabis) rugosus</i>	<i>Nabidae</i>	<i>Hemiptera</i>	
<i>Nephrotoma quadrifaria</i>	<i>Tipulidae</i>	<i>Diptera</i>	
<i>Nomada fabriciana</i>	<i>Apidae</i>	<i>Hymenoptera</i>	

Species	Family	Order	Conservation status
<i>Nomada flava</i>	<i>Apidae</i>	<i>Hymenoptera</i>	
<i>Nomada flavoguttata</i>	<i>Apidae</i>	<i>Hymenoptera</i>	
<i>Notostira elongata</i>	<i>Miridae</i>	<i>Hemiptera</i>	
<i>Ochlodes sylvanus</i>	<i>Hesperiidae</i>	<i>Lepidoptera</i>	
<i>Orgyia antiqua</i>	<i>Erebidae</i>	<i>Lepidoptera</i>	
<i>Oulema melanopus s.l.</i>	<i>Chrysomelidae</i>	<i>Coleoptera</i>	
<i>Pachygaster leachii</i>	<i>Stratiomyidae</i>	<i>Diptera</i>	
<i>Panorpa communis</i>	<i>Panorpidae</i>	<i>Mecoptera</i>	
<i>Panorpa germanica</i>	<i>Panorpidae</i>	<i>Mecoptera</i>	
<i>Pararge aegeria</i>	<i>Nymphalidae</i>	<i>Lepidoptera</i>	
<i>Passaloecus gracilis</i>	<i>Crabronidae</i>	<i>Hymenoptera</i>	
<i>Pentatoma rufipes</i>	<i>Pentatomidae</i>	<i>Hemiptera</i>	
<i>Peplomyza litura</i>	<i>Lauxaniidae</i>	<i>Diptera</i>	
<i>Phaonia subventa</i>	<i>Muscidae</i>	<i>Diptera</i>	
<i>Pholidoptera griseoptera</i>	<i>Tettigoniidae</i>	<i>Orthoptera</i>	
<i>Phyllotreta vittula</i>	<i>Chrysomelidae</i>	<i>Coleoptera</i>	
<i>Pieris brassicae</i>	<i>Pieridae</i>	<i>Lepidoptera</i>	
<i>Pieris napi</i>	<i>Pieridae</i>	<i>Lepidoptera</i>	
<i>Pieris rapae</i>	<i>Pieridae</i>	<i>Lepidoptera</i>	
<i>Platycheirus albimanus</i>	<i>Syrphidae</i>	<i>Diptera</i>	
<i>Platynus assimilis</i>	<i>Carabidae</i>	<i>Coleoptera</i>	
<i>Platypus cylindrus</i>	<i>Platypodidae</i>	<i>Coleoptera</i>	Notable b*
<i>Platystomos albinus</i>	<i>Anthribidae</i>	<i>Coleoptera</i>	Notable b*
<i>Poecilobothrus nobilitatus</i>	<i>Dolichopodidae</i>	<i>Diptera</i>	
<i>Polydrusus pterygomalis</i>	<i>Curculionidae</i>	<i>Coleoptera</i>	
<i>Polygonia c-album</i>	<i>Nymphalidae</i>	<i>Lepidoptera</i>	
<i>Portevinia maculata</i>	<i>Syrphidae</i>	<i>Diptera</i>	

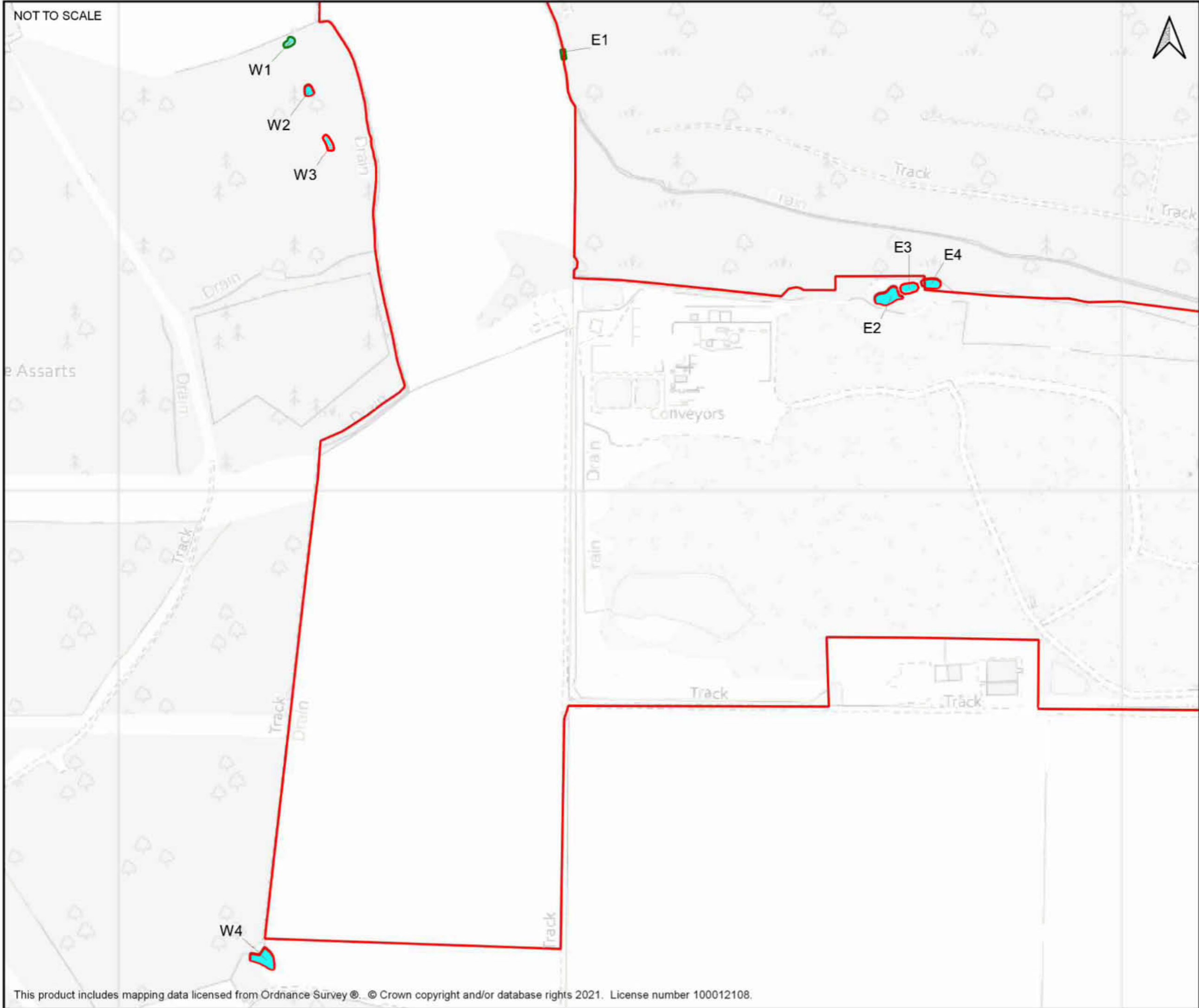
Species	Family	Order	Conservation status
<i>Propylea quattuordecimpunctata</i>	Coccinellidae	Coleoptera	
<i>Psylliodes chrysocephala</i>	Chrysomelidae	Coleoptera	
<i>Ptilinus pectinicornis</i>	Anobiidae	Coleoptera	
<i>Pyronia tithonus</i>	Nymphalidae	Lepidoptera	
<i>Rhagio tringarius</i>	Rhagionidae	Diptera	
<i>Rhagium mordax</i>	Cerambycidae	Coleoptera	
<i>Rhagonycha lignosa</i>	Cantharidae	Coleoptera	
<i>Rhagonycha limbata</i>	Cantharidae	Coleoptera	
<i>Rhingia rostrata</i>	Syrphidae	Diptera	
<i>Rhinophora lepida</i>	Rhinophoridae	Diptera	
<i>Rutpela maculata</i>	Cerambycidae	Coleoptera	
<i>Scellus notatus</i>	Dolichopodidae	Diptera	
<i>Sciapus platypterus</i>	Dolichopodidae	Diptera	
<i>Sciodrepoides watsoni</i>	Leiodidae	Coleoptera	
<i>Silpha atrata</i>	Silphidae	Coleoptera	
<i>Sinodendron cylindricum</i>	Lucanidae	Coleoptera	
<i>Sitona lineatus</i>	Curculionidae	Coleoptera	
<i>Soronia grisea</i>	Nitidulidae	Coleoptera	
<i>Stenocorus meridianus</i>	Cerambycidae	Coleoptera	
<i>Stenodema (Stenodema) laevigata</i>	Miridae	Hemiptera	
<i>Stenurella melanura</i>	Cerambycidae	Coleoptera	
<i>Suillia variegata</i>	Heleomyzidae	Diptera	
<i>Sympetrum striolatum</i>	Libellulidae	Odonata	
<i>Sympetrum striolatum</i>	Libellulidae	Odonata	
<i>Syrphus ribesii</i>	Syrphidae	Diptera	
<i>Syrphus torvus</i>	Syrphidae	Diptera	
<i>Tachina fera</i>	Tachinidae	Diptera	

Species	Family	Order	Conservation status
<i>Tanyptera atrata</i>	<i>Tipulidae</i>	<i>Diptera</i>	Notable
<i>Tetanocera hyalipennis</i>	<i>Sciomyzidae</i>	<i>Diptera</i>	
<i>Thanasimus formicarius</i>	<i>Cleridae</i>	<i>Coleoptera</i>	
<i>Thyreocoris scarabaeoides</i>	<i>Thyreocoridae</i>	<i>Hemiptera</i>	Nationally Scarce
<i>Tillus elongatus</i>	<i>Cleridae</i>	<i>Coleoptera</i>	Nationally Scarce
<i>Tipula lunata</i>	<i>Tipulidae</i>	<i>Diptera</i>	
<i>Tipula paludosa</i>	<i>Tipulidae</i>	<i>Diptera</i>	
<i>Tomoxia bucephala</i>	<i>Mordellidae</i>	<i>Coleoptera</i>	Nationally Scarce
<i>Tricholauxania praeusta</i>	<i>Lauxaniidae</i>	<i>Diptera</i>	
<i>Trichrysis cyanea</i>	<i>Chrysididae</i>	<i>Hymenoptera</i>	
<i>Trypetoptera punctulata</i>	<i>Sciomyzidae</i>	<i>Diptera</i>	
<i>Trypoxylon attenuatum</i>	<i>Crabronidae</i>	<i>Hymenoptera</i>	
<i>Tyria jacobaeae</i>	<i>Erebidae</i>	<i>Lepidoptera</i>	S41 Species – research only
<i>Vanessa atalanta</i>	<i>Nymphalidae</i>	<i>Lepidoptera</i>	
<i>Variimorda villosa</i>	<i>Mordellidae</i>	<i>Coleoptera</i>	Nationally Scarce
<i>Vespa crabro</i>	<i>Vespidae</i>	<i>Hymenoptera</i>	
<i>Volucella inanis</i>	<i>Syrphidae</i>	<i>Diptera</i>	
<i>Xanthogramma pedissequum sensu lato</i>	<i>Syrphidae</i>	<i>Diptera</i>	
<i>Xylota segnis</i>	<i>Syrphidae</i>	<i>Diptera</i>	
<i>Xylota sylvarum</i>	<i>Syrphidae</i>	<i>Diptera</i>	
<i>Zicrona caerulea</i>	<i>Pentatomidae</i>	<i>Hemiptera</i>	

*Widely accepted as being much more common than this status suggests; likely to be downgraded.

KEY

-  Site boundary
-  Great crested newts not present
-  Great crested newts present



SITE NAME:
ENRMF Western Extension.

DRAWING TITLE:
Location of ponds surveyed and results from 2019 and 2020.

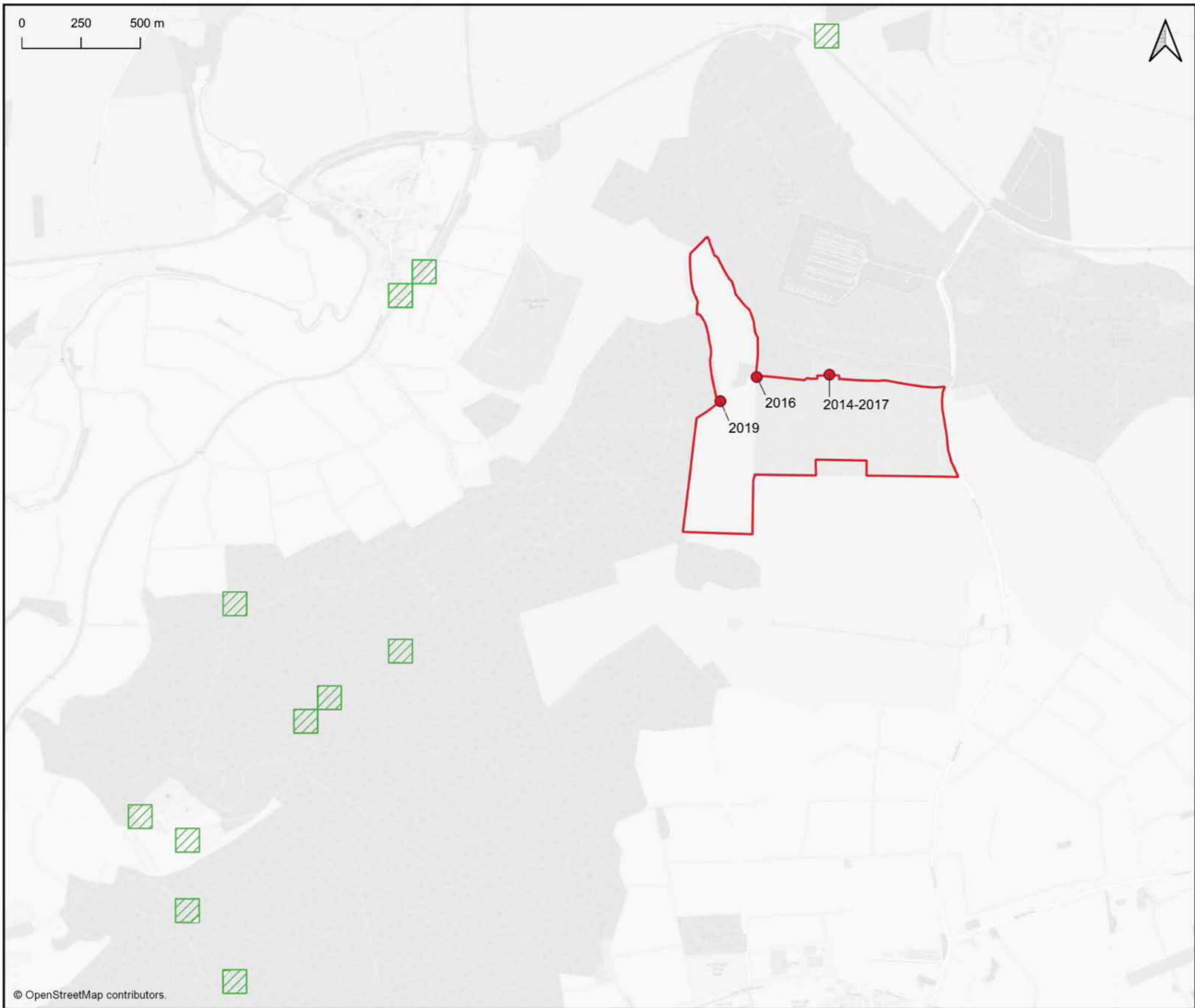
Figure 5.1
Dwg no.: 118-L049-027 Date: Mar 2021



KEY

- Site boundary
- Adder record (ESL sightings)
- ▨ Adder record 100m atlas (NBRC, 2006-2017)

0 250 500 m



SITE NAME:
ENRMF Western Extension.

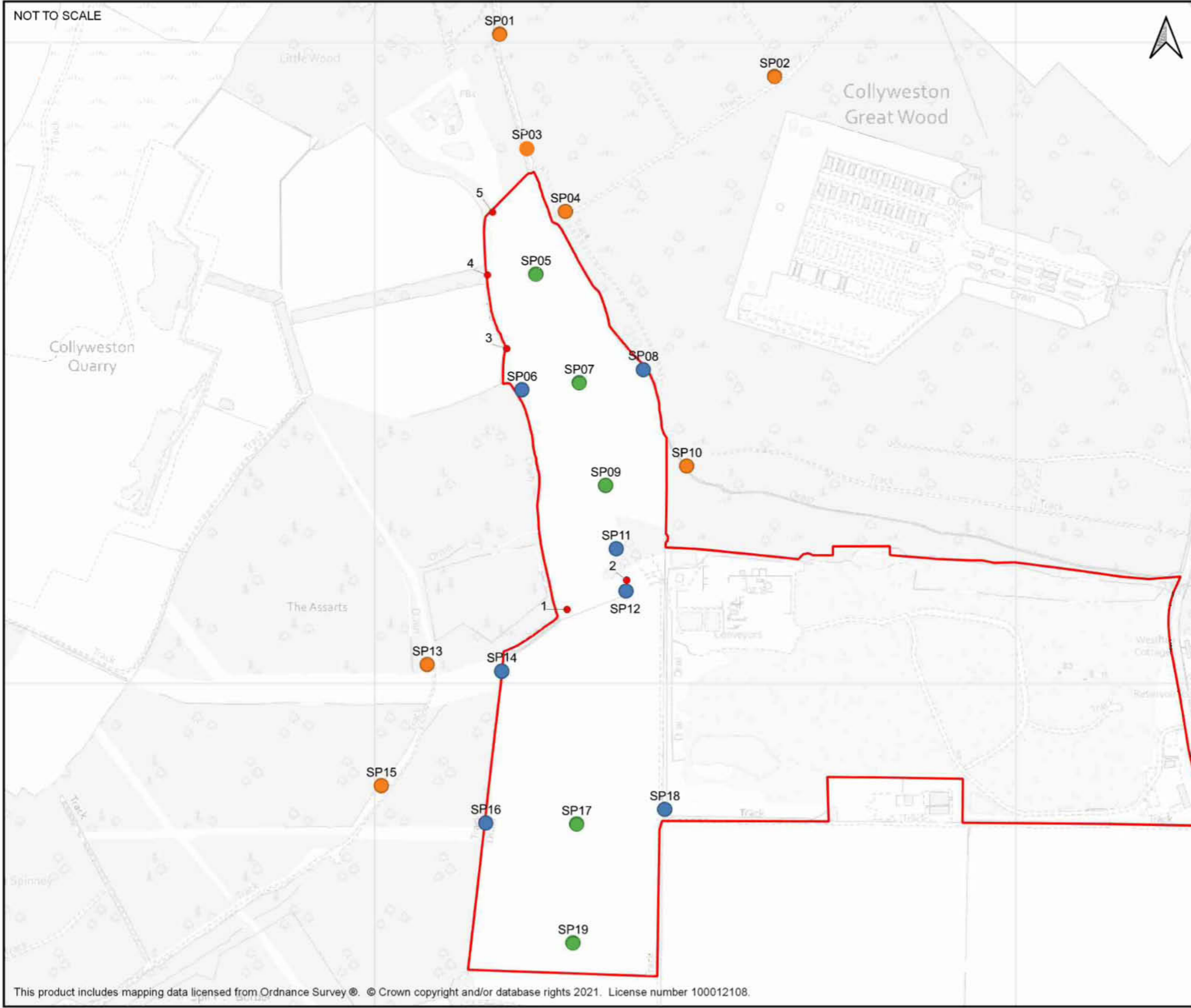
DRAWING TITLE:
Adder records.

Figure 6.1
Dwg no.: 118-L049-015 Date: Feb 2021



KEY

- Edge/linear habitat
- Open habitat
- Adjacent habitat
- Back from the Brink
- Site boundary



NOT TO SCALE

SITE NAME:
ENRMF Western Extension.

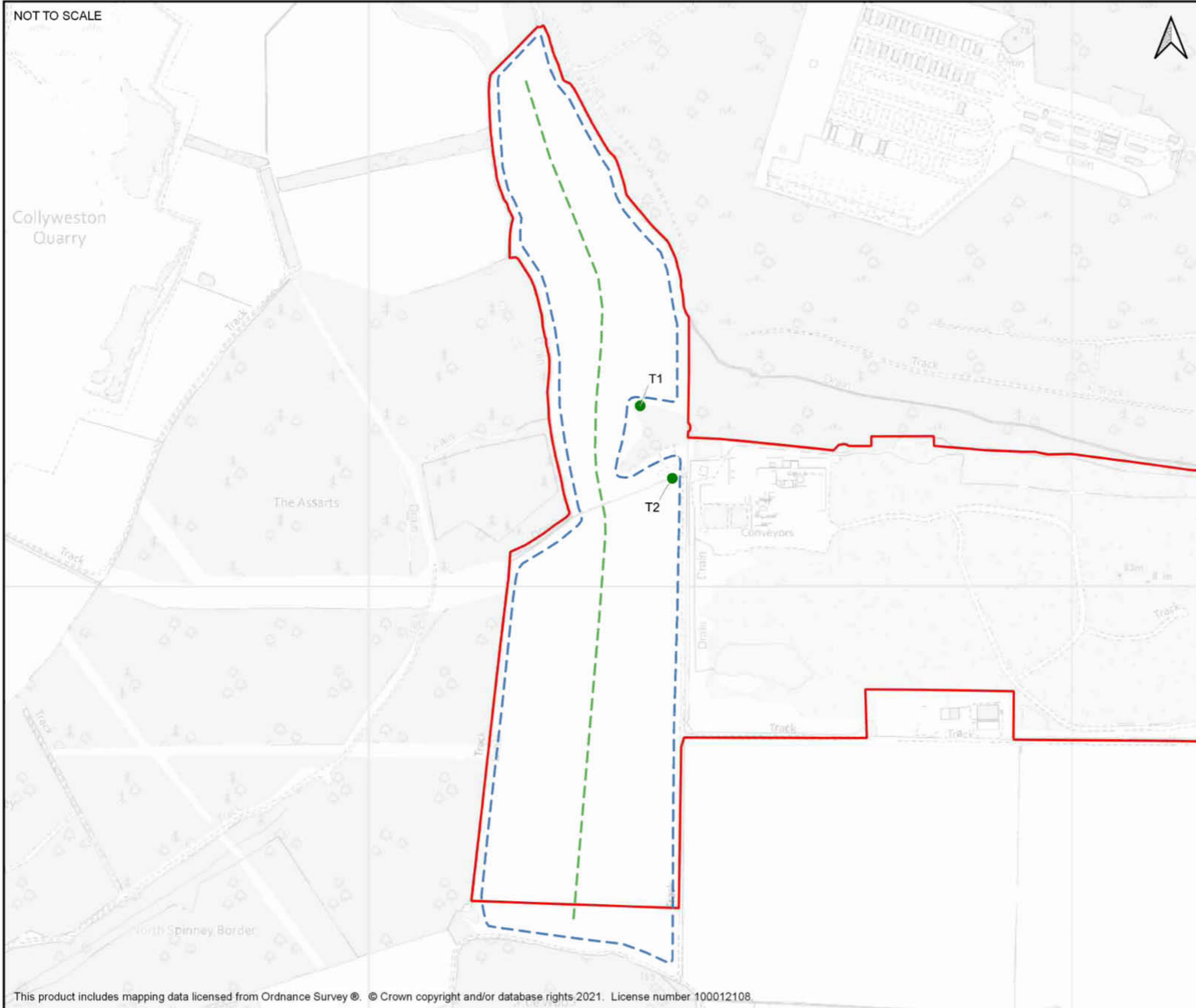
DRAWING TITLE:
Location of static ultrasound recorders.

Figure 8.1
Dwg no.: 118-L049-024 Date: Mar 2021



KEY

- Site boundary
- - - Surveyor one transect route
- - - Surveyor two transect route



SITE NAME:
ENRMF Western Extension.

DRAWING TITLE:
Bat transect routes.

Figure 8.2
Dwg no.: 118-L049-023 Date: Mar 2021



**TECHNICAL APPENDIX 2,
ARBORICULTURAL IMPACT
ASSESSMENT:
EAST NORTANTS RESOURCE
MANAGEMENT FACILITY PROPOSED
WESTERN EXTENSION**

**Final
July 2021**

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FIGURES

- 1 Tree protection plan.

EXECUTIVE SUMMARY

ESL (Ecological Services) Limited (ESL) has been commissioned to undertake an Arboricultural Impact Assessment for the proposed Western Extension to the East Northants Resource Management Facility (ENRMF). For the purposes of this assessment, the proposed Western Extension is known as 'the Site'.

The survey was carried out on 26th September 2019.

East Northamptonshire Council's website was used to confirm there are no Tree Preservation Orders (TPOs) or Conservation Areas on the Site. Natural England's GIS datasets were used to confirm there are no statutory sites within the boundary of the proposed works. The Collyweston Great Wood and Easton Hornstocks Site of Special Scientific Interest (SSSI) and Wittering Coppice ancient and semi-natural woodland area abut the Site's north-eastern boundary.

The Site comprises arable fields with rough grassland margins and trees, tree groups and hedgerows ('stock') predominantly beyond the Site's boundaries.

The Root Protection Area (RPA) for the stock adjacent to the Site's boundaries was used to inform the location of reptile/amphibian exclusion fencing, which further separates the proposed works from this stock.

Three trees (one of which is standing deadwood), some of an area of scrub/woodland around a sinkhole on the eastern boundary of the Site and a hedgerow that runs east-west between the northern and southern fields of the Site will/may be removed. Stock beyond the Site boundary will not be impacted.

The losses on Site are minor and will be mitigated by way of post-works restoration planting and improvements to boundary features.

TECHNICAL APPENDIX 2, ARBORICULTURAL IMPACT ASSESSMENT: EAST NORTANTS RESOURCE MANAGEMENT FACILITY PROPOSED WESTERN EXTENSION

1 INTRODUCTION

1.1 SCOPE OF WORK

1.1.1 ESL has been commissioned to undertake an Arboricultural Impact Assessment for the Site west of the ENRMF at King's Cliffe, Northamptonshire. The Site is located north of Kings Cliffe, east of Duddington and south of the A47 (approximate grid reference TF0034700046).

1.1.2 This report contains:

- An Arboricultural Impact Assessment.
- A Tree Protection Plan.

1.1.3 A schedule of the stock surveyed is given as Appendix 1.

1.2 LIMITATIONS

1.2.1 ESL does not carry out soil assessments, advise on specialist construction techniques or pronounce on the health of trees beyond the initial informal visual assessment and advises the client engage a suitably qualified professional to provide these services as required.

2 SURVEY METHODOLOGY

2.1 STANDARDS AND HARDWARE USED

2.1.1 The survey was carried out within the guidelines detailed in 'BS 5837:2012 – Trees in relation to design, demolition and construction – recommendations' (hereafter, 'the Standard').

2.1.2 Tree positions were recorded using a Trimble Geo 7X (accurate to sub 500mm). Stem diameters were measured using a stem diameter tape in accordance with

Annex C of the Standard. Due to the nature of the proposed work, tree heights were not recorded.

- 2.1.3 Canopy spreads and other measurements were recorded using a tape and/or Leica DISTO D110 where practicable, otherwise by estimation (also in accordance with Section 4.4.2.6 of the Standard).
- 2.1.4 Common names are used throughout this report with scientific names given at the first instance.
- 2.1.5 Prior to the site visit, a risk assessment was undertaken by the Project Manager in order to make all fieldworkers aware of any site-specific risks and of the required safe working methods. These assessments are updated as required during the course of the survey.

3 ARBORICULTURAL IMPACT ASSESSMENT

3.1 TPO AND CONSERVATION AREAS

- 3.1.1 East Northamptonshire Council's website was consulted for information on TPOs and Conservations Areas (initial search 3rd September 2020, re-checked 8th July 2021). There are no TPOs or Conservation Areas within the red-line boundary as shown on Figure 1. The search results are given as Appendix 2.
- 3.1.2 The Collyweston Great Wood and Easton Hornstocks SSSI and National Nature Reserve (NNR) and Wittering Coppice ancient and semi-natural woodland area abut the north-eastern boundary of the Site. These are shown on Figure 1.

3.2 SURVEY RESULTS

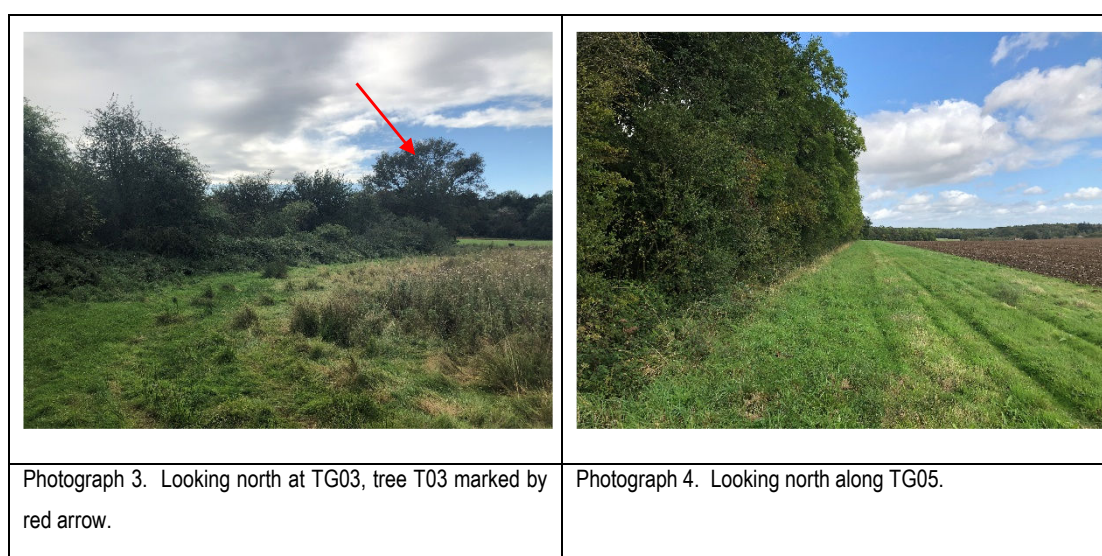
- 3.2.1 The northern and north-eastern boundaries of the Site are marked by tree groups TG01 and TG02. Both are part of Collyweston Great Wood although TG01 lies outside the SSSI/NNR. TG02 is separated by a path from TG01 and from the Site by a ditch. All of TG02 bounding the Site falls within the boundary of the ancient woodland area and with the exception of a narrow strip along the southern edge, within the boundary of the SSSI and NNR. These groups

comprise a mix including oak *Quercus robur*, ash *Fraxinus excelsior*, elm *Ulmus* sp., spindle *Euonymus europaeus*, buckthorn *Rhamnus cathartica*, hazel *Corylus avellana*, hawthorn *Crataegus monogyna*, blackthorn *Prunus spinosa*, service tree *Sorbus torminalis*, sycamore *Acer pseudoplatanus*, lime *Tilia x europaea*, apple *Malus sylvestris*, silver birch *Betula pendula* and willow *Salix* spp. (Photographs 1 and 2).



3.2.2 Trees T01, T02 and DW01 are three ash trees on the western boundary. Trees T01 and T02 are in poor condition and DW01 is standing deadwood.

3.2.3 Tree Group TG03 is located around a sink hole; it comprises a mix including T03, a mature oak that is bordering on locally-notable, hawthorn, blackthorn and elder *Sambucus nigra* scrub with occasional willow.



3.2.4 Tree groups TG04 and TG05 (The Assarts/Fineshade Woods) mark the western boundary of the Site and have a similar composition including oak, ash, hawthorn, blackthorn, spruce *Picea abies*, field maple *Acer campestre*, elm, willow, apple and dogwood *Cornus sanguinea*.

3.2.5 Hedgerow H01 (Photograph 5) connects TG01 to TG04 in the north-western corner of the Site. It is defunct with some deadwood and comprises a mix including hawthorn, buckthorn, spindle, field maple, sycamore and elder.



3.2.6 Hedgerow H02 (Photograph 6) bisects the Site at the mid-point, running east-west from the existing ENRMF to TG04. It comprises a mix including hawthorn, blackthorn, elder, wayfaring tree *Viburnum lantana*, spindle, privet *Ligustrum vulgaris*, field maple, wych elm and T04, a mature oak at the eastern end of the hedgerow.



3.2.7 Hedgerows H03 and H04 (Photographs 7 and 8 above) run along the eastern boundary of the Site and are similar in composition (although H03 is less well managed and merges with the scrub on the western boundary of the existing ENRMF), being a mix including hawthorn, blackthorn, elder, field maple, privet, ash and willow.

3.3 IMPACTS AND MITIGATION

3.3.1 The RPA of the adjacent stock (adjusted where necessary to account for canopy spread) was used to inform the location of reptile/amphibian fencing (TAF), which is often several metres beyond the RPA. This creates a Construction Exclusion Zone (CEZ) in excess of that required by the Standard, ensuring no direct impact on the adjacent stock as well as fulfilling other ecological requirements.

3.3.2 The excavation boundary for the proposed works is a minimum of 2.5m beyond the TAF, further increasing the area of undisturbed ground around the retained stock.

3.3.3 Trees T01, T02 and DW01 may be removed. As they fall within the Site's perimeter CEZ and while it may be tempting to fell these trees, the ecological value of standing deadwood must not be underestimated. The possibility of keeping these trees as monoliths, reduced to a safe height, should be explored.

3.3.4 The loss of part of TG03 (T03 will be retained if practicable), hedgerow H02 and T04 will have a minor impact on the Site's amenity value. This loss will be more than mitigated by the proposed restoration scheme.

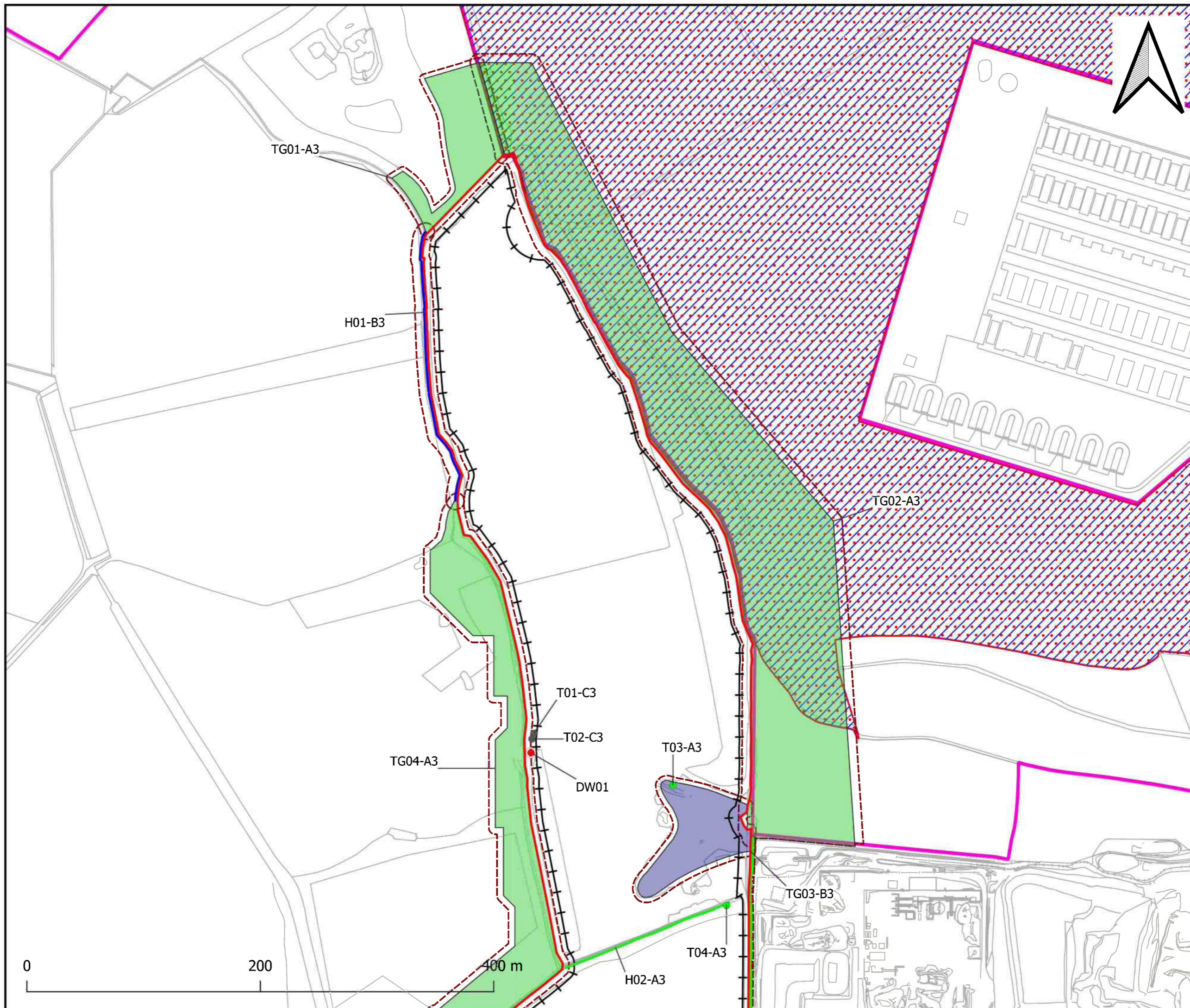
3.3.5 The following issues are beyond the scope of this survey but have been addressed prior to works commencing:

- Shading. Preliminary 3D modelling of the proposed restoration scheme (based on Figure 1b, given as Appendix 3) suggests shading of the adjacent stock will be negligible. Whilst this is not the final landform profile, the extent of the landform has not changed since Figure 1b was prepared.
- Hydrology. The client has undertaken a hydrology assessment; the results are presented in the Environmental Statement.

- Pollution. Pollution control measures are described in the Environmental Statement.

KEY

- Cat A tree
- Cat C tree
- Target note
- Proposed Western Extension boundary
- Cat A hedgerow
- Cat B hedgerow
- Protective fencing
- Cat A tree group
- Cat B tree group
- RPA/CEZ
- Ancient Woodland
- National Nature Reserve
- Site of Special Scientific Interest



SITE NAME:
ENRMF proposed Western Extension.

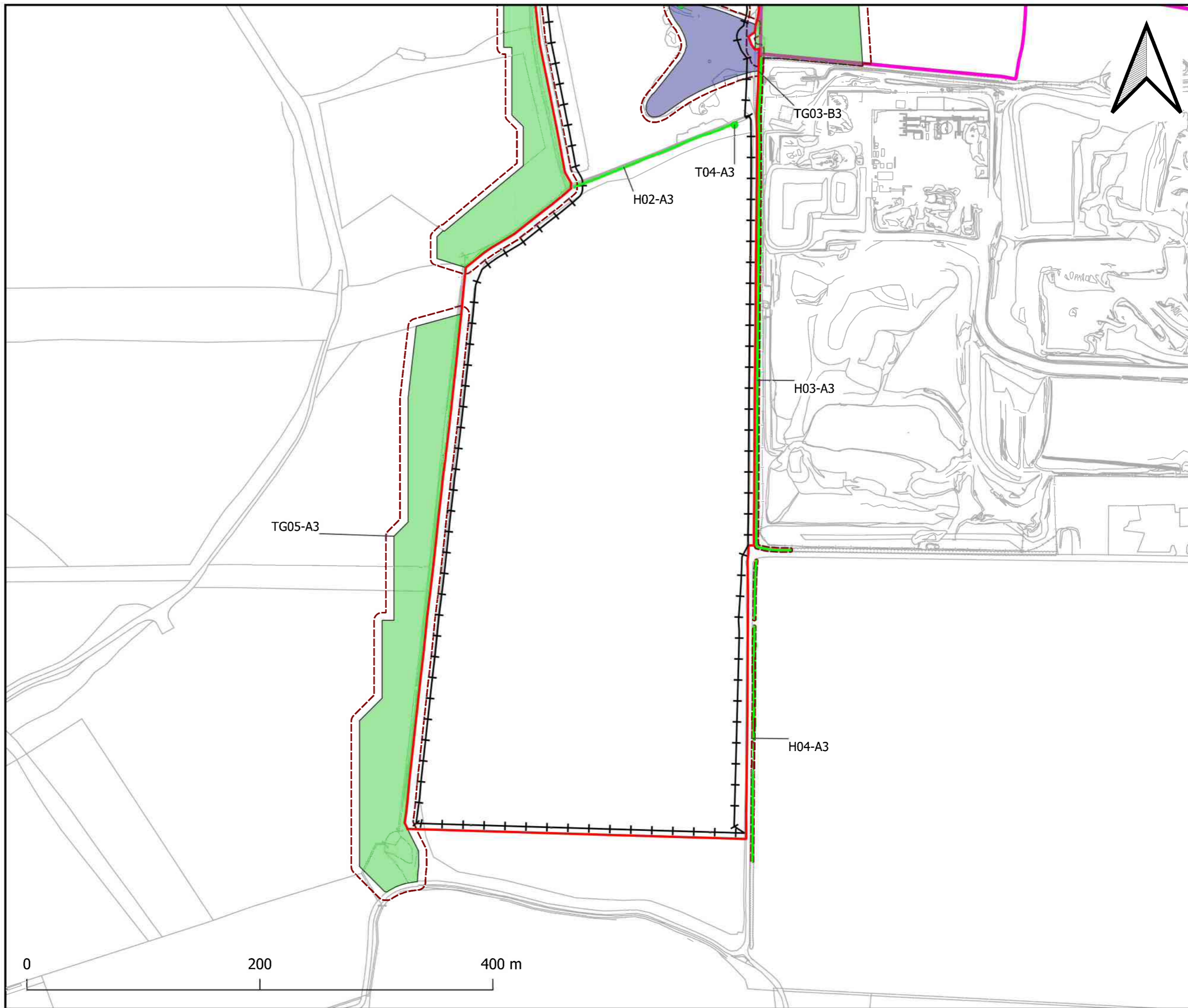
DRAWING TITLE:
Tree protection plan.

Dwg no.: 118-L049-001 Date: Jul 2021
Scale: 1:3,000 @ A3 Figure: 1-01

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KEY

- Cat A tree
- Proposed Western Extension boundary
- Cat A hedgerow
- Protective fencing
- Cat A tree group
- Cat B tree group
- RPA/CEZ
- Ancient Woodland



SITE NAME:
ENRMF proposed Western Extension.

DRAWING TITLE:
Tree protection plan.

Dwg no.: 118-L049-001 Date: Jul 2021
Scale: 1:3,000 @ A3 Figure: 1-02

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APPENDIX 1

TREE SCHEDULE

Tree number	Species	Stem type	Stem Diameter	Branch spread - North	Branch spread - East	Branch spread - South	Branch spread - West	Height above ground - First significant branch and direction	Height above ground - Canopy	Life stage	Physiological condition	Structural condition	Preliminary Management Recommendations	Estimated Remaining Contribution	Category	RPA (m)	RPA (m ²)
T01	Ash	S	500	8.00	8.00	0.00	N/A	6.5-E	6.00	Mature	Poor	Poor	None	10+	C3	6.00	113
T02	Ash	S	900	5.50	5.00	5.00	N/A	3-S	1.50	Mature	Poor	Poor	None	10+	C3	10.80	366
T03	Oak	MS	1,014	7.00	7.50	N/A	8.00	5-NW	4.00	Mature	Fair	Fair	None	40+	A3	12.00	452
T04	Oak	S	1,000	10.00	11.00	8.00	8.00	4-W	3.00	Mature	Good	Good	None	40+	A3	12.00	452

Tree group number	Species	Stem type	Stem Diameter	Branch spread	Life stage	Physiological condition	Structural condition	Preliminary Management Recommendations	Estimated Remaining Contribution	Category	RPA (m)
TG01	Ash, elm, spindle, buckthorn, hazel, hawthorn, blackthorn	S/MS	360	5.00	Mature	Good	Good	None	40+	A3	4.20
TG02	Ash, oak, sycamore, lime, service tree, hawthorn, blackthorn, apple, birch, willow	S/MS	620	7.00	Mature	Good	Good	None	40+	A3	7.50
TG03	Oak, willow, hawthorn, blackthorn, elder	S/MS	350	4.00	Mature	Good	Good	None	20+	B3	4.20
TG04	Oak, ash, hawthorn, blackthorn, spruce, field maple, elm	S/MS	460	9.00	Mature	Good	Good	None	40+	A3	5.40
TG05	Oak, willow, field maple, apple, hawthorn, blackthorn dogwood	S/MS	570	8.00	Mature	Good	Good	None	40+	A3	6.90

Hedgerow number	Species	Stem diameter (average)	Height (average)	Width (average)	Life stage	Physiological condition	Structural condition	Preliminary Management Recommendations	Estimated Remaining Contribution	Category	RPA (m)
H01	Hawthorn, buckthorn, spindle, field maple, sycamore, elder	650	Var	Var	Mature	Good	Good	None	20+	B3	7.80
H02	Hawthorn, blackthorn, elder, mayfairing, spindle, privet, field maple, oak, wych elm	110	2.00	2.00	Mature	Good	Good	None	40+	A3	1.20
H03	Hawthorn, blackthorn, willow, privet, elder, field maple	150	2.00	4.00	Mature	Good	Good	None	40+	A3	1.80
H04	Hawthorn, elder, field maple, privet, ash	100	2.00	2.00	Mature	Good	Good	None	40+	A3	1.20

Key to Tree Schedule

PHYSIOLOGICAL CONDITION

- Good – A tree in good health with no significant defects.
- Fair – A tree in generally good health that might require remediation for some issues.
- Poor – A tree in poor health having issues that cannot be remediated.
- Dead – A tree without sufficient live material to sustain life.

STRUCTURAL CONDITION

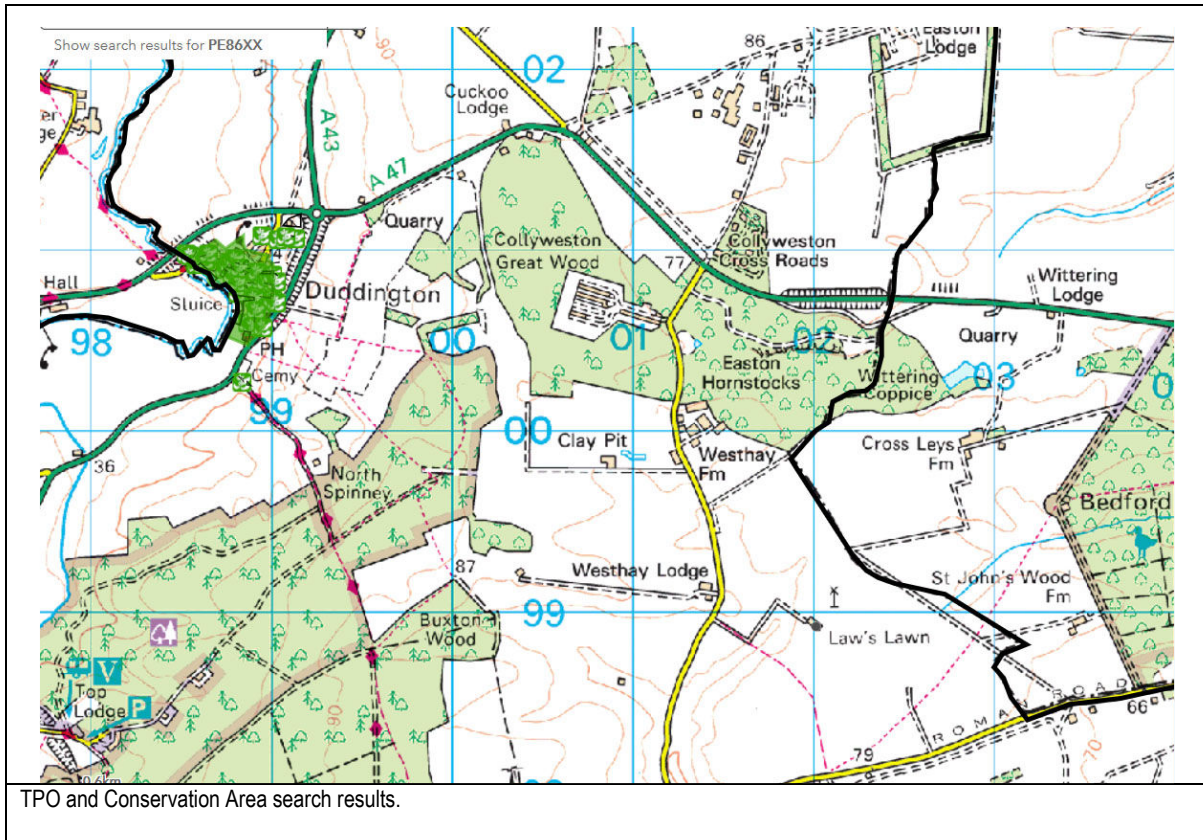
- Good – A tree with no obvious sign of defect.
- Fair – A tree with minor defects or defects that can be corrected.
- Poor – A tree with major defects or defects beyond remediation.

CATEGORY

- U - Trees unlikely to contribute beyond 10 years.
- A - Trees of HIGH quality with an estimated remaining life expectancy of at least 40 years.
- B - Trees of MODERATE quality with an estimated remaining life expectancy of at least 20 years.
- C - Trees of LOW quality with an estimated remaining life expectancy of at least 10 years or young trees with a stem diameter of less than 150mm.

APPENDIX 2

TREE PRESERVATION ORDER AND CONSERVATION AREA SEARCH RESULTS



TPO and Conservation Area search results.

APPENDIX 3

DRAWING 1B



Drawing AU/KCW/07-20-21885 - Figure 1B used for preliminary shading assessment.

**EAST NORTHANTS RESOURCE
MANAGEMENT FACILITY PROPOSED
WESTERN EXTENSION
ECOLOGICAL BASELINE -
APPENDIX 3:
BIODIVERSITY NET GAIN ASSESSMENT**

**Final
July 2021**

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FIGURES

- A3-01 Biodiversity Net Gain baseline.
- A3-02 Biodiversity Net Gain impact area.
- A3-03 Biodiversity Net Gain post-intervention.

ENRMF WESTERN EXTENSION ECOLOGICAL BASELINE - APPENDIX 3: BIODIVERSITY NET GAIN ASSESSMENT

1 INTRODUCTION

- 1.1 ESL (Ecological Services) Limited (ESL) has been commissioned by MJCA to undertake a Biodiversity Net Gain (BNG) assessment of the East Northants Resource Management Facility (ENRMF) proposed Western Extension and to compare the BNG, which would have been obtained using the approved Restoration Plan for the current ENRMF site, with the BNG provided using the new Restoration Plan.
- 1.2 The purpose of this report is to demonstrate the increased ecological value of post-intervention habitat creation and management and to maximise the development's potential to enhance local biodiversity.
- 1.3 The entire application area, consisting of both the existing ENRMF and proposed Western Extension, are referred to as the 'Site'. The term 'impact area' is used to describe the area of land directly affected by the proposed scheme and includes the working footprint and access routes.
- 1.4 The structure of the report is as follows:
- 'Baseline' - A description of the habitats currently present on the Site and an assessment of their biodiversity value, as determined by the current Defra Biodiversity Metric 3.0 methodology (Panks *et al.*, 2021)¹, hereafter referred to as 'the Metric'.

¹ Panks S, White N, Newsome A, Potter J, Heydon M, Mayhew E, Alvarez M, Russell T, Scott SJ, Heaver M, Scott SH, Treweek J, Butcher B, and Stone D. 2021. Biodiversity metric 3.0: Auditing and accounting for biodiversity – User Guide. Natural England.

- 'Pre-intervention' - A description of the habitat loss that will occur during the course of the development and the resulting loss of biodiversity if appropriate compensation habitat is not provided.
- 'Post-intervention' - An outline of the recommended habitat creation and enhancement targets that would be required to sufficiently compensate for the lost habitat so that an overall '**net gain**' in biodiversity is achieved.
- The 'phasing of impact and restoration' - An outline of how the phased works and restoration will result in BNG being delivered throughout the project.
- The 'restoration of the ENRMF' - A comparison between the old restoration plan for the existing ENRMF and the new restoration plan.

2 METHODS

2.1 DATA COLLECTION

2.1.1 A walkover was conducted on 4 December 2019 by experienced ESL ecologists in which the main habitats present were identified. Habitat data collected throughout 2018-2020 was also used to assist in characterising and condition-assessing the habitats present. Aerial photography was used to complement mapping of the habitat extents on Site.

2.1.2 The habitats were assigned a classification type using the definitions given in the UKHab Definitions document (The UK Habitat Classification Working Group, 2018)² and their condition was assessed using the Metric.

2.2 BNG ASSESSMENT

2.2.1 A complete BNG assessment of the proposed Western Extension is set out in Section 3 and modelling of how the phasing of the works will impact biodiversity loss and gain temporally can be found in Section 4. A concise comparison of

² UK Habitat Classification Working Group, 2018. UK Habitat Classification - Habitat Definitions V1.0. UK Habitat Classification Working Group.

restoration plans for the existing ENRMF, utilising the Metric to quantify biodiversity value, is detailed in Section 5.

- 2.2.2 Full descriptions of the methods used to determine the baseline state of the proposed Western Extension and of the avoidance, protection, mitigation, enhancement and restoration measures used to maximise its eventual biodiversity value are given in ESL, 2021³, including the attached Technical Appendix 1.
- 2.2.3 The Metric calculation tool was used to determine the value of the proposed Western Extension's biodiversity as Biodiversity Units (BU) and to assess the impact of the works as a loss of BU, as well as to calculate the BU delivered through the habitat creation as shown in the restoration plan.
- 2.2.4 The 'Headline Results' provided in the Metric calculation tool details the **net change** caused by the proposals. This report also sets out the **net gain** (Section 3.3.4), which is an assessment of change between the BU lost from the works and those delivered through habitat creation and enhancement measures.
- 2.2.5 Installation of fencing will delineate a 10m buffer from the Site boundary where the boundary is adjacent to woodland. This buffer will be used for habitat creation before the start of works and will be treated wholly as being enhanced to 'Lowland Meadow' to produce the post-intervention scenario.
- 2.2.6 Within the impact area, habitat described as 'Meadow' in the restoration plan has been split 50:50 between 'Lowland Meadow' and 'Lowland dry calcareous grassland' as the exact ratio of each habitat created will be dependent on soil sourcing and blending before restoration.
- 2.2.7 Swallow Brook has been categorised and assessed in the post-intervention scenario as a ditch habitat. Although the design will aim to mimic natural riverine features such as meanders and periodically-inundated areas,

³ Ecological Impact Assessment: East Northants Resource Management Facility Western Extension, Northamptonshire 2021. ESL (Ecological Services) Ltd.

conservatively it is treated as a man-made watercourse for the purpose of land drainage.

3 RESULTS

3.1 BASELINE

3.1.1 The proposed Western Extension was found to contain four habitat types and two hedgerow types. These covered an area of 26.17ha and a length of 0.51km, providing 59.94BU and 4.55BU respectively. The contribution of each habitat and hedgerow type is given in Table 1 and illustrated on Figure A3-01.

Table 1. Baseline habitats and hedgerows.

Broad Habitat Category	Habitat/Hedgerow Type	Habitat Area (ha)	Hedgerow Length (km)	Habitat (BU)	Hedgerow (BU)
Cropland	Cereal crops	23.59	N/A	47.18	N/A
Grassland	Modified grassland	1.75	N/A	7.70	N/A
Heathland and shrub	Mixed scrub	0.55	N/A	5.06	N/A
Urban	Artificial unvegetated unsealed surface	0.28	N/A	0	N/A
Hedgerows	Native Hedgerow - Associated with bank or ditch	N/A	0.15	N/A	2.07
	Native Hedgerow	N/A	0.36	N/A	2.48
Total		26.17	0.51	59.94	4.55

3.2 PRE-INTERVENTION

3.2.1 The impact area of the proposed Western Extension covers a total of 24.16ha of habitats and 0.51km of hedgerows, resulting in the loss of 52.99BU and

4.55BU respectively. The extent of loss to each habitat and hedgerow type is given in Table 2 and the impact area used is illustrated on Figure A3-02.

Table 2. Loss to habitats and hedgerows.

Broad Habitat Category	Habitat/Hedgerow Type	Habitat Area (ha)	Hedgerow Length (km)	Habitat (BU)	Hedgerow (BU)
Cropland	Cereal crops	22.80	N/A	45.60	N/A
Grassland	Modified grassland	0.53	N/A	2.33	N/A
Heathland and shrub	Mixed scrub	0.55	N/A	5.06	N/A
Urban	Artificial unvegetated unsealed surface	0.28	N/A	0	N/A
Hedgerows	Native Hedgerow - Associated with bank or ditch	N/A	0.15	N/A	2.07
	Native Hedgerow	N/A	0.36	N/A	2.48
Total		24.16	0.51	52.99	4.55

3.3 POST-INTERVENTION

3.3.1 The post-intervention scenario has been modelled based on the restoration plan, drawing number ENORTH028 (DB Landscape Consultancy, 2021)⁴. The extent of habitat, hedgerow and river BU are given in Table 3 and illustrated on Figure A3-03.

⁴ DB Landscape Consultancy. July 2021. Restoration Concept Scheme. Drawing No. ENORTH028.

Table 3. Post-intervention habitats and hedgerows.

Broad Habitat Category	Habitat/ Hedgerow/ River Type	Habitat Area (ha)	Hedgerow Length (km)	River Length (km)	Habitat (BU)	Hedgerow (BU)	River (BU)
Grassland	Lowland meadows	9.31	N/A	N/A	59.81	N/A	N/A
	Lowland calcareous grassland	9.31	N/A	N/A	31.19	N/A	N/A
Heathland and shrub	Mixed scrub	2.59	N/A	N/A	25.03	N/A	N/A
Woodland and forest	Lowland mixed deciduous woodland	3.50	N/A	N/A	7.65	N/A	N/A
Lakes	Ponds (Priority Habitat)	0.04	N/A	N/A	0.46	N/A	N/A
Urban	Sustainable urban drainage feature	1.08	N/A	N/A	2.86	N/A	N/A
	Artificial unvegetated, unsealed surface	0.33	N/A	N/A	0	N/A	N/A
Hedgerows	Native Species Rich Hedgerow - Associated with bank or ditch	N/A	0.18	N/A	N/A	2.44	N/A
	Native Species Rich Hedgerow with trees	N/A	1.34	N/A	N/A	13.60	N/A
	Native Species Rich Hedgerow	N/A	1.51	N/A	N/A	13.59	N/A

Broad Habitat Category	Habitat/ Hedgerow/ River Type	Habitat Area (ha)	Hedgerow Length (km)	River Length (km)	Habitat (BU)	Hedgerow (BU)	River (BU)
Rivers	Ditches	N/A	N/A	0.19	N/A	N/A	1.84
Total		26.16	3.03	0.19	127.00	29.63	1.84

3.3.2 This achieves an additional 67.06BU of habitats and 25.08BU of hedgerows compared with the baseline, which is a 111.87% and 550.59% **net change on** the baseline respectively. Additionally, 1.84BU of rivers are delivered through the creation of the Swallow Brook.

3.3.3 Importantly, as not all habitats within the baseline are negatively impacted by the works and therefore do not require compensation, the habitat creation and restoration plans provide a **net gain** of 139.67% for habitats. All hedgerows are to be impacted so achieve a **net gain** of 550.59%.

4 PHASING OF IMPACT AND RESTORATION

4.1 BACKGROUND

4.1.1 The scheme proposes a phased approach to works, with new habitat created once each cell is filled, capped and restored and a new phase commences. In this way, habitat creation and therefore BU gain will be achieved in tandem with works throughout the duration of the scheme. The details of this phased approach are presented in the DCO Environmental Commitments (MJCA, 2021)⁵.

4.1.2 The vast majority of the impact from the scheme will be on arable land and this is also the case for each phase of the works, excluding any phase-specific enabling activities. The restoration plan provides an illustrative idea of most

⁵ MJCA. July 2021. DCO Environmental Commitments.

habitats to be created so each phase can be considered to secure a percentage of each of these habitat types, along with the BU they deliver, proportional to their size. Locations of ponds, attenuation basins and drainage features are considered to be definite and are included in their corresponding phases of works.

- 4.1.3 Further location details for enabling activities such as haul roads and storage areas are currently unconfirmed and have not been including in the scope of the below phasing. Although these activities will not increase the overall impact, it will likely shift more of the impact to earlier phases of the works.

4.2 PHASED APPROACH TO IMPACT AND RESTORATION

- 4.2.1 Pre-commencement habitat and hedgerow creation, which is an important feature of the scheme, will provide BU prior to any impact.

- 4.2.2 The approximate extent of pre-commencement habitat and hedgerow creation and the BU they deliver are given in Table 4.

- 4.2.3 The key ecological benefits pre-commencement will deliver:

- Increased habitat connectivity between The Assarts and Collyweston Great Wood by planting a new species-rich hedgerow and therefore adding understorey structure along the treeline bordering the northwest edge of the proposed Western Extension.
- Improved habitat connectivity south through the landscape by securing hedgerow creation along the southeast boundary of the southern field.
- Enhancement of the modified grassland and arable land 10m from the edge of the woodland boundaries, securing and improving important edge habitats and acting as a species bank for rapid colonisation of habitats created at the end of each phase of works.
- Enhancement habitat for a range of protected species.

Table 4. Pre-commencement habitat and hedgerow creation.

Description		Habitat Area (ha)	Hedgerow Length (km)	Habitat (BU)	Hedgerow (BU)
Impact	None.	N/A	N/A	N/A	N/A
Gain	Species-rich lowland meadow/lowland calcareous grassland 10m-wide around the boundary of the northern field of the Western Extension, replacing modified grassland and arable.	1.40	N/A	13.74	N/A
	Species-rich hedgerow creation along northwest boundary.	N/A	0.34	N/A	3.06
	Species-rich hedgerow creation along southeast boundary.	N/A	0.26	N/A	2.59
Total		1.40	0.60	13.74	5.65

4.2.4 This means that 10.82% of all habitat BU and 19.07% of all hedgerow BU generated by the scheme's habitat enhancement and creation will be achieved prior to the start of any works and therefore, before any impact is incurred.

4.2.5 The approximate impact and gain through the completion of each phase of works are given in Table 5.

Table 5. BNG at completion of each phase of works.

Description		Habitat Area (ha)	Hedgerow Length (km)	River Length (km)	Habitat (BU)	Hedgerow (BU)	River (BU)
PHASE 12							
Impact	Arable footprint works.	in of 2.68	N/A	N/A	5.36	N/A	N/A

Description		Habitat Area (ha)	Hedgerow Length (km)	River Length (km)	Habitat (BU)	Hedgerow (BU)	River (BU)
	Removal of scrub to facilitate access.	0.55	N/A	N/A	5.06	N/A	N/A
	Hedgerow removal between new and existing ENRMF.	N/A	0.36	N/A	N/A	2.48	N/A
	Partial central hedgerow removal to facilitate access.	N/A	0.07	N/A	N/A	1.04	N/A
Gain	Creation of attenuation basin (SuDS).	0.10	N/A	N/A	0.26	N/A	N/A
	Creation of a new pond in the northern corner.	0.03	N/A	N/A	0.35	N/A	N/A
	Additional habitat restored as a proportion of phase area.	2.55	N/A	N/A	11.67	N/A	N/A
	Restoration of hedgerows.	N/A	0.30	N/A	N/A	3.05	N/A
Total		-0.55	-0.13	N/A	1.86	-0.47	N/A
PHASE 13							
Impact	Arable footprint of works.	1.98	N/A	N/A	3.96	N/A	N/A
Gain	Habitat restored as a proportion of phase area.	1.98	N/A	N/A	9.06	N/A	N/A
	Restoration of hedgerows.	N/A	0.20	N/A	N/A	2.03	N/A
Total		0	0.20	N/A	5.10	2.03	N/A

Description		Habitat Area (ha)	Hedgerow Length (km)	River Length (km)	Habitat (BU)	Hedgerow (BU)	River (BU)
PHASE 14							
Impact	Arable and modified grassland footprint in of works.	2.93	N/A	N/A	5.98	N/A	N/A
Gain	Creation of attenuation basin (SuDS)	0.22	N/A	N/A	0.58	N/A	N/A
	Additional habitat restored as a proportion of phase area, including existing doline.	2.90	N/A	N/A	13.27	N/A	N/A
	Restoration of hedgerows.	N/A	0.20	N/A	N/A	2.03	N/A
	Creation of Swallow Brook	N/A	N/A	0.19	N/A	N/A	1.84
Total		0.19	0.20	0.19	7.87	2.03	1.84
PHASE 15							
Impact	Arable footprint in of works.	2.96	N/A	N/A	5.92	N/A	N/A
Gain	Species-rich lowland meadow/lowland calcareous grassland 10m-wide along the western boundary of the southern field of the Western Extension, replacing modified	0.61	N/A	N/A	6.46	N/A	N/A

Description		Habitat Area (ha)	Hedgerow Length (km)	River Length (km)	Habitat (BU)	Hedgerow (BU)	River (BU)
	grassland and arable.						
	Creation of attenuation basin (SuDS).	0.32	N/A	N/A	0.85	N/A	N/A
	Additional habitat restored as a proportion of phase area.	2.64	N/A	N/A	11.61	N/A	N/A
	Restoration of hedgerows.	N/A	0.26	N/A	N/A	5.18	N/A
Total		0.61	0.26	N/A	13.00	2.59	N/A
PHASE 16							
Impact	Arable footprint in of works.	1.49	N/A	N/A	2.98	N/A	N/A
Gain	Habitat restored as a proportion of phase area.	1.49	N/A	N/A	6.82	N/A	N/A
Total		0	N/A	N/A	3.84	N/A	N/A
PHASE 17							
Impact	Arable footprint in of works.	1.80	N/A	N/A	3.60	N/A	N/A
Gain	Habitat restored as a proportion of phase area.	1.80	N/A	N/A	8.24	N/A	N/A
	Restoration of hedgerows.	N/A	0.51	N/A	N/A	4.59	N/A
Total		0	0.51	N/A	4.64	4.59	N/A
PHASE 18							
Impact	Arable footprint in of works.	3.47	N/A	N/A	6.94	N/A	N/A

Description		Habitat Area (ha)	Hedgerow Length (km)	River Length (km)	Habitat (BU)	Hedgerow (BU)	River (BU)
Gain	Creation of attenuation basin (SuDS).	0.16	N/A	N/A	0.42	N/A	N/A
	Additional habitat restored as a proportion of phase area.	3.31	N/A	N/A	15.15	N/A	N/A
	Restoration of hedgerows.	N/A	0.66	N/A	N/A	5.94	N/A
Total		0	0.66	N/A	8.62	5.94	N/A
PHASE 19							
Impact	Arable footprint in of works.	2.37	N/A	N/A	4.74	N/A	N/A
Gain	Creation of attenuation basin (SuDS).	0.28	N/A	N/A	0.74	N/A	N/A
	Additional habitat restored as a proportion of phase area.	2.09	N/A	N/A	9.56	N/A	N/A
	Restoration of hedgerows.	N/A	0.06	N/A	N/A	0.61	N/A
Total		0	0.06	N/A	5.56	0.61	N/A
PHASE 20							
Impact	Arable footprint in of works.	1.40	N/A	N/A	2.80	N/A	N/A
Gain	Habitat restored as a proportion of phase area.	1.40	N/A	N/A	6.41	N/A	N/A
Total		0	N/A	N/A	3.61	N/A	N/A
PHASE 21							

Description		Habitat Area (ha)	Hedgerow Length (km)	River Length (km)	Habitat (BU)	Hedgerow (BU)	River (BU)
Impact	Arable and grassland in footprint of works.	2.34	N/A	N/A	5.81	N/A	N/A
	Impact of remaining existing farm compound and access tracks.	0.17	N/A	N/A	0.00	N/A	N/A
	Remaining central hedgerow removed.	N/A	0.07	N/A	N/A	1.04	N/A
Gain	Creation of a new pond in the northwest corner.	0.02	N/A	N/A	0.23	N/A	N/A
	Additional habitat restored as a proportion of phase area.	2.52	N/A	N/A	11.53	N/A	N/A
	Creation of footpath through entire site.	0.33	N/A	N/A	0.00	N/A	N/A
	Restoration of hedgerows.	N/A	0.25	N/A	N/A	3.15	N/A
Total		0.36	0.18	N/A	5.95	2.11	N/A

5 RESTORATION PROPOSALS ON THE EXISTING ENRMF

5.1 BACKGROUND

5.1.1 The previous restoration proposal was created (in consultation with the Beds, Cambs and Northants Wildlife Trust) for the original planning application for the existing ENRMF. It also served as the baseline for the Ecological Management and Aftercare Plan (EMAP) (the 'Plan'), which is still in operation. This Plan

predated the (now) proposed BNG legislation but was designed to create a range of UK BAP habitats, which would in turn provide the feeding/roosting/resting/nesting/breeding requirements of a wide range of UK BAP species and qualify as a County Wildlife Site on completion.

5.1.2 Before the work carried out under the EMAP was well-advanced, thinking had turned to the need for extending the available space. This in turn required a rethink of the original phasing plan and thus restoration plan, to allow for a seamless extension of habitats into any new area. With the new application, this has been formalised, as shown on the current restoration plan.

5.1.3 In order to provide a comparison therefore, the following section provides a demonstrative exercise of modelling the BU output of the 'old' restoration plan and the 'new' one on the existing ENRMF.

5.2 COMPARISON BETWEEN OLD AND NEW RESTORATION PLANS OF THE EXISTING ENRMF

5.2.1 The 'old' restoration plan for the existing ENRMF is detailed in the Landscape Proposals, drawing number 2242/PA/001 (David Jarvis Associates, 2013)⁶. The 'new' restoration plan, which includes the proposed Western Extension and the existing ENRMF, is as above (DB Landscape Consultancy, 2021)⁷.

5.2.2 This section does not provide a full BNG assessment as any look at impact would be retrospective, an accurate baseline is not available as data was collected prior to Defra Metric's release and the application does not propose future impact to the existing ENRMF that would need to be suitably assessed and mitigated for. All habitats are taken as if they are created from a 'clean

⁶ David Jarvis Associates. October 2013. Landscape Proposals, East Northants Resource Management Facility. Drawing No. 2242/PA/001.

⁷ DB Landscape Consultancy. July 2021. Restoration Concept Scheme. Drawing No. ENORTH028.

slate'. **Net gain** achieved by works on the existing ENRMF is therefore beyond the scope of this section.

5.2.3 The BUs summarised below are those that are delivered through the creation of each habitat type in the restoration plans so it takes into account the Metric calculation tool's temporal and difficulty-risk multipliers.

5.2.4 Habitat described as 'Meadow' in each restoration plan has been split 50:50 between 'Lowland Meadow' and 'Lowland dry calcareous grassland' as the exact ratio of each habitat created would have been and will be dependent on soil types available for restoration.

5.2.5 The BUs delivered by each of the restoration plans for the existing ENRMF area are summarised in Table 6.

Table 6. Comparison between old and new restoration plans of the existing ENRMF area.

Restoration plan	Habitat Area (ha)	Hedgerow Length (km)	Habitat (BU)	Hedgerow (BU)
Old	31.14	1.51	138.74	15.33
New	31.14	2.06	133.37	20.43

6 DISCUSSION

6.1 BNG ASSESSMENT OF PROPOSED WESTERN EXTENSION

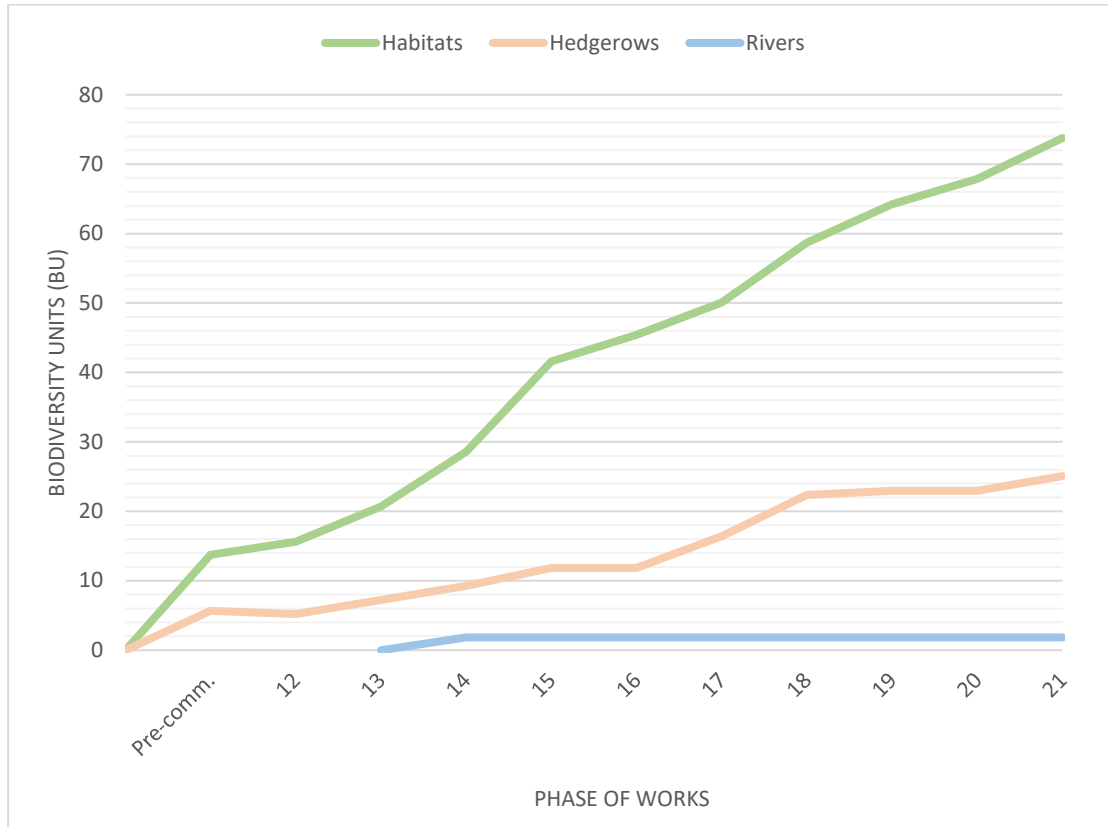
6.1.1 The scheme provides substantial habitat creation, restoration and connectivity opportunity, with the restoration plans seeking to revert the entire proposed Western Extension area from primarily arable land to natural habitat. This is demonstrated by the 139.67% and 550.59% **net gain** of habitats and hedgerows, achieving 111.87% and 550.59% **net change**, as evidenced in this report.

6.2 PHASING OF IMPACT AND RESTORATION

6.2.1 In addition, the phased approach demonstrates that a **net gain** of biodiversity will actually be provided with the completion of each phase of the development.

The connectivity benefit of the northern part of the proposed Western Extension area restoration will be fully realised as soon as fencing is removed on completion of each phase, which will connect natural habitats on each side, allowing flora and fauna to move onto and across the new habitat.

Figure 1. Trend of BU loss and gain throughout the phasing of works.



6.3 RESTORATION PROPOSALS ON THE EXISTING ENRMF

- 6.3.1 The 'new' restoration plan provides a minor decrease in BU (4%) over the 'old', despite the same area of habitat creation being planned. This relates to the extra consideration in the 'new' restoration plans to hydrology and engineering challenges, being the inclusion of (dry) attenuation basins, which have been defined as SuDS in the BNG assessment and possess a low distinctiveness score.
- 6.3.2 The 'new' plan provides a 36.42% increase in hedgerow creation as a length over the 'old', which is reflected in the greater linear BU it delivers.

7 CONCLUSION

- 7.1 The significant BNG reported in sub-section 6.1 demonstrates that with sound understanding of the Site's potential, gained from in-depth survey and wide consultations, with thorough forward planning, location of an NSIP on arable farmland can provide very rich rewards for biodiversity.
- 7.2 An important element of this planning has been to ensure that, as shown in Table 5 and reported in sub-section 6.2, this gain could be seen and enjoyed from a relatively early stage, especially since some of the new planting would already be in the ground and making growth before the development started. The selection of habitats and their distribution across the Site was deliberately intended to provide a wood-pasture effect in the early stages, as desired by most of those consulted, with the potential for more woody species to arrive in future years, building in resilience against future climate change. The need to consider this was also involved in the choice of the species for early planting.
- 7.3 This consideration also explains some of the effect of comparing the new and old restoration schemes for the ENRMF. Increasingly heavy rainfall and the understanding that this is likely to be a part of future climate change has affected the need to consider sustainable surface water drainage more specifically than was the case at the earlier stage. Despite this, the closeness of the biodiversity units shows that the two schemes both provide excellent areas for people and wildlife.

8 REFERENCES

Baker J, Hoskin R, and Butterworth T. 2019. Biodiversity net gain. Good practice principles for development. Ciria.

David Jarvis Associates. October 2013. Landscape Proposals, East Northants Resource Management Facility. Drawing No. 2242/PA/001.

DB Landscape Consultancy. July 2021. Restoration Concept Scheme. Drawing No. ENORTH028.

MJCA. July 2021. Illustrative phase boundaries for the existing ENRMF and proposed western extension. Drawing Ref. AU/KCW/07-21/22603.

Natural England, 2021. The Biodiversity Metric 3.0: Calculation Tool (December July 2021). Natural England.








Panks S, White N, Newsome A, Potter J, Heydon M, Mayhew E, Alvarez M, Russell T, Scott SJ, Heaver M, Scott SH, Treweek J, Butcher B, and Stone D. 2021. Biodiversity metric 3.0: Auditing and accounting for biodiversity – User Guide. Natural England.

The Environment Bill (2019-2021). Parliament: House of Commons. Bill no. 3. London: The Stationary Office.

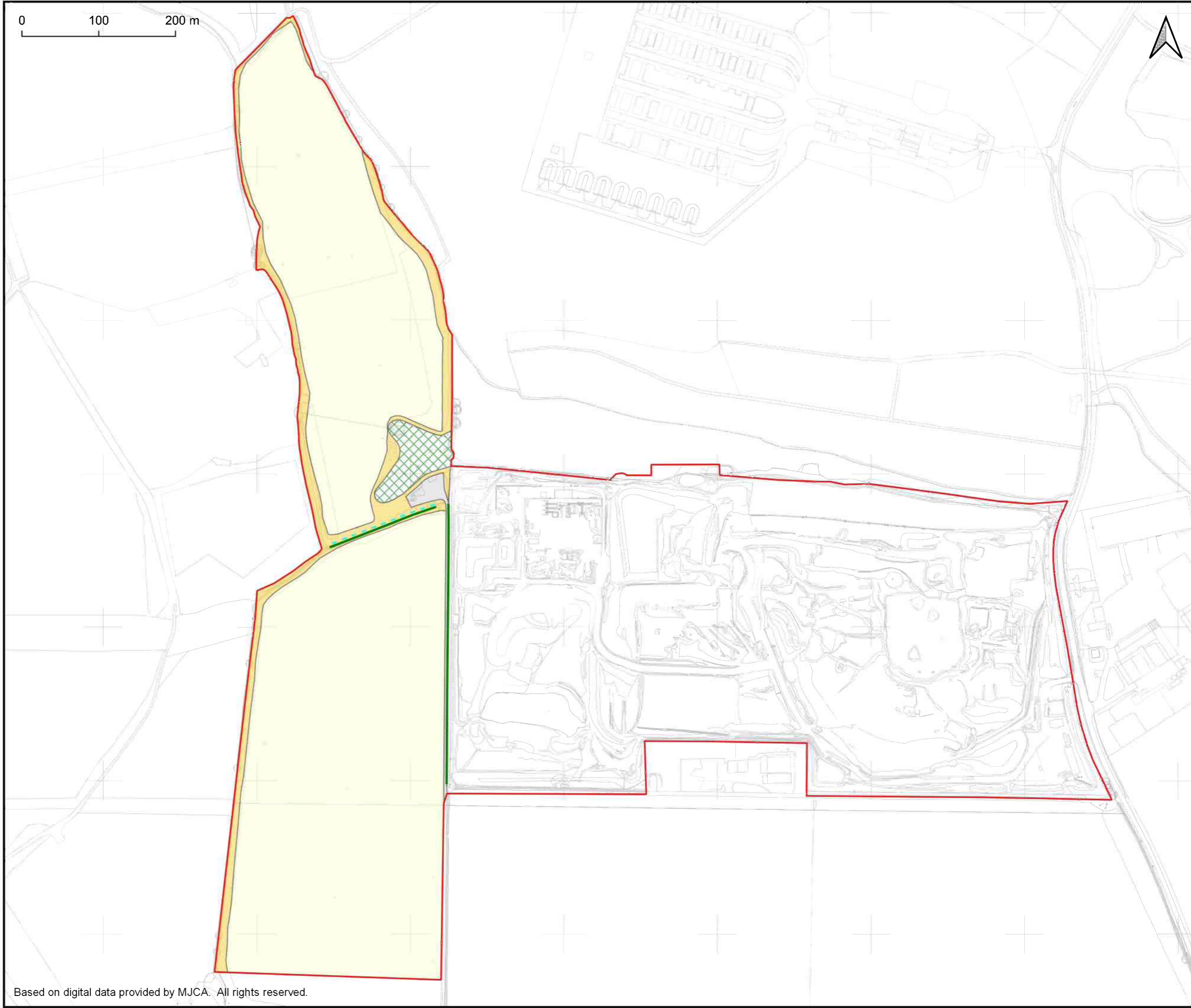
UK Habitat Classification Working Group, 2018. UK Habitat Classification - Habitat Definitions V1.0. UK Habitat Classification Working Group.

Wigginton M J, 1999. British Red Data Books. 1 Vascular Plants. 3rd edition. JNCC, Peterborough.

KEY

-  Site boundary
-  Native Hedgerow
- Associated with bank or ditch
-  Native Hedgerow
-  Cropland - Crops
-  Grassland - Modified grassland
-  Heathland and shrub - Mixed scrub
-  Urban - Artificial unvegetated, unsealed surface

0 100 200 m



SITE NAME:
ENRMF Western Extension.

DRAWING TITLE:
Biodiversity Net Gain baseline.

Figure A3-01
Dwg no.: 118-L049-018 Date: Jul 2021



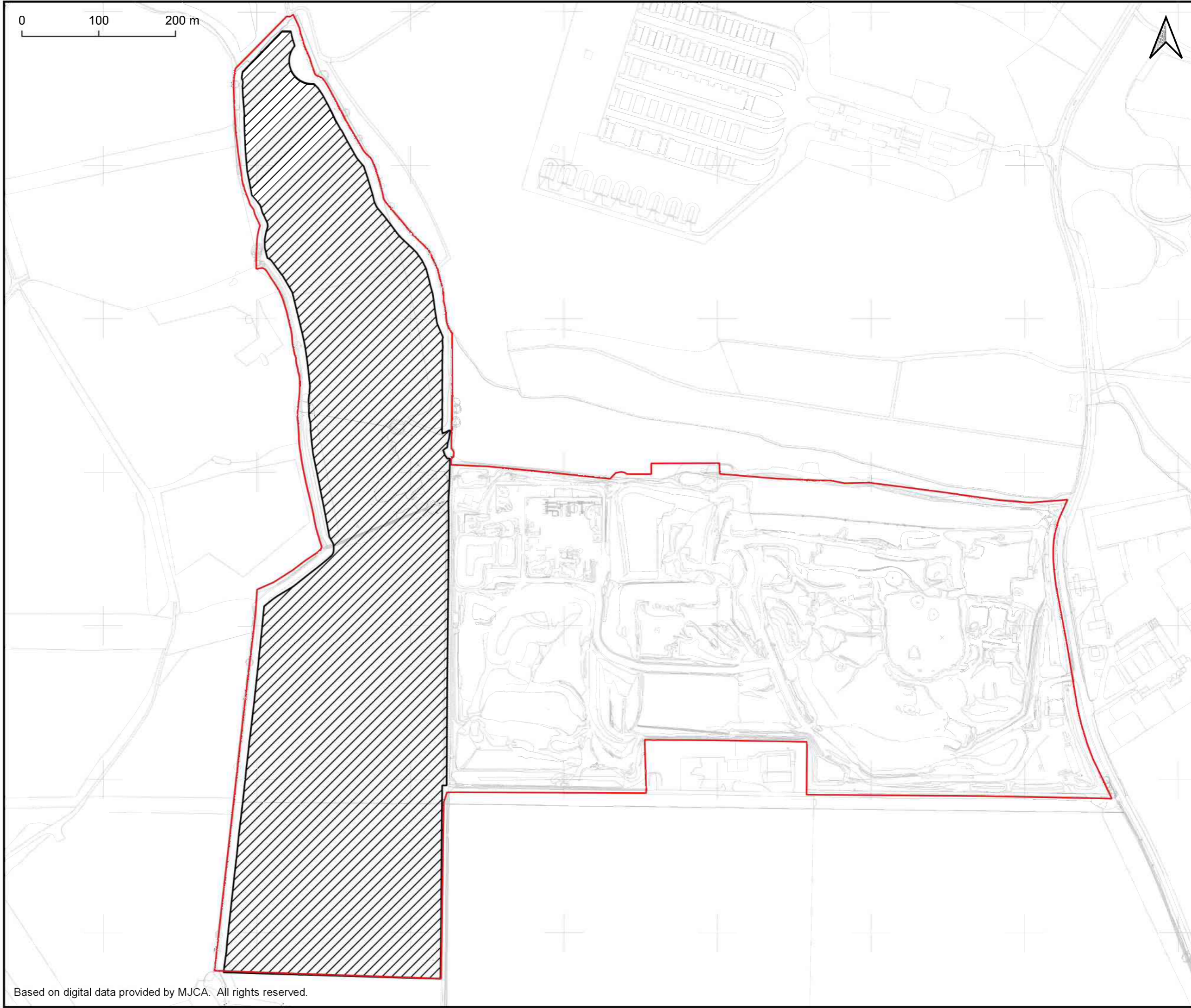
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KEY

— Site boundary

▨ Impact area

0 100 200 m



SITE NAME:
ENRMF Western Extension.

DRAWING TITLE:
Biodiversity Net Gain impact area.

Figure A3-02
Dwg no.: 118-L049-019 Date: Jul 2021



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KEY

-  Site boundary
-  Native Species Rich Hedgerow with trees - Associated with bank or ditch
-  Native Species Rich Hedgerow with trees
-  Native Species Rich Hedgerow
-  Ditches
-  Grassland - Lowland meadows/Lowland dry calcareous grassland
-  Heathland and shrub - Mixed scrub
-  Lakes - Ponds (Priority Habitat)
-  Lakes - Ponds (Non-Priority Habitat)
-  Urban - Artificial unvegetated, unsealed surface
-  Woodland and forest - Lowland mixed deciduous woodland
-  Urban - Sustainable urban drainage feature

0 100 200 m



SITE NAME:
ENRMF Western Extension.

DRAWING TITLE:
Biodiversity Net Gain post-intervention.

Figure A3-03
Dwg no.: 118-L049-020 Date: Jul 2021



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The Biodiversity Metric 3.0 - Calculation Tool

Start page

Project details	
Planning authority:	
Project name:	ENRMF Western Extension
Applicant:	
Application type:	
Planning application reference:	
Assessor:	Luke Hartley
Reviewer:	
Metric version:	
Assessment date:	12/07/2021
Planning authority reviewer:	

Instructions

Main menu

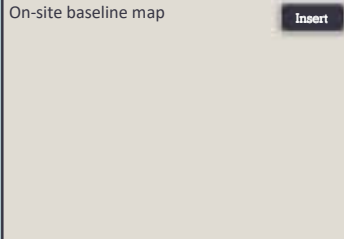
Results

View all

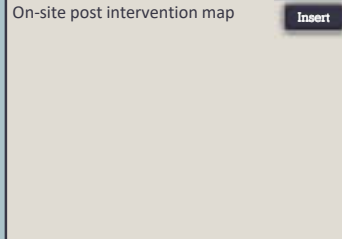
Reset view

Cell style conventions	
	Enter data
	Automatic lookup
	Result

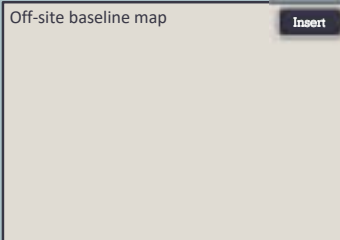
On-site baseline map



On-site post intervention map



Off-site baseline map



Off-site post intervention map



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On-site baseline	<i>Habitat units</i>	59.94
	<i>Hedgerow units</i>	4.55
	<i>River units</i>	0.00
On-site post-intervention <small>(Including habitat retention, creation & enhancement)</small>	<i>Habitat units</i>	126.99
	<i>Hedgerow units</i>	29.63
	<i>River units</i>	1.84
On-site net % change <small>(Including habitat retention, creation & enhancement)</small>	<i>Habitat units</i>	111.87%
	<i>Hedgerow units</i>	550.59%
	<i>River units</i>	100.00%
Off-site baseline	<i>Habitat units</i>	0.00
	<i>Hedgerow units</i>	0.00
	<i>River units</i>	0.00
Off-site post-intervention <small>(Including habitat retention, creation & enhancement)</small>	<i>Habitat units</i>	0.00
	<i>Hedgerow units</i>	0.00
	<i>River units</i>	0.00
Total net unit change <small>(including all on-site & off-site habitat retention, creation & enhancement)</small>	<i>Habitat units</i>	67.05
	<i>Hedgerow units</i>	25.07
	<i>River units</i>	1.84
Total on-site net % change plus off-site surplus <small>(including all on-site & off-site habitat retention, creation & enhancement)</small>	<i>Habitat units</i>	111.87%
	<i>Hedgerow units</i>	550.59%
	<i>River units</i>	100.00%
Trading rules Satisfied?	Yes	

ENRMF Western Extension
A-1 Site Habitat Baseline

Condense / Show Columns Condense / Show Rows
Main Menu Instructions

Ref	Habitats and areas			Distinctiveness	Condition	Strategic significance	Suggested action to address habitat losses	Ecological baseline	
	Broad habitat	Habitat type	Area (hectares)					Total habitat units	
1	Cropland	Cereal crops	6.12	Low	N/A Agricultural	Area/compensation not in local strategy/ no local strategy	Same distinctiveness or better habitat required	18.24	
2	Cropland	Cereal crops	14.47	Low	N/A Agricultural	Area/compensation not in local strategy/ no local strategy	Same distinctiveness or better habitat required	28.94	
3	Grassland	Modified grassland	1.75	Low	Moderate	Location ecologically desirable but not in local strategy	Same distinctiveness or better habitat required	7.70	
4	Heathland and shrub	Mixed scrub	0.55	Medium	Moderate	Value area formally identified in local strategy	Same broad habitat or a higher distinctiveness habitat required	5.06	
8	Urban	Artificial unvegetated, unsealed surfaces	0.38	V.Low	N/A - Other	Area/compensation not in local strategy/ no local strategy	Compensation Not Required	0.00	
			26.17					69.94	

Retention category biodiversity value						Bespoke compensation agreed for unacceptable losses	Comments	
Area retained	Area enhanced	Baseline units retained	Baseline units enhanced	Area lost	Units lost		Assessor comments	Reviewer comments
0		0.00	0.00	9.12	18.24			
0		0.00	0.00	14.47	28.94			
	1.22	0.00	5.37	0.53	2.33			
0		0.00	0.00	0.55	5.06			
0		0.00	0.00	0.38	0.00			
0.00	1.22	0.00	5.37	24.95	54.57			

ENRMP Western Extension

A-3 Site Habitat Enhancement

Condense / Show Columns Condense / Show Rows

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Baseline habitats		Proposed Habitat (Pre-Populated but can be overridden)		Post development/ post intervention habitats			Strategic significance		Temporal risk multiplier		Difficulty risk multipliers		Habitat units delivered	Comments	
Baseline ref	Baseline habitat	Proposed Broad Habitat	Proposed habitat	Distinctiveness change	Condition change	Area (hectares)	Distinctiveness	Condition	Strategic significance	Standard or adjusted time to target condition	Final time to target condition/years	Final difficulty of enhancement		Assessor comments	Reviewer comments
3	Grassland - Modified grassland	Grassland	Lowland meadows	Low - V High	Lower Distinctiveness Habitat - Good	1.92	V High	Good	Water area formally identified in local strategy	Standard time to target condition applied	10	Medium	16.63		
						1.92							16.63		

B-1 Site Hedge Baseline

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Baseline ref	UK Habitats - existing habitats			Habitat distinctiveness	Habitat condition	Strategic significance	Suggested action to address habitat losses	Ecological baseline Total hedgerow units	Retention category biodiversity value						Comments	
	Hedge number	Hedgerow type	Length KM	Distinctiveness	Condition	Strategic significance			Length retained	Length enhanced	Units retained	Units enhanced	Length lost	Units lost	Assessor comments	Reviewer comments
1	b1	Native Hedgerow - Associated with bank or ditch	0.15	Medium	Good	Within area formally identified in local strategy	None for this or better	2.07	0		0.00	0.00	0.15	2.07		
2	b2	Native Hedgerow	0.36	Low	Good	Within area formally identified in local strategy	Same distinctiveness based on better	2.48	0		0.00	0.00	0.36	2.48		
3																
4																
5																
6																
7			0.51					4.55	0.00	0.00	0.00	0.00	0.51	4.55		

B-2 Site Hedge Creation

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Condense / Show Rows

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Baseline ref	New hedge number	Proposed habitats		Habitat distinctiveness	Habitat condition	Strategic significance	Temporal multiplier			Difficulty risk multipliers	Hedge units delivered	Comments	
		Habitat type	Length km	Distinctiveness	Condition	Strategic significance	Standard or adjusted time to target condition	Final time to target condition/years	Final difficulty of creation	Assessor comments		Reviewer comments	
1		Native Species Rich Hedgerow with trees - Associated with bank or ditch	0.18	V.High	Good	Within area formally identified in local strategy	Standard time to target condition applied	20	Low	2.44			
2		Native Species Rich Hedgerow with trees	1.34	High	Good	Within area formally identified in local strategy	Standard time to target condition applied	20	Low	13.60			
3		Native Species Rich Hedgerow	1.51	Medium	Good	Within area formally identified in local strategy	Standard time to target condition applied	18	Low	13.59			
4													
5													
6													
7													
8			3.03							29.63			

C-2 Site River Creation

Condense / Show Columns

Condense / Show Rows

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Baseline ref	Proposed habitats		Habitat distinctiveness	Habitat condition	Strategic significance	Temporal multiplier		Difficulty multipliers	Watercourse encroachment	Riparian encroachment	River units delivered	Comments	
	River type	Length km	Distinctiveness	Condition	Strategic significance	Standard or adjusted time to target condition	Final time to target condition/years	Final difficulty of creation	Extent of encroachment	Extent of encroachment		Assessor comments	Reviewer comments
1	Ditches	0.19	Medium	Good	Delivery within Local Plans	Standard time to target condition applied	10	Low	No Encroachment	No Encroachment	1.84		
2													
3													
4													
5													
6													
		0.19									1.84		