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INTRODUCTION

11.1 Hatfield Aerodrome lies between the conurbations of Hatfield to the east and St Albans to the west on land to the north of the A1057. The airfield ceased operation in the 1990's and the easternmost part, on the fringe of Hatfield itself and incorporating the former hangars and other main buildings, was redeveloped in the 1990s/00s. That area now houses a business park, the University of Hertfordshire campus, areas of housing and a landscaped linear park.

11.2 The remaining undeveloped areas of former airfield are identified in the adopted Hertfordshire Minerals Local Plan 2007 as a 'Preferred Area' for sand and gravel extraction[1]. Pursuant to this allocation, Brett Aggregates Limited instructed Bioscan (UK) Ltd in July 2014 to commence a programme of ecological surveys to inform the design and subsequent assessment of a proposal for mineral extraction on leasehold land within the western part of the Preferred Area. This ecological assessment is contained within Chapter 11 of the "2016 ES" and associated Appendices which accompanied a planning application lodged in January 2016 (refer to Chapter 1 above). This application was refused in January 2021.

11.3 Brett Aggregates Limited commissioned SLR in March 2021 to conduct an updated Ecological Impact Assessment (EcIA) and targeted update of the ecological baseline (*i.e.* wintering bird surveys, habitat survey and great crested newt *Triturus cristatus* Habitat Suitability Index (HSI) Assessment) to inform a re-application for a similar development proposal. In addition to updating baseline and ecological assessment for this proposed development, a Biodiversity Net Gain metric assessment, using the Natural England Metric 3.0[2], has been undertaken and is reported separately (see **Appendix 11/1**). This chapter of the ES therefore presents the findings of the updated EcIA and follows the format of the earlier ES Chapter contained in the 2016 ES.

11.4 The proposal is for the phased extraction of approximately eight million tonnes of sand and gravel, with on-site processing, and for progressive restoration. Further details of the proposed development are set out in Chapter 3 of this ES. In the light of the recent refusal to grant planning permission, the scheme has been amended from that assessed in the 2016 ES as follows:

- the erection and operation of a concrete batching plant has been removed;
- no de-watering of the lower mineral horizon (LMH) and the standoff for mineral extraction in the LMH to the bromate plume has been increased to 100m;
- The access road from the quarry entrance has been moved 5m east and additional screening is proposed.

11.5 The undeveloped parts of the airfield have since the early 2000's been managed as an informal country park (Ellenbrook Fields) and are today crossed by permissive paths with interpretation sign-boards stationed at a few key locations. Parts are also actively grazed or mown. The restoration scheme has been drawn up with the intention of reinstating similar uses in the future, and in cognisance of national and local nature conservation objectives, the site's geology and its historical and present-day ecology.

[1] https://www.hertfordshire.gov.uk/services/recycling-waste-and-environment/planning-in-hertfordshire/minerals-and-waste-planning/minerals-planning/minerals-planning.aspx

[2] Natural England (July 2021) http://publications.naturalengland.org.uk/publication/6049804846366720

As part of this process the Hertfordshire and Middlesex Wildlife Trust have been actively consulted in drawing up the restoration proposals.

11.6 This Ecological Impact Assessment (EcIA) considers the likely significant effects of the proposal on ecological resources following the guidelines set out by the Chartered Institute of Ecology and Environmental Management (CIEEM 2006, 2016, 2018)[3]. The following chapters set out the information sources that have informed the assessment (including the methodologies and results of surveys undertaken); the baseline ecological conditions existing at the site; the key ecological receptors; the likely significant ecological effects on these receptors arising; the mitigation measures proposed if and where appropriate to prevent, reduce or compensate for any of these effects adjudged to be significant and adverse; and finally the predicted residual effects after these measures have been employed (including any positive benefits arising).

ECOLOGICAL CONTEXT AND PRE-EXISTING SURVEY DATA

Physical and Ecological Context of the Site

11.7 As noted from Chapter 2 above, the application site covers an area of 87.1ha occupying the western part of the former British Aerospace landholding, as illustrated on Drawing HQ 2/1 in Chapter 2 above (and edged in red on **Drawing HQ 11/1** to this chapter – see **Appendix 11/3**). It is bordered to the south by the A1057, with a nursery/garden centre and small-scale development off Oaklands Road bordering the site to the south-west. An existing sand and gravel quarry (Hatfield CEMEX Quarry) adjoins the site to the northwest, with the CEMEX landholding also including the mature woodland of Home Covert immediately to the north. Bordering the application site to the north-east is the remaining undeveloped area of the former airfield, with the University of Hertfordshire sports pitches adjoining the site to the south-east.

11.8 The mineral deposit comprises glacio-fluvial origin sands and gravels in two horizons lying over the Upper Chalk (Upper Mineral Horizon (UMH) and Lower Mineral Horizon (LMH)) and separated by a boulder clay interburden layer. In the natural condition, the upper deposit would be covered by chalky boulder clay and silty drift soils, mapped as belonging to the Hamble 2 association[4], and tending to moderately droughty with some seasonal waterlogging[5]. However, the modern depth of soil cover on the site has been influenced by significant episodes of disturbance during the 20th Century and there are localised areas on the site where more stony and gravelly subsoils are apparent at the surface.

11.9 In terms of regional ecological characteristics and restoration priorities, the application site sits within Hertfordshire's "Hornbeams and Heaths" Character Area (Part of NCA111 – North Thames Basin) as described by the Hertfordshire Ecological Network Mapping project[6]. The nature conservation priorities for this area include neutral and acid grassland, heathland and open woodland and parkland.

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[3] CIEEM (2018) Guidelines for Ecological Impact Assessment. https://cieem.net/resource/guidelines-for-ecological-impact-assessment-ecia/

[4] Jarvis et al (1984). Soils and their Use in Eastern England. Soil Survey of England and Wales Bulletin No. 13. Harpenden

[5] Other sources (e.g. De Haviland Plain landscape character area description) identify Gresham series soils as present on the airfield site

[6] https://www.hertswildlifetrust.org.uk/sites/default/files/2018-07/Hertfordshire%27s%20ecological%20networks%20report%20-%20Final%20Aug%202014.pdf

Pre-existing Surveys

11.10 The former airfield has been subject to several previous campaigns of ecological surveys dating back to 1999. These have been undertaken in connection with the now completed redevelopment of the easternmost portion, the subsequent management of the remainder as an informal country park, and more recently the promotion of the eastern area for housing. These studies are discussed in chronological order below.

11.11 Cresswell Associates reported on an ecological appraisal of the airfield in June 1999, and subsequently produced a management plan for the undeveloped balance of the site in July 2001, a report on botanical surveys (also in July 2001) and a report on ground-nesting birds and brown hare surveys (December 2001). Esus Forestry and Woodland also produced a survey and management plan for Home Covert, Round Wood and Cut Field Wood, north of the airfield, in April 2001.

11.12 This body of work was reviewed and updated in an ecological assessment produced in 2008[7] . This report also set out the results of an updated desk study, Phase 1 habitat survey and a protected species assessment. It assessed the grassland resource on the site as falling short of qualification as a County Wildlife Site, identifying the adjoining Home Covert as of greater habitat and botanical interest. The site's population of great crested newts was assessed as unlikely to be of more than local value, although no surveys of population size were carried out. The report refers to both slow worm and grass snake having been recorded in 1999-2001 and suggested that common lizard and/or adder could also be present, by virtue of the extent of suitable habitat. Barn owl was noted as present (in both 2001 and 2008) and attention was drawn to the high density of skylark and meadow pipit, and the presence of other declining farmland birds (lapwing was recorded as a breeding species in 2001). Reference was made to local records of four bat species, and to the presence of a number of mature trees and buildings potentially suitable for use by roosting bats, although no bat surveys were carried out. The presence of brown hare was also noted, with signs of badger, but no setts, found.

11.13 Based on recommendations for further survey work set out in the above study, and to inform proposals to open up the remainder of the airfield for public recreation, further targeted surveys were commissioned and carried out during 2010[8] . These included detailed surveys for great crested newts, reptiles, breeding birds and water voles. These surveys identified:

- a 'medium' population of great crested newts occupying ponds scattered across the airfield site and potentially linked to a wider metapopulation centred on the adjoining gravel pits to the north;
- no reptiles, despite the availability of abundant suitable habitat;
- a breeding bird assemblage assessed to be of 'importance in a local context' with high densities of skylark, meadow pipit and whitethroat and with cuckoo and barn owl also present;
- no evidence of water voles or otter *Lutra lutra*; and

[7] Cresswell Associates/Hyder Consulting (2008) Ecological Appraisal of Hatfield Green. Report No. WX82186/C1186/V1 Produced for Goodman UK Ltd.

[8] Cresswell Associates/Hyder Consulting (2010) Hatfield Green Summary of Ecological Surveys. Briefing document Produced for Goodman UK Ltd

- the presence of badger setts.

11.14 The above survey work informed a review and updated ecology assessment carried out by LDA Design in 2013[9] in connection with the promotion of land to the east for residential development, although no further survey work was commissioned at that time.

11.15 Separately, in 2013, the Wildlife Sites Survey team of the Hertfordshire and Middlesex Wildlife Trust carried out a series of habitat and botanical survey visits, focussed on the eastern and northern part of the airfield, but covering around half of the Brett application site[10] . They classified the areas of former airfield they surveyed as a mixture of species-poor and locally quite species-rich, predominantly neutral, grasslands, with ranker areas and areas of scrub and ponds. They also noted a number of local indicator species and concluded that much of the site met the criteria for designation as a Local Wildlife Site (LWS).

11.16 Further baseline survey work for the land to the east of the application site was commissioned by Goodman in 2015. This survey work, which was carried out by LDA Design in parallel with the Bioscan surveys of the application site, and in some instances overlapping, included an Extended Phase 1 Habitat Survey and a great crested newt habitat suitability survey[11] and latterly a great crested newt eDNA survey of certain ponds[12] . The results have been shared with Bioscan and, where relevant to the assessment, are assimilated into the baseline conditions section of this chapter.

11.17 Brett Aggregates commissioned SLR to update baseline surveys at the application site in 2021 with the agreed scope to include wintering bird surveys, habitat survey and great crested newt Habitat Suitability Index (HSI) Assessment. Results of these surveys are reported in this Chapter.

SCOPING

Scoping Submission

11.18 In connection with the EIA reported in the 2016 ES a request for a scoping opinion was submitted to Hertfordshire County Council in June 2015.

11.19 A subsequent request for Scoping Opinion was provided to Hertfordshire County Council in March 2021. SLR's report sets out that the likely effects are to populations of protected fauna, notably great crested newts and badgers, and that mitigation for these species is proposed. The report also highlights that short-term impacts on existing biodiversity resources, including grasslands and associated species, would be offset by the proposed restoration of the site and creation of new habitats with potential to provide a net biodiversity gain. The request for scoping opinion stated that the EIA would include a chapter on biodiversity, with an updated EcIA supported by a refreshed desktop study, updated walkover survey and a baseline feasibility approach to Biodiversity Net Gain (BNG) Assessment.

[9] LDA Design (2013) Hatfield Green Ecology Assessment. Report produced as Appendix 2 to a 'Landscape and Energy Strategy' for Goodman UK Limited.

[10] Wise, et al (2013) Wildlife Site Survey Report for: Ellenbrook Fields. Unpublished report for Hertfordshire and Middlesex Wildlife Trust.

[11] LDA Design (2015). Hatfield EIP Allocation – Ecology Appraisal. Report for Goodman UK Ltd.

[12] LDA Design (2015). Hatfield EIP Allocation: GCN eDNA Report. Report for Goodman UK Ltd.

Previously prescribed mitigation measures for great crested newt, bats, badgers, barn owl and reptiles were summarised therein and would be reviewed and updated where appropriate.

Scoping Responses

11.20 Hertfordshire County Council's formal scoping opinion was received in July 2021. In brief, this response stated:

- Baseline surveys should be updated to ensure that habitats and species are accurately recorded;
- Proposals to avoid further habitat loss and fragmentation and make provisions for net biodiversity gain should be delivered at each stage of the project;
- Proposals should provide net gains for biodiversity and contribute to local ecological networks;
- Support and maintain green infrastructure and landscape.

BASELINE DATA COLLECTION

Methodology

Desk Study & Data Review

11.21 A broad range of data sources have been consulted and in many instances re-consulted over time in assembling information on the baseline ecological conditions on the site, and putting it into the appropriate context, as follows:

Web-based and Archive Search

11.22 A search of relevant internet sources included the on-line 'Magic' database managed by Natural England (http://magic.defra.gov.uk/home.htm) for information on statutory designations and priority habitats, the planning portals of both Welwyn Hatfield and St Alban's Council for information from any ecological surveys submitted with current or recent planning applications for adjoining land, and web-based literature on the relevant Natural Area and on the Hertfordshire and Middlesex Wildlife Trust's 'Living Landscapes' and ecological networks projects. Local special-interest websites, including the Hertfordshire Natural History Society, Herts Bird Club and Herts and Middlesex Bat Group were also accessed for sighting data and other records pertaining to the site, and to put the records obtained from fieldwork into context.

11.23 A review of Bioscan's in-house data archive was also conducted to support the 2016 ES, with results included in the summarised data below.

Environmental Records Centre

11.24 A formal data request was submitted to the Hertfordshire Environmental Records Centre (HERC) in October 2015 and again in May 2021. Information was received on protected / notable species records as well as areas designated for their nature conservation interest. HERC were asked to provide records within a 2km radius of the centre of the site (taken as TL199083).

Herts and Middlesex Wildlife Trust

11.25 As part of the consultation exercise for the 2016 ES, the Herts and Middlesex Wildlife Trust were consulted on appropriate restoration principles and objectives, and a visit to their offices was made in order to review data related to the ecological networks project and unpublished information they held from surveys of the site carried out in 2013. The latter survey data was later obtained once appropriate landowner release-permissions had been secured.

Previous Consultancy Survey Reports

11.26 The reports of previous ecological surveys of the airfield were obtained from LDA Design in October and November 2015. These reports comprise the following:

- Ecological Appraisal of Hatfield Green (Cresswell Associates/Hyder 2008)
- Hatfield Green Summary of Ecological Surveys (Cresswell Associates/Hyder 2010)
- Hatfield Green Ecology Assessment (LDA Design 2013)
- Hatfield Ecology Appraisal (LDA Design 2015)
- Hatfield GCN eDNA Report (LDA Design 2015)
- Chapter 11 'Ecology' and supporting baseline Appendices within the 2016 ES (BioScan and SLR Consulting Ltd, 2015 - 2016)

11.27 The data within these reports is summarised and drawn upon where relevant in the description of baseline conditions.

Barn Owl Nest Box Monitoring Data

2014

11.28 By agreement with Goodman, four barn owl nest boxes and one kestrel nest box have previously been erected on mature trees falling within the application site, with additional boxes in other parts of the Goodman and/or adjoining CEMEX landholdings. These boxes are monitored by Barry Trevis[13], who is also the warden of the nearby Herts and Middlesex Wildlife Trust reserve at Lemsford Springs. Information from the monitoring undertaken of these boxes is supplied by Mr Trevis to Goodmans, who in turn supplied a report (relating to the 2014 breeding season) to Bioscan. Mr Trevis also supplied the same information to Bioscan via the Wildlife Trust.

2021

11.29 The current landowner was contacted in May 2021 to share any knowledge of ongoing barn owl and kestrel box monitoring and whether he receives data as per the previous landowner. Detail is provided in the baseline section below.

11.30 Information from all the above listed sources has been used in this assessment where corroborated by

[13] British Trust for Ornithology Ringing Licence Number A3821

up-to-date survey or otherwise considered to still be relevant to assessing the baseline ecological status of the land.

Habitat Surveys

2014/15

11.31 An extended Phase 1 survey of the application site by Bioscan took place over several dates during the course of 2014 and 2015. An initial walkover survey and Phase 1 habitat mapping was carried out in July 2014, with completion and refinement taking place on subsequent visits and ultimately finalised in November 2015. The many visits for bird surveys and other purposes between these two dates were also used to augment and refine the mapping and botanical recording element, ensuring coverage across all seasons. In this way, a detailed picture of current habitat distribution and quality has been built up using the Phase habitat 1 survey approach (Joint Nature Conservation Committee, 2016)[14]. This technique provides an inventory of the broad habitat types present on the site and targets areas of more interest which are then subject to more detailed examination either at the time or on subsequent visits. Additional detail was provided in the form of representative lists of species compiled for each habitat (an 'extended' Phase 1 survey).

11.32 The habitats on the site were also assessed to see if any qualify as 'priority' habitats, as listed by the Government further to the provisions of sections 40-41 of the Natural Environment and Rural Communities Act 2006. Where appropriate this involved consideration of grassland community assemblages up to NVC/Phase 2 level (i.e. against the community classifications set out in the National Vegetation Classification[15]).

11.33 The Habitat Map (Figure 1 from Chapter 11 of the 2016 ES) is contained in **Appendix 11/2** of this Chapter for completeness.

11.34 The site's hedgerows were further assessed for their potential to meet the ecological criteria of an 'Important' hedgerow as defined by the Hedgerows Regulations 1997. This involved assessing the number of woody species (as listed on Schedule 3 of the Hedgerows Regulations 1997) in a sample 30m stretch of hedgerow (for hedgerows between 100m and 200m in length two 30m stretches of hedgerow were surveyed and an average taken, and for hedgerows in excess of 200m in length, three 30m stretches of hedgerow were surveyed and an average taken). Relevant features along each hedgerow were recorded, such as ditches, banks, standard trees, lack of gaps, parallel hedgerows, multiple connections with other hedgerows/woodland/ponds, and woodland ground flora (as listed on Schedule 2 of the Hedgerows Regulations 1997).

11.35 A hedgerow is considered to be 'Important' under the Regulations if it, amongst other criteria, has:

- An average of at least 7 woody species per 30m length;
- Averages at least 6 woody species per 30m and has at least 3 qualifying additional features (e.g. ditches and banks);

[14] JNCC, (2016), Handbook for Phase 1 habitat survey - a technique for environmental audit

[15] Rodwell, J (ed) British Plant Communities Volumes 1-5. Cambridge

- Averages at least 5 woody species per 30m and has at least 4 qualifying features;
- Averages at least 6 woody species per 30m including one of: black poplar *Populus nigra*, large-leaved lime *Tilia platyphyllos*, small-leaved lime *Tilia cordata* or wild service-tree *Sorbus torminalis*; and
- Averages at least 4 woody species per 30m, has at least 2 qualifying features and is adjacent to a public right of way (PROW).

11.36 For the purposes of this assessment, a hedgerow was also considered to be 'species-rich' if it contained five or more native woody species per 30m section on average, and 'species-poor' if it contained four or fewer native woody species per 30m section on average.

2021

11.37 An updated habitat survey was conducted on the 16th and 22nd April 2021 in accordance with the UK Habitat Classification (UKHab) methodology. The habitats were mapped (**Appendix 11/3**) using the UKHab Primary Habitat Hierarchy including mandatory secondary habitat codes (numbers 10-41), for all locations within the site, where accessible. The minimum mapping unit (MMU) used was $25m^2$.

11.38 During the habitat survey, attention was afforded to searching for any signs of protected or notable plant or faunal species that could constitute a material consideration in planning terms (e.g. evidence of badger sett creation and activity and potential bat roosting opportunities). These incidental records were recorded and are presented on a separate map[16]. The results were used to inform and/or augment the separate targeted work on great crested newts, reptiles, bats, badgers, birds and invertebrates that is described below.

Bat Surveys

Bat Activity Survey

2015

11.39 Bat surveys were conducted in 2015.

11.40 The principal aim of the bat activity surveys was to assess the overall levels of bat activity within the site, the bat species composition, and to identify any landscape features used for commuting/foraging. The methodology for this survey was derived from the industry-standard BCT Survey Guidelines at that time. The survey effort is in line with the updated BCT Survey Guidelines[17] for a large site of low quality bat habitat. The guidelines state for this category that there should be '*one visit per transect each season (spring, summer and autumn)*'.

11.41 Transect surveys were undertaken in June, July and September 2015. During the June visit the site was walked as a continuous transect by a single surveyor, and for the July and September visits two surveyors each covered separate areas of the site (broadly the northern part of the site and the

[16] Also contained in the Hatfield Aerodrome Confidential Badger Appendix (Appendix 11-5) for detail relating to this species (not included within this assessment for confidentiality).

[17] Collins, J. (ed.) (2016). *Bat Surveys for Professional Ecologists: Good Practice Guidelines* 3rd edition. Bat Conservation Trust.

southern). The transects not only followed existing landscape features such as hedgerows, footpaths, woodland edges, but due to the relative paucity of upstanding landscape features, the transect also covered the more open aspects of the site (see Figure 2 for the transect routes walked on each survey).

11.42 Surveyors were equipped with an Anabat (SD1, SD2 or Express) and a Pettersson D240X time expansion and heterodyne bat detector connected to a MP3 recorder. The Pettersson is employed in addition to the Anabat to aid real-time identification in the field, to allow reactive effort to be directed towards obtaining good recordings of any unusual or uncertain species and to provide supplementary recordings for use in corroboration of the Anabat data more generally.

11.43 The June transect survey commenced at around sunset and the subsequent July and September 2015 transect surveys commenced approximately one hour after sunset, following on from emergence surveys (see below). Table 11-1 below provides the details of each survey.

Table 11-1:
Dates, Timings and Weather for each Bat Activity Survey in 2015

Date	23/06/2015	29/07/2015	07/09/2015
Cloud	1/8	8/8	3/8 at start to 0/8 at end
Wind	Little/ none	Little/ none	Little/none
Moon	1st quarter	Not visible	Not visible
Start temperature (°C)	16	13	14
End temperature (°C)	12	12	9.5
Start time	21:33	21:53	20:35
End time	23:40	23:46	22:11
Sunset	21:25	20:53	19:35

11.44 Analysis of the survey recordings was undertaken at the Bioscan offices using propriety software (Analook for the Anabat recordings and Batsound v10.0 software for the D240X recordings).

11.45 The Anabat system records in 15 second segments when sound (bats or otherwise) triggers the detector. For example, if one bat is detected for two seconds one sound file is created; if four bats are recorded continuously for 15 seconds again one sound file is created. Identifying and labelling bat calls within recording segments was undertaken with the aid of published species call parameters[18] , as well as Bioscan's in-house library of calls. The label(s) for each sound file were then tallied to produce the file count for each transect. It should be noted that registration or call tallies derived from Anabat recordings reflect the number of sound files for each species rather than reflecting the number of bats present. The D240X recordings were used to corroborate and/or cross-check uncertain or difficult calls

[18] J Russ, (2012). British Bat Calls: A Guide to Species Identification. Pelagic Publishing

identified from the Anabat analysis.

2021

11.46 Bat surveys were not updated in 2021.

Automated Bat Survey

2015

11.47 Additional detectors were deployed at various locations around the site in 2015 to collect data over a longer time-series, helping to improve certainty about the overall species-composition present, but also providing additional data on foraging and commuting activity specific to certain landscape or habitat features. The methodology for this survey was derived from the BCT Survey Guidelines[19] for a large site of low quality bat habitat. This category recommended that there should be '1 [automated detector] location per transect. *Data to be collected on 4 consecutive nights each season (spring, summer and autumn)'.*

11.48 Anabat Express detectors were deployed in three different locations in each of June, July and September 2015 and were left to record for a minimum of four nights (Figure 2 provides the locations where each Anabat Express was deployed). Table 11-2 below provides details of the duration and weather conditions of each static survey period.

Table 11-2:
Details of the Automated Bat Detector Surveys

Month of Survey	June	July	September
Deployment location	A1	A2	A3
Start date	23/06/2015	29/07/2015	07/09/2015
End Date	29/06/2015	12/08/2015	16/09/2015
Total number of nights recorded	6	15	9
Average mean night-time temperature over each survey period (°C)[20]	14.7	14.6	11.7
Lowest recorded night-time temperature over each survey period (°C)[20]	9	6	7.5

2021

[19] Hundt, L. (2012). Bat surveys – good practice guidelines, 2nd edition. Bat Conservation Trust.

[20] The Anabat Express contains a temperature logger and records the temperature approximately every five minutes. This temperature information is downloaded concurrently with the extraction of the bat calls.

11.49 No bat activity surveys were conducted in 2021.

Bat Tree Roost Assessment

2015 and 2021

11.50 The mature trees within the application site were subject to an initial (ground-based) examination to identify any features that could be of potential use for roosting bats (such as splits, cracks, rot holes, coverings of ivy, peeling bark, or similar), using binoculars where necessary. The potential of each tree to support roosting bats was then ranked in accordance with the following criteria:

- **Negligible Potential**: Trees which lack any significant opportunities for bats to roost.
- **Low Potential**: Trees with minor roosting opportunities such as loose bark plates, small cracks in limbs or ivy cover.
- **Medium Potential**: Trees with medium roosting opportunities such as significant areas of flaking bark or relatively large splits or cracks.
- **High Potential**: Trees with major roosting opportunities such as woodpecker holes or large, deep cracks or fractures, thereby having the potential to support roosting bats all year round.

Built Structure Inspection

2015 and 2021

11.51 One built structure within the application site (B1 on Figure 2 in **Appendix 11/2**) is a former radio beacon/aerial lighthouse building located in the east of the application site. This was subject to an external and internal structural inspection (from the ground only – the internal structure being visible from that level) for evidence of bats, and the likelihood of it being utilised by roosting bats assessed.

Bat Emergence Survey

2015

11.52 Two trees were identified on the site that appeared to a) fall within the proposed extraction area and b) contained features that could be utilised by roosting bats (see T1 and T2 on Figure 2 for their location). Two surveyors undertook emergence surveys of these trees prior to the July and September 2015 bat activity surveys. The surveys commenced approximately 15 minutes prior to sunset and were concluded approximately one hour after sunset when it became too dark to determine with certainty if any bats subsequently detected had emerged.

2021

11.53 No bat emergence surveys were conducted in 2021.

Great Crested Newt survey

2015

11.54 Few ponds are indicated as being present on the site by OS mapping; however, it rapidly became apparent during the early phases of survey work that in addition to these the site contains a number of both well-established and recent artificial ponds not shown on OS maps. Whilst undertaking the wintering bird survey visits of the site, the locations of all waterbodies present within and immediately adjacent to the site were therefore recorded on a map. In total eight waterbodies or waterbody complexes were found within the application site boundary, with an additional three accessible for survey outside of the site but within close proximity. Figure 3 in **Appendix 11/4** provides the locations of these waterbodies.

11.55 Around one of these, Pond P1, fencing has been erected and a sign indicates that great crested newts are present. Efforts were made to establish the origin of this sign and whether it related to past mitigation work (e.g. speculated to relate to the use of the site as a film set in the 1990's). However neither Goodman nor the Hertfordshire and Middlesex Wildlife Trust were able to confirm its origin.

11.56 Presence/absence and population size class assessment surveys for great crested newts were carried out between April and June 2015 following industry-standard methodology[21] . Survey visits were conducted between the 29th April 2015 and 9th June 2015. The commencement of the survey was deliberately delayed because of the exceptional run of low overnight temperatures experienced in southern England during spring 2015. In the event, sub-optimal overnight temperatures lasted well into May, but it was evident from the survey results that this did not preclude amphibian activity.

11.57 During each survey visit a minimum of three survey techniques were used. The techniques were primarily egg-searches, torching and bottle trapping; although, netting was deployed in later visits within certain waterbodies that were close to drying out. A minimum of four survey visits to each waterbody was made in this period, with those ponds confirmed as supporting great crested newts subject to a total of six visits to obtain data from which to derive a broad population 'size class' for assessment purposes.

11.58 Each waterbody was also assessed for its habitat quality and/or potential to support great crested newts using the Habitat Suitability Index[22] (HSI) system. This allocates scores to ten physical attributes of the waterbody and its surrounding environment that are known to affect the likelihood of newt presence, and is now the standard repeatable technique applied when assessing how suitable a waterbody is for great crested newts. A HSI score of 1 suggests optimal habitat and 0.01 suggests unsuitable habitat; although, the system has to be applied with caution as it is not sufficiently precise to be able to conclude that a pond with a high score would support newts, or that a pond with a low score would not[23].

2018 and 2021

11.59 In 2018, SLR conducted an update HSI and presence/absence population size class assessment survey

[21] Following English Nature (2001*): Great Crested Newt Mitigation Guidelines*

[22] 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.

[23] Amphibian and Reptile Groups of the United Kingdom advice note 5: Great Crested Newt Habitat Suitability Index. ARG UK May 2010

of Ponds 1-11, between April and May. Survey visits were conducted between the 12th April 3rd May which is within the peak breeding time of mid-April to mid-May.

11.60 In 2021, SLR conducted an update HSI survey of Ponds 1-11. The survey was conducted across two survey dates alongside the habitat survey on the 16th and 22nd April. Although, presence/absence surveys were not undertaken on this occasion, submergent vegetation was inspected for the presence of newt eggs where accessible.

Reptile Survey

2015

11.61 The presence of reptiles was assessed on the initial visits as being likely, due to the large expanses of suitable habitat in the form of rough grassland over the majority of the site. In order to sample the species assemblage and derive broad population size-class assessments, a reptile survey using artificial refugia was conducted over the spring and early summer of 2015. A total of 466 refugia, comprising a mixture of corrugated bitumen sheeting and roofing felt approximately 0.5m^2 in size, were placed within the five areas of highest quality reptile habitat within the site. The refugia were placed in each of these areas to a density of approximately ten per hectare. For general surveying purposes a minimum of five to ten refugia per hectare was recommended[24] . Therefore, the density of the refugia placed on the site was on the higher side of that suggested by applicable best practice guidelines. Each refugium was checked on at least seven occasions throughout the survey period (due to the high number of refugia deployed not all could be checked during suitable weather conditions during one visit).

11.62 Refugia of this type heat up faster than the surrounding substrate, and they therefore serve as an attractant for reptiles to bask on and shelter beneath in order to attain optimal body temperature more efficiently. The technique thereby allows these often elusive animals to be detected more readily.

11.63 Table 11-3 below provides the number of refugia used in each reptile survey area R1-R5 and the size of each area. Figure 3 provides the locations of these areas.

Table 11-3:
Size and Number of Reptile Refugia uses in each Area

Reptile Area	Approximate Size of Area (ha)	Number of Refugia Deployed
R1	14	140
R2	7.5	80
R3	11	110
R4	9	126
R5	1	10
Total	**42.5**	**466**

[24] Froglife (1999) Reptile Survey: an introduction to planning, conducting and interpreting surveys for snakes and lizard conservation. Froglife Advice Sheet 10. Froglife, Halesworth

2020/21

11.64 Incidental sightings of reptiles and notes on changes to suitable habitat were recorded during the wintering bird surveys of 2020/21 and the habitat survey of 2021. Detailed surveys for reptiles were not updated.

Bird Survey

Wintering Birds

2014/15

11.65 Continuous transect surveys of wintering bird activity within the application site were undertaken in each of November 2014, December 2014, January 2015 and February 2015. The methodology essentially replicated the territory mapping technique used for breeding surveys and based on the British Trust for Ornithology's (BTO) Common Bird Census[25] technique. The surveyor attended the site soon after sunrise in the morning of each visit and walked a continuous transect around the site taking in all field boundaries and concentrations of scrub, as well as more open habitats, and recording all visual and aural registrations of birds present onto a large scale map using standard species identification and activity notation. The start and end point and direction of travel along transects was varied between visits to avoid sequential bias.

11.66 Due to the known historic use of the site by owls, including in particular short-eared owl *Asio flammeus* and barn owl *Tyto alba*, a visit was made in the late afternoon/ early evening of the January visit in order to detect these species. The visit involved walking the site as a transect concentrating on areas perceived to offer high quality owl foraging habitat.

11.67 Table 11-4 below provides the details of each wintering bird survey visit.

Table 11-4:
Details of Wintering Bird Survey Visits

Date	28/11/2014	15/12/2014	20/01/2015	20/01/2015	25/02/2015
Start time	07:25	08:10	08:10	15:27	06:55
End time	10:30	11:15	11:30	17:10	11:35
Sunrise	07:41	08:02	07:57	-	07:01
Sunset	-	-	-	16:27	-
Cloud	8/8	0/8 to 8/8	0/8 to 8/8	8/8	8/8
Wind	Breezy at times	Little/no wind	Little/no wind	Little/no wind	Little/no wind

[25] Bibby, C. J., N.D. Burgess, D.A. Hill, and S.H. Mustoe. 2000. Bird census techniques. 2nd ed. Academic Press, London and San Diego, Calif. 302 p.

Temperature	10°C	6°C to 8°C	-3.5°C rising to 4°C	4°C dropping to 3.5°C	5°C to 8°C
Notes	Survey commenced prior to sunrise in order to detect owls		Heavy frost	Dusk survey	Light drizzle through most of survey. Clearing towards end.

2020/21

11.68 Three wintering bird surveys were conducted by SLR between mid-January and early March 2021, following the same methodology as described above. Two of the surveys were conducted just after sunrise and a third survey was conducted later in the day, taking in the dusk period, in order to increase the chances of detecting barn owl.

11.69 Table 11-5 below provides the details of each wintering bird survey visit.

Table 11-5:
Details of Wintering Bird Survey Visits 2020/21

Date	15/01/21	09/02/21	09/03/21
Start time	08:00	11:55	06:50
End time	13:05	17:35	12:00
Sunrise	08:00	-	06:28
Sunset	-	17:04	-
Cloud	8/8 to 7/8	7/8 to 8/8	0/8 to 1/8
Wind	Light wind	Moderate wind	Light wind
Temperature	1°C to 3°C	1°C to 2°C	3°C to 12°C
Notes	Dry	Light snow flurries at the beginning and end	Dry

Breeding Birds

2015

11.70 A continuous transect breeding bird survey of the application site was undertaken during each of April, May and June 2015. The methodology is based up the application of the territory mapping technique as forms the basis of the British Trust for Ornithology's (BTO) Common Bird Census[26] approach. The

[26] Bibby, C. J., N.D. Burgess, D.A. Hill, and S.H. Mustoe. 2000. Bird census techniques. 2nd ed. Academic Press, London and San Diego, Calif. 302 p.

surveyor attended the site just after sunrise and walked a continuous transect around the site taking in all field boundaries, as well as the more open aspects of the site, recording all visual and aural observations of birds present onto a large scale map using standard species identification and behavioural notation. Table 11-6 below provides the details of the breeding bird survey visits.

Table 11-6
Details of Breeding Bird Survey Visits

Date	15/04/2015	21/05/2015	24/06/2015
Start time	06:15	05:30	05:31
End time	10:25	10:00	09:48
Sunrise	06:04	04:58	04:41
Cloud	0/8	0/8	7/8- high cloud
Wind	Little/no wind	Little/no wind	Westerly 2-3
Temperature	5.5°C to 12.5°c	4.5°C to 13.5°C	14°C to 18°C

11.71 Surveys were only carried out during suitable weather; conditions that could suppress bird activity or otherwise compromise the effectiveness of the technique (e.g. strong wind, rain) were avoided.

11.72 Each species recorded during the survey was assigned to one of the following evidence categories[27] to assess the likelihood of breeding within the study area. The highest category observed over the three visits is used to inform the breeding status assessment for each species.

- Non-breeding
  - Flying over.
  - Feeding on the site only (likely to be breeding off-site).
- Possible Breeder
  - Species observed in suitable nesting habitat.
  - Singing male in suitable nesting habitat.
- Probable Breeder
  - Pair present in suitable nesting habitat.
  - Territory present between survey visits.
  - Courtship/ displaying.
  - Visiting probable nest.
  - Agitated behaviour from a parent bird.

[27] Derived from the methodology of the UK Breeding Bird Atlas 2007-11

- Nest building.

- Confirmed Breeding
  - Recently fledged young in suitable nesting habitat.
  - Adults entering or leaving a nest site.
  - Adult carrying a faecal sac or food.
  - Nest with eggs.
  - Nest with young.

11.73 At the completion of the three surveys, the visit maps were analysed and the number of apparent territories, based on individual singing males or other indications of territory holding/breeding, were counted to arrive at a site territory total for each species.

2020/21

11.74 Incidental sightings of breeding birds were recorded during the survey over 2020 and 2021. These are included within **Appendix 11/4**.

Barn Owl Monitoring

11.75 SLR is aware of the location of three of the owl boxes on site (refer to **Appendix 11/4** and **Appendix 11/6**). The bases of the trees on which they were located were checked for the presence owl pellets during the habitat walkover survey in April 2021.

Badger Survey

2014/15

11.76 Badger field signs searched for include prints, push-throughs, snagged hair, latrines, foraging evidence, paths and active or disused setts. Setts, if noted, were assessed for activity and classified according to standard criteria[28]. Incidental observations of badgers, where made, were recorded during the bat and bird surveys undertaken during 2014 and 2015.

2020/21

11.77 Incidental observations of badger setts and signs of their activity were searched for during the wintering bird surveys of 2020/21 and the habitat survey of 2021. Results are provided in a confidential map and **Appendix 11/5** (that would not be made available in the public domain).

Invertebrate Survey

2015

11.78 A specific assessment of the invertebrate interest of the study area was conducted between June and

[28] Harris, Cresswell & Jefferies (1989) Surveying Badgers. The Mammal Society. Blandford Forum, Dorset.

October 2015. Three different surveyors, with different specialist skills, were involved in the site visits in order to maximise the potential for recording different invertebrate groups.

11.79 The site was visited and terrestrial invertebrates were sampled on a total of five occasions as follows:

- 13th May 2015;
- 12th June 2015;
- 7th August 2015;
- 7th September 2015; and
- 7th October 2015.

11.80 On these dates, terrestrial invertebrate sampling was undertaken by direct observation and by the following active sampling methods:

- Sweep-netting. A stout hand-held net was moved vigorously through vegetation to dislodge resting insects. The technique may be used semi-quantitatively by timing the number of sweeps through vegetation of a similar type and counting selected groups of species;
- Beating trees and bushes. A cloth tray, held on a folding frame, was positioned below branches of trees or bushes and these were sharply tapped with a stick to dislodge insects. Black or white trays were used depending upon which group of invertebrates was being targeted for search. Insects were collected from the tray using a pooter – a mouth-operated suction device; and
- Suction sampling. This consisted of using a converted leaf blower to collect samples from grass and other longer ground vegetation. The sample was then everted into a net bag and the invertebrates removed with a pooter. The advantage of suction sampling is that it catches species which do not fly readily or which live in deep vegetation. It is particularly productive for Coleoptera, some Diptera and Arachnida.

11.81 In addition, overnight moth trapping was undertaken over the following nights:

- 13-14th June 2015;
- 28th-29th July 2015;
- 12th-13th August 2015; and
- 7th-8th October 2015.

11.82 The methods used during each nocturnal visit comprised the following:

- MV light-trapping. Mercury-vapour (mv) light bulbs were used to attract nocturnal insects - especially moths. These bulbs emit ultra-violet light at a wavelength which causes moths to be attracted, but the wavelength used is harmless to humans. The bulbs were mounted over catching chambers filled with cardboard egg-trays. Moths that entered the chambers and settled on these trays were examined. Bulbs were powered from portable generators. Light trapping is the single most effective method of recording moths. It is also valuable for recording some other nocturnal insect groups; and

- Actinic light trapping. Small size actinic traps, operated from 12-volt burglar-alarm batteries were left running from early evening to the following morning. These units are discrete because, whilst still having an output in the safe zone of the UV range, their light output in the visible part of the spectrum is reduced; thus, they can be tucked away in undergrowth at the side of a track without passers-by noticing them. For the same reasons, they attract moths and other insects from a much shorter distance and so the resultant catch is usually more representative of the habitat selected, in comparison with that in mercury vapour traps which attract flying species from a much wider area of the countryside.

11.83 The moth recording was not designed to be exhaustive. The objective was to obtain representative samples of the moth fauna from the various habitats present to ensure complete sampling coverage.

11.84 Passive sampling. This occurs in the absence of the surveyor. The use of a malaise trap for this purpose was regarded as highly desirable, but given the near constant presence of the general public on the site it was judged likely that the trap would probably not survive. Consequently, malaise trapping was judged impractical, and pitfall trapping was used.

- Pitfall trapping. Vending-machine cups or similar were placed in the ground with the rim flush at, or slightly below, the surface. A fluid was added, containing ethylene glycol, sodium chloride and formalin with a little detergent to reduce surface tension. Traps may be covered or uncovered and are typically left in position for a month at a time. Holes made in the sides of the cups a couple of centimetres below the rim permit flood or rain water to drain without the traps over-flowing and the catch becoming lost. Invertebrates simply fall into the traps. This is the single most effective means of recording ground beetles *(Carabidae)* but is also effective for rove beetles *(Staphylinidae),* some other beetle groups, spiders and most non-insect soil-dwelling arthropods.

11.85 Survey constraints. The main constraint of the invertebrate survey related to the digging up of the pitfall traps by dogs or foxes. Therefore, a limited amount of data was obtained from using this survey technique.

2021

11.86 Dedicated invertebrate surveys were not repeated in 2021; however, the surveyors were tasked with recording evidence of presence as incidental records within other surveys carried out.

Baseline Conditions

Nature Conservation Designations

11.87 The application site is not subject to any statutory or non-statutory nature conservation designation.

11.88 There are no International/European Statutory designated sites within 10km of the site boundary.

11.89 Table 11-7 below lists additional (non-International/European) Statutory designated sites within 5km of the application site boundary.

Table 11-7

Statutory Nature Conservation Sites within 5km of the Application Site Boundary

Site Name	Designation	Brief Description	Distance and Orientation from Site
Colney Heath	Local Nature Reserve	One of the few remaining acid heathlands in Hertfordshire.	South. 1.9km
Howe Dell	Local Nature Reserve	Comprises a stream lying at the bottom of a deeply incised valley containing a woodland.	East. 2.3km
Oxleys Wood	Local Nature Reserve	A woodland providing habitat for insects and common birds.	South East. 2.4km
The Wick Wood	Local Nature Reserve	Ancient semi-natural woodland, with a seasonal pond and an informal playing field.	West. 2.5km
Stanborough Reedmarsh	Local Nature Reserve	A wet woodland, reed marsh, and river bank.	North East. 3.3km
Watercress Wildlife Site	Local Nature Reserve	Old watercress beds and allotments. Bounded by the River Ver.	South West. 4.6km
Wheathampstead Development Centre	Local Nature Reserve	Secondary woodland with scrub and unimproved neutral grassland.	North West. 4.7km

11.90 In 2015, HERC notified of 23 non-statutory Local Wildlife Sites (LWS) within 2km of the application site boundary. In 2021 this was restricted to 15 LWS sites. Maps for the 2021 search are provided within **Appendix 11/7** with a list of the sites and a description (the previous chapter details the desk study in 2015).

11.91 The nearest LWS is 'Home Covert & Round Wood' LWS which adjoins the northern boundary of the application site. The description provided by HERC for this site states the following:

> *'Two areas of ancient semi-natural broadleaved woodland. Home Covert is predominantly Pedunculate Oak (Quercus robur) and Ash (Fraxinus excelsior) with remnant Hazel (Corylus avellana) coppice with some old Hornbeam (Carpinus betulus), including pollards, around the woodland edge. Sycamore (Acer pseudoplatanus) is frequent and Pedunculate Oak has been planted. Other canopy species include Betula pendula, Field Maple (Acer campestre) and rare Beech (Fagus sylvatica). The ground flora supports woodland indicators such as Bluebell (Hyacinthoides non-scripta), Dog's Mercury (Mercurialis perennis), Yellow Archangel (Lamiastrum galeobdolon) and Common Dog-violet (Viola riviniana) along with a good fern flora of Broad Buckler-fern (Dryopteris dilatata) and Male Fern (Dryopteris filix-mas). Round Wood is primarily a Hornbeam coppice with some Ash and Silver Birch standards and an occasional Holly (Ilex aquifolium) with Bluebell below. The bank along the eastern margin supports old coppiced Hornbeam, and Pedunculate Oak and Field Maple also occur at the woodland edge. Wildlife Site criteria: Ancient Woodland Inventory site; woodland indicators.'*

11.92 Reviewing the Ancient Woodland Inventory provided by HERC highlighted that Home Covert was not

mapped as an Ancient Woodland Inventory site, and a review of old map evidence similarly suggested it was secondary in origin. Subsequent correspondence with HERC revealed that the site was designated as a LWS on the basis of the presence of ancient woodland indicator species, rather than due to it being ancient woodland per se.

11.93 In 2015, HERC noted a total of seven Ancient Woodland Inventory Sites present further afield and within 2km of the application site boundary. In 2021 three sites were identified within the same boundary. The closest, Oak Wood, is located approximately 0.75km to the north-west. **Appendix 11/7** provides the list of these sites provided for the 2021 desk study request.

11.94 The application site is identified as lying within an opportunity area for 'acidic' grassland and/or heath creation in the Hertfordshire Ecological Networks Project.

Habitats

2015

11.95 The application site contained the following main habitat types in 2015 (categorised in accordance with the JNCC Phase 1 habitat survey methodology):

- Unmanaged neutral grassland
- Species-poor semi-improved mown grassland
- Grazed neutral grassland
- Neutral to acidic grassland
- Early succession communities with calcareous element
- Tall ruderal
- Hedgerows
- Scattered / dense scrub
- Recent plantation
- Waterbodies
- Watercourse / wet ditches
- Recently disturbed/bare ground
- Hard surfaces

11.96 A description of each habitat recorded, with an account of the dominant or more notable plant species recorded in each, is fully described within Chapter 11 of the 2016 ES; along with a full list of vascular plant species recorded on the application site.

2021

11.97 This updated assessment describes the habitats on site with reference to the UKHab methodology, making mention of notable differences to the previous habitat conditions described using the JNCC

methodology.

- Primary habitat classifications include:
  - Other lowland dry acid grassland
  - Other neutral grassland
  - Modified grassland
  - Hedgerow (Priority Habitat)
  - Eutrophic standing waters
  - Standing open water and canals
  - Lines of trees
  - Blackthorn scrub
  - Bramble scrub
  - Mixed scrub
  - Building
  - Other lowland mixed deciduous woodland
  - Developed land/sealed surface
- Secondary habitat classifications include:
  - Scattered scrub
  - Scattered trees
  - Scattered rushes
  - Tall herb
  - Ruderal/ephemeral
  - Plantation
  - Semi-natural woodland
  - Secondary woodland
  - Fresh water man-made
  - Freshwater natural
  - Grazed
  - Bare ground
  - Unmanaged
  - Green lane
  - Nature reserve
  - Temporary water bodies
  - Ditch
  - Recreation ground

11.98 A description of each habitat follows below, with an account of the dominant or more notable plant species recorded in each. The primary habitats are discussed in full and the secondary habitats are discussed in context with primary habitats that they are contained within.

u1b5 - Building

11.99 A former radio beacon/aerial lighthouse building is located on the eastern edge of the application site (shown as B1 on Figure 2 in **Appendix 11/2**). The building is a small, single storey height structure with a flat roof covered with roofing felt, constructed from redbrick (single skin), steel ceiling beams, antenna array and mast. The building is open on two sides where a door and window would have

originally been, therefore is open to the elements. Internally, there are a few electrical fixtures and metal cabinets left over from when the building was in use.

g3c Other Neutral Grassland (Previous Phase 1 Designation: Unmanaged Neutral Grassland

11.100 This is the dominant habitat type across large areas of the site, presenting itself as a more or less homogenous expanse of tall graminoid dominated vegetation punctuated by scattered saplings and small bushes, which locally become closer-spaced and mark a transition to scrub. The community owes much of its outward homogeneity to the dominance of a few bulky grass species, of which false oat-grass *Arrehantherum elatius* is the most typical; although, in some areas it is subordinate to cocksfoot *Dactylis glomerata* in cover. A broad range of other grass species make up the rest of the bulk in these outgrown swards, typically including timothy *Phleum pratense*, Yorkshire fog *Holcus lanatus*, couch *Elytrigia repens*, meadow foxtail *Alopecurus pratensis* and occasionally, tall fescue *Festuca arundinacea*. Finer leaved species include rough meadow grass *Poa trivialis*, creeping bent *Agrostis stolonifera* and red fescue *Festuca rubra* – the increasing dominance of the last of these marking a transition to typically more herb-rich examples. Of more scattered occurrence are perennial rye-grass *Lolium perenne,* soft brome *Bromus hordaceus*, barren brome *Anisantha sterilis,* sweet vernal grass *Anthoxanthum odoratum*, common bent *Agrostis capillaris,* smooth meadow grass *Poa pratensis* and more localised still are wood false brome *Brachypodium sylvaticum*¸ tufted hair-grass *Deschampsia cespitosa* and crested dog's-tail *Cynosurus cristatus*. A few clumps of the non-native pampas grass *Cortaderia sp*. and pendulous sedge *Carex pendula* (here likely to derive from imported material or of garden-escape origin) are also present in the central part of the site.

11.101 Herb diversity in these swards varies from areas where ruderals are prominent, to fairly species-rich swards, within which are a restricted suite of species indicative of semi-natural 'unimproved' conditions. The former areas are characterised by the presence of stinging nettle *Urtica dioica*, creeping thistle *Cirsium arvense*, hogweed *Heracleum sphondylium* and cleavers *Galium aparine* while the latter areas, the most diverse of which are often signposted by an increase to co-dominance of red fescue amongst the graminoid component, are commonly characterised by stands of common knapweed *Centaurea nigra*, with a variety of other herb species. These include, variously, wild carrot *Daucus carota*, bird's-foot trefoil *Lotus corniculatus*, stone parsley *Sison ammomum*, common toadflax *Linaria vulgaris,* ox-eye daisy *Leucantheum vulgare,* goat's-beard *Tragopogon pratensis*, smooth tare *Vicia tetrasperma,* tufted vetch *Vicia cracca*, red clover *Trifolium pratense,* hedge bedstraw *Galium mollugo,* lady's bedstraw *Galium verum,* red bartsia *Odontites vernus*, hawkweed ox-tongue *Picris hieracioides* meadow vetchling *Lathyrus pratensis* and hairy tare *Vicia hirsuta.* A notable find was the county-rare green-winged orchid *Orchis morio,* present in a relatively short-sward area in the central part of the site (see target note 1).

11.102 In general, there appears to be a good representation of the various sub-communities of *Arrehatherum elatioris* grassland recognised as community MG1 in the NVC. The F. rubra subcommunity MG1a, including both the *Bromus sterilis* and *Epilobium angustifolium* variants is certainly present, as is the *Urtica dioica* sub-community MG1b (including the *Artemisia vulgaris* variant). The more species-rich knapweed-dominated stands on the site also conform to the *Centaurea nigra* sub-community MG1e, with a particular concentration of these in the central part of the site along the course of the former run-way, and potentially indicative of the exposure of low-fertility soils beneath the now-removed concrete. In some ways, the chief interest of these grasslands, which are not dissimilar to the type of unmanaged grasslands commonly found on road-verges, over and above their unbroken extent (which is unusual), is the presence in one place of several sub-communities of MG1.

11.103 In 2021, the main difference across the grassland is the amount of scrub present. More areas have self-set with new scrub growth and the previous scattered saplings and small bushes have matured into small trees or merged into larger areas of scrub. Only a few additional species were recorded due to the time of year that the update survey was carried out. Some of the species listed above were not recorded, for example green-winged orchid flowers between May to June as do many of the other species described above. Also, the weather in the weeks preceding the survey has been poor for April. Additional species recorded within the grassland include; drooping brome, common ragwort, wild marjoram, germander speedwell, broad-leaved dock, broad-leaved willowherb, dog violet, cinquefoil, white dead nettle, spear thistle, black medick, hawkweed sp., lesser chickweed, couch, colt's-foot, oxeye daisy, ribwort plantain, common sorrel and greater plantain. A few rushes are present within the grassland close to waterbodies in the centre of the site where these areas become flooded seasonally.

11.104 Ant hills are found predominantly in the central and southern areas of the application site.

g3c, 520 – Other Neutral Grassland, Recreation Ground (Previous Phase 1 Designation - Species-poor Semi-improved Mown Grassland)

11.105 This habitat occurs in the western part of the application site, occupying one large irregularly shaped area that is maintained by periodic mowing. It is essentially little different in composition to the more species-poor examples of NVC MG1/ UKHab g3c described above; although, false oat-grass is sub-dominant in this area and the increased presence of species such as perennial rye-grass and robust fodder varieties of timothy and meadow foxtail testify to some input of fertiliser or other nutrients, either recently or in the past. Herb-wise, this area is very poor in species, with species such as creeping buttercup *Ranunculus repens*, ribwort plantain *Plantago lanceolata* and creeping cinquefoil *Potentilla reptans* being typical. Bird's-foot trefoil was still noted in one area.

11.106 In 2021, this area still shows signs of management with the majority comprising of short-sward grassland with a few smaller areas of longer grassland around the margins, but not completely unmanaged as no tussocks have formed. Additional species recorded than those above include; cock's-foot, red fescue, common bent, Yorkshire fog, sweet vernal, yarrow, white clover, common ragwort, dandelion, sheep's sorrel, creeping thistle, wild marjoram, common hogweed and cut-leaved geranium. The continued management in this area is the likely reason that it remains almost free of scrub, except a young oak and a few young hawthorns.

g4, 10, 11, 58 – Modified Grassland, Scattered Scrub, Scattered Trees, Grazed (Previous Phase 1 Designation: Grazed Neutral Grassland)

11.107 The eastern part of the application site encompasses part of a fenced-in enclosure that is subject to grazing by longhorn cattle. The sward here is close-cropped; although, punctuated by scattered taller individuals of less palatable species (such as ragwort Senecio jacobaea and knapweed), and with scattered topiaried survivals of pre-existing scrub, indicating that these areas were much like any other neglected area on the airfield prior to the comparatively recent introduction of grazing. More established thickets of (predominantly willow) scrub in this area are also developing a clear browse-line. The grassland species diversity here is quite high, probably reflective of the choice of location for the grazing enclosure more than a response to the grazing, with species such as wild carrot, yarrow *Achillea millefolium*, bird's-foot trefoil, common sorrel *Rumex acetosa*, meadow buttercup *Ranunculus acris,* hoary ragwort *Senecio erucifolius* and self-heal *Prunella vulgaris* noted here. The alien species goat's rue *Galega officinalis* is also present in this part of the site, probably introduced with disturbance

associated with the break-out of the former runway.

11.108 In 2021, this area is still grazed by longhorn cattle regularly keeping the sward close-cropped which helps to reduce the amount of ruderals and scrub. The description above is still relevant with bird's-foot trefoil, meadow buttercup, yarrow and clover sp., being most abundant at this time of year.

g1a6, 10 – Other Lowland Dry Acid Grassland, Scattered Scrub (Previous Phase 1 Designation: Neutral to Acidic Grassland)

11.109 This habitat occurs mainly in an area of rabbit-grazed short sward in the northern part of the site, with outlying representations occurring to the north and east of here at the boundaries of Home Covert. It is distinguished by the presence of certain species collectively indicative of a change in soil chemistry, and by the differing proportions of more broad-tolerance species such as common bent and sweet vernal grass, which become more prominent. In the main area, between Pond P1 (see above) and Home Covert, rabbit grazing acting in concert with past disturbance and compaction, has resulted in an expanse of close-cropped short turf with localised ruts and depressions that hold water after rain and during the winter.

11.110 The grassland is comprised mainly of red fescue, common bent, creeping bent, Yorkshire fog, smooth meadow grass and annual meadow grass *Poa annua* with the moss *Rhytidiadelphus squarrosus* abundant throughout. Herb species recorded here include bird's-foot trefoil, lesser trefoil *Trifolium dubium*, common centaury *Centaurium erythraea,* self-heal, dove's-foot cranesbill *Geranium molle,* sticky mouse-ear *Cerastium glomeratum*, sheep's sorrel *Rumex acetosella,* wall speedwell *Veronica arvensis,* thyme-leaved speedwell *Veronica serpyllifolia*, changing forget-me-not *Myosois discolor*, procumbent pearlwort *Sagina procumbens*, common centaury, parsley piert *Aphanes arvensis* and creeping cinquefoil. In seasonally damp ruts and depressions, creeping bent becomes prominent with creeping buttercup, procumbent pearlwort, fleabane *Pulicaria dysenterica*, marsh cudweed *Gnaphalium uliginosum* and the moss *Calliergonella cuspidata* with upstanding clumps of compact rush *Juncus conglomeratus* and hard rush *Juncus inflexus*, and a little toad rush *Juncus bufonis* also found. A seedling stage, green-leaved sedge assumed to be false-fox sedge *Carex otrubae* was also recorded here. Bracken *Pteridium aquilinum*, lesser stitchwort *Stellaria graminea* become prominent components of the drier and taller woodland edge grasslands eastwards of here and adjoining Home Covert, and similarly indicate a more acidic substrate. Additional species recorded in this area in 2021 include field wood-rush *Luzula campestris*.

11.111 In 2021, two additional areas were identified which fit this habitat definition in the northwest of the site. These areas are adjacent and comprise of a tightly grazed sward (rabbit grazed) with fine grasses, low-growing herbs, lichens and mosses. The grassland component included red fescue, common bent, sheep's-fescue and annual meadow-grass. Herbs recorded here include dove's-foot cranesbill, sticky mouse-ear, sheep's sorrel, procumbent pearlwort, parsley piert, common dog-violet and cat's-ear *Hypochaeris radicata*. Field wood-rush was also recorded occasionally. In July 2021, a further survey visit identified additional small areas of short sward rabbit grazed herb-rich grasslands with an acidic character. These areas were typically too small to map as distinct stands within other grassland vegetation.

g3c Other Neutral Grassland (Previous Phase 1 Designation: Neutral-calcareous Grassland)

11.112 In a very few areas of the application site, recent episodes of disturbance appear to have exposed lenses

of quite calcareous boulder clay, or disturbed soils have otherwise been admixed with crushed concrete or other calcium-rich artificial substrates. In these areas, and in addition to the more typical suite of neutral grassland species, a very limited suite of *calcicoles* is found, including blue fleabane *Erigeron acer* but with wild marjoram *Origanum vulgare*, hawkweed ox-tongue, and wild basil *Clinopodium vulgare* also noted, alongside typically higher cover of bird's-foot trefoil, knapweed and wild carrot.

11.113 In 2021 field surveys, this habitat type was less distinct than as described above from the remaining areas of unmanaged grassland sward, typically comprising an abundance of competitive grasses. A Dead heads of wild marjoram, knapweed and wild basil were sparsely distributed within the other neutral grassland habitat type described above.

g3c, 16, 17 - Other Neutral Grassland, tall herb, ruderal/ephemeral and g3c, 16, 73 – Other Neutral Grassland, tall herb, bare ground. (Previous Phase 1 Designation - Early Succession Communities)

11.114 Grass-poor and herb-rich communities with a high proportion of bare ground occur in certain areas of the site that have been subject to disturbance in the relatively recent past. Examples include the steep banks bordering pond P7, and locally along the course of and around the end of the former runway, with similar, although more species-poor, examples also found encroaching onto tarmac at the edges of the former taxiway.

11.115 Typical dominants in these areas include creeping cinquefoil, smooth hawk's-beard *Crepis capillaris*, dove's-foot cranesbill, black medick *Medicago lupulina*, ribwort plantain, daisy *Bellis perennis*, scented mayweed *Matricaria recutita*, perforate St. John's wort *Hypericum perforatum*, colt's-foot *Tussilago farfara*, scarlet pimpernel *Anagallis arvensis*, American willowherb *Epilobium ciliatum* and Canadian fleabane *Conyza canadensis*. Less frequent are more robust rosette-forming herbs such as teasel *Dipsacus fullonum*, weld *Reseda luteola* and great mullein *Verbascum thapsus*.

11.116 In 2021, much of the areas around Pond 7 and along the former runway, as discussed above, have grown up and are indistinguishable from the rest of the unmanaged grassland. There are still some sparser areas along the former runway and many of the species listed above are still present. Stands of similar vegetation are present around the two areas of bare ground towards the centre of the application site and on the adjacent bunds.

g3c, 16, 10 – Other Neutral Grassland, Tall Herb, Scattered Scrub (Previous Phase 1 Designation - Tall Ruderal)

11.117 This habitat is found on raised banks of loosely consolidated material, associated with two main areas of the site. Growing on these are tall, near monotypic stands of stinging nettle, with other species including elder, broad-leaved dock *Rumex obtusifolius*, hogweed and mugwort *Artemisia vulgaris.*

11.118 In 2021, these areas are much the same with a slight increase in the amount of scrub. Additional species recorded in 2021 include; hemlock, creeping thistle, ragwort, garlic mustard, broad-leaved willowherb, hawthorn and blackthorn.

Hedgerows

11.119 The hedgerow resource within the application site is relatively sparse given the extent of land area, reflecting rationalisation of Enclosure-age field boundaries and later 20th century removals to create the open area of the airfield. Consequently, most of the hedgerows on the site occur as remnant

stretches, with the most robust examples demarcating the western and southern boundaries of the former airfield. Each hedgerow is described below with reference to Figure 1 (**Appendix 11/2**). Note that hedgerows are mapped as polygons; although, converted to linear features for the purposes of Biodiversity Net Gain.

h2a Hedgerow (Priority Habitat) - Hedgerow H1

11.120 This hedgerow extends into the site from the eastern boundary, is partly sited on an indistinct bank, and adjoins a public right of way. It is dominated by hawthorn *Crataegus monogyna*, field maple *Acer campestre* and blackthorn *Prunus spinosa*, the last of which is suckering outwards into the adjoining grasslands in places. Less frequent woody species include hazel *Corylus avellana,* holly Ilex *aquifolium,* elder *Sambucus nigra*, oak *Quercus robur,* ash *Fraxinus excelsior* and hornbeam *Carpinus betulus*. There are a small number of standards, comprised of ash, oak and field maple, some of which are multi-stemmed from past cutting, with hornbeam at the western end. The ground-flora is species-poor, in part due to intense rabbit activity; although, hedge garlic *Alliaria petiolata,* wood dock *Rumex sangineus* and wood false brome are present. Woody species-diversity is around five species per 30m, which in conjunction with the adjoining public footpath, qualifies it as 'Important' under Schedule 2 of the Hedgerows Regulations 1997.

11.121 In 2021, the hedgerow the description above remains relevant, the main difference is the increase in hawthorn and blackthorn scrub, predominantly on the northern side growing outwards into the grassland. Only one further additional species was recorded, a single cherry *Prunus sp*.

11.122 There is more management on the southern side of the hedgerow to stop it encroaching onto the adjacent footpath.

h2a Hedgerow (Priority Habitat) - Hedgerow H2

11.123 This is an eastward continuation of H1 above, although without the adjoining public right of way. The same complement of species is present, with standards comprised of ash, hornbeam and field maple. The hedgerow is close to the qualification threshold for an 'Important' hedgerow set out under Schedule 2 of the Hedgerows Regulations but likely to fall just short.

11.124 In 2021, the hedgerow description above remains relevant, and as above the main difference is the increase of hawthorn and blackthorn scrub along the northern boundary.

11.125 As with hedgerow 1, there is more management on the southern side of the hedgerow to stop it encroaching onto the adjacent footpath.

Hedgerow H3 (defined in 2021 as Scrub)

11.126 This is a relict stretch of hedgerow extending part-way into the former airfield site from the southern boundary and with a shallow associated ditch. It comprises remnant lengths or isolated shrubs of woody vegetation, in between which are gaps filled with linear thickets of bramble *Rubus fruticosus agg*, itself permeated with ruderals such as stinging nettle and rosebay willowherb *Chamerion angustifolium.* Woody species diversity averages around 2-3 per 30m, comprising hawthorn, with elder and suckering elm *Ulmus procera* at the southern end, an area of dense blackthorn thicket in the central stretch, two small oak standards and one ash. The ground flora contains no woodland species. This

hedgerow does not meet the criteria for importance under Schedule 2 of the Hedgerows Regulations 1997.

11.127 In 2021, this is no longer regarded as a hedgerow as it is more than 5m wide and is not managed as a hedge. The feature has become incorporated into the surrounding scrub and wouldeventually become part of the woodland to the west and is currently partly joined to the woodland at the southern end.

h2a Hedgerow (Priority Habitat) (Hedgerow H4)

11.128 Another stretch of relict hedgerow extending a short way northwards into the site from Popefield Farm. The longest stretch is almost entirely dominated by blackthorn, which has expanded outwards to form a dense domed thicket. Closer to Popefield Farm the species mix includes goat willow *Salix caprea*, hawthorn and oak. This hedgerow does not meet the criteria for importance under Schedule 2 of the Hedgerows Regulations 1997.

11.129 In 2021, the hedgerow description above is still relevant. The only additional species was a couple of ash saplings.

11.130 There was previously a short section that bordered the northern grounds of Popefield farm, but this has since been removed leaving only the hedgerow bordering the western boundary.

h2a Hedgerow (Priority Habitat) (Hedgerow H5)

11.131 This mature hedgerow runs along the southern boundary of the application site adjoining the A1057 Hatfield Road. It is an unmanaged feature with a significant complement of large mature trees, including specimens of probably 19th century planted origin east of Popefield Farm. The woody species complement, in approximate order of abundance, includes hawthorn, oak, field maple, blackthorn, elder, ash, hazel, holly, wild cherry, common lime, beech, field maple and Norway maple, the last five of which occur as standards in the easternmost section. West of Popefield Farm the standards are mostly oak, with some ash. Ground flora includes wood avens, wood dock, rough meadow grass, lords and ladies, wood false brome and herb Robert. East of Popefield Farm, the northern side of this hedgerow is gradually beginning to merge with adjoining scrub, with a intervening transitional band of the non-native snowberry *Symphoricarpos alba* present here. This hedgerow averages between five and six qualifying woody species per thirty metres and in conjunction with other features meets the criteria for importance under Schedule 2 of the Hedgerows Regulations 1997.

11.132 In 2021, the hedgerow description above is still relevant. At the western end the area of grassland that was previous between the hedgerow and the planted woodland to the north has been largely scrubbed over. It is likely that this section of hedgerow with eventually become incorporated into the woodland. The same is true for part of the eastern end where the scrub within the grassland has matured and is now considered to meet the UKHab classification for woodland.

h2a, 94 - Hedgerow, Green Lane (Priority Habitat) (Hedgerow H6)

11.133 A mature hedgerow, locally a double-rowed feature on indistinct banks, which forms the south-western boundary of the site and adjoins a public right of way. It is a neglected feature, suffering from the effects of damage from foot traffic, dumping (including of garden waste) and shading due to proximity of buildings, but retains a fine complement of mature standards, mostly of oak but with some ash. Other

woody species include hazel, hawthorn, hornbeam, field maple and holly. Ground flora includes greater stitchwort *Stellaria holostea*, wood avens, wood dock and hedge garlic. This hedgerow averages between five and six qualifying woody species per thirty metres and in conjunction with other features such as the presence of the public right of way within or adjoining it, meets the criteria for importance under Schedule 2 of the Hedgerows Regulations 1997.

11.134 In 2021, the hedgerow description above is still relevant. The western hedgerow is in a poor state, gappy and very narrow against adjacent fence/buildings. The western hedgerow is predominantly Leyland cypress at the southern end. Additional species to those listed above include; sycamore saplings, blackthorn, elder, herb Robert and white dead nettle.

11.135 A few bluebells were noted at the northern end towards hedgerow H1.

h2a Hedgerow (Priority Habitat) - Hedgerow H7

11.136 A short section of hedgerow H7 falls within the application site and has been identified as meeting the priority habitat description.

w1g6 - Line of Trees

11.137 Two lines of trees are present within the site. One adjoins the western end of Hedgerow H1 and comprises semi-mature trees which are mainly hornbeam, with oak, ash, hawthorn and a small field maple. The other comprised of *Salix Sp.* is located a short distance north of Pond 7.

H3a – Blackthorn Scrub, H3d – Bramble Scrub, H3H – Mixed Scrub (Previous Phase 1 Designation Scattered / Dense Scrub)

11.138 Scattered self-sown scrub is an ever-present feature over the majority of the grasslands on the site, the main exception being the regularly mown areas in the south-west. Generally, it comprises shrubs and small trees up to around 3-4m in height occurring as isolated individuals, small groups or more concentrated patches which are beginning to occlude the remaining areas of grassland and influence their composition through light competition.

11.139 The make-up of the scrub across the site appears to vary based on soil conditions and/or the history of past disturbance. In the driest and least-disturbed areas, hawthorn is generally the most prevalent species, with localised dense thickets of blackthorn, but there are also areas in the southern part of the site east of Popefield Farm where oak seems to be dominant or co-dominant. Over most of the central and eastern portion of the site, these species give way to willow, variously goat willow, white willow *Salix alba* or (very locally) *osier Salix viminalis* and grey willow *Salix cinerea*, with hybrids between these also appearing to be present. More locally encountered are dog rose *Rosa canina* and field maple.

11.140 Scattered through this backdrop of hawthorn, oak or willow dominated scrub are various other species, some of which have evidently arrived as garden throw-outs or in otherwise imported material, have been actively planted or in some instances may be bird-sown. They include cherry plum *Prunus cerasifera var 'Atropurpurea'*, damson *Prunus domestica*, laburnum *Laburnum anagyroides*, golden willow *Salix alba var 'Vitellina'*, apple *Malus domestica,* silver birch *Betula pendula*, false acacia *Robinia pseudoacacia*, Italian alder *Alnus cordata*, buddleia *Buddleja davidii* and broom *Cytisus scoparius.*

11.141 The expanse of occluding scrub cover in the south-western part of the site is influencing the composition of the grasslands beneath, with an increase in shade-tolerant species such as male fern *Dryopteris filix-mas* and increases in the cover of mosses such as *Brachythecium rutabulum*.

11.142 In 2021, the descriptions above are still relevant, the only changes have been the maturing of small trees from 3-4m in height to 5m and above and an increase in more self-set scrub.

11.143 As per the UKHab classification these areas have been split into three categories where blackthorn and bramble are the dominant species and a third category for areas of mixed scrub.

w1f7, 38 – Other Lowland Mixed Deciduous Woodland – Secondary Woodland

11.144 The UKHab definition of a wood is land with more than 25% cover of trees more than 5m in height. Previously the scattered/dense scrub consisted of small trees up to 3-4m in height in 2016. In 2021, many of the trees are at least 5-6m tall and where this represents more than 25% within the grassland habitats (densely grouped areas, canopy's touching), these areas have been reclassified as woodland.

11.145 If the site is left without management in the future, it is likely that more areas wouldqualify as woodland under the UKHab classification.

w1f7, 37, 99 – Other Lowland Mixed Deciduous Woodland – Semi-Natural Woodland – Nature Reserve

11.146 A small section of semi-natural woodland falls within the application boundary and this forms part of the larger Home Covert Wood to the north of the site. The area which falls within the boundary was predominantly mature beech and carpets of bluebell *Hyacinthoides non-scripta.*

w1f7, 36 – Other Lowland Mixed Deciduous Woodland, Plantation (Previous Phase 1 Designation: Recent Plantation)

11.147 There are three small discrete areas of recent tree and shrub planting present in the south-western part of the application site, at the edges of the open area of mown grassland. The complement of species used is diverse, with blackthorn, field maple, goat willow, hornbeam, hawthorn and dog rose present, alongside dogwood *Cornus sanguinea*, silver birch, wild privet *Ligustrum vulgare*, guelder rose *Viburnum opulus* and other species that are otherwise scarce on the site.

11.148 Additional species recorded in 2021 include: alder (*Alnus glutinosus*), wayfaring tree (*Viburnum lantana*) and bramble. The understorey is predominantly bare ground with areas of patchy grasses, ruderals and herbs including cock's-foot, false oat-grass, red fescue, common nettle, wood avens, lords and ladies, cow parsley, germander speedwell and garlic mustard.

11.149 A fourth, slightly larger rectangular area in the south west corner of the site also contains, silver birch, oak, cherry sp., hazel, ash, hawthorn, dogwood, wayfaring tree, goat willow and blackthorn. These have been planted very close together and as such, the understorey is predominantly bare ground with a few grasses and common nettle.

r1a – Eutrophic Standing Waters (Waterbodies)– 41 Freshwater – Natural or 39 Freshwater – Man-made

11.150 There are seven waterbodies contained within the application site. Each is described below with reference to Figure 3 (in **Appendix 11/2**). Only those ponds falling within the application site boundary

are fully described below, hence the numbering is not sequential. Ponds 10 and 11 fall outside of the application site boundary, and sufficiently distant to be outside the zone of likely influence of the proposed activities, are therefore not discussed further in this chapter.

11.151 Where ponds have been given the UKHab Secondary Code 19 (Ponds – Priority Habitat), these have met the criteria due supporting protected species, great crested newt. This has also been assigned based on the most recent survey conducted in 2018 by SLR.

11.152 Ponds 1-4 and 6-11 have been given the Secondary Code 41 – freshwater – natural as, although some of them comprise of water-filled sand and gravel pits or land drains, they can be identified on 19th Century mapping and as such are natural, or at least long-established. The only pond that is a more recent addition is Pond 5 and therefore, this has been given the Secondary Code 39 – Freshwater – man-made. Ponds that were dry (Pond 2 and 9) were assigned Primary Habitat codes of the habitat adjacent to the feature.

Pond P1

11.153 Bioscan identified that this pond was present on19th century maps as a former small gravel pit, consisting of two adjoining basins (P1a and P1b) set within an area of scrub and mature trees and enclosed within post and wire fencing of recent origin. P1a was the larger, western depression and the more heavily shaded, with emergent vegetation restricted to a little reed canary grass *Phalaris arundinacea* and yellow flag *Iris pseudacorus* at the southern end. The pond appeared to dry out annually; although, in the summer the invasive non-native aquatic plant New Zealand pigmyweed *Crassula helmsii* was abundant. P1b was partly unshaded, and it also appeared to dry up annually or near-annually, supports a much more luxurious complement of emergent vegetation, including reed canary grass, yellow flag, soft rush *Juncus effusus*, gypsywort *Lycopus europeaus*, bittersweet *Solanum dulcumara*, clustered dock *Rumex conglomerates*, marsh bedstraw *Galium palustre*, pale persicaria *Persicaria lapathifolia*, common duckweed *Lemna minor*, marsh cudweed, water forget-me-not *Myostotis scorpiodes*, and a drawdown zone with rough meadow grass, chickweed *Stellaria media* and many-seeded goosefoot *Chenopodium polyspermum*. Moorhen nested in this pond.

11.154 In 2018, SLR refers to the pond as Pond 1 instead of two adjoining basins as the water had flooded across both basins, joining them as one. Water levels only receded slightly over the duration of the GCN surveys.

11.155 In 2021, the pond contained water and contained a moderate amount of aquatic vegetation. There has been a slight increase in perimeter scrub encroachment,

Pond P2

11.156 Bioscan referred to Pond 2 as a group of three very small depressions (potentially bomb craters left over from the WWII film set), close to P1 and overshaded by grey willow. During the Bioscan surveys two retained standing water in the early part of the year; although, the only vegetation associated with them was a mat of creeping bent.

11.157 In 2018, only two of these small depressions, containing water were identified by SLR and are therefore separately referred to as Ponds 2 and 3. Water levels only receded slightly over the duration of the GCN surveys.

11.158 In 2021, this pond was dry and was therefore assigned Primary Habitat codes of the habitat adjacent to the feature.

Pond 3

11.159 Bioscan identified this waterbody as a somewhat larger, crater-like, steep-sided depression close to P1. It retained standing water in the early part of the year and was shaded on two sides by dense willow, bramble, dog rose and tall ruderals. Wetland vegetation comprised mainly a dense mat of creeping bent, but there was also a little creeping buttercup, gypsywort and water forget-me-not.

11.160 This pond was not evident to SLR in 2018 and as described above, SLR reference to Ponds 2 and 3 is not the same. Water levels only receded slightly over the duration of the GCN surveys.

11.161 In 2021, Pond 3 contained water and very little aquatic vegetation.

Pond P4

11.162 Bioscan identified this pond as a length of steep-sided ditch forming part of the course of the Nast that retained standing water for much of the winter and the early part of the year. It only appeared to function as part of a flowing water system in periods of high precipitation and surface water run-off. Emergent vegetation included tufted hair grass, lesser pond sedge *Carex acutiformis*, water mint, meadow vetchling, compact rush, hoary willowherb *Epilobium parviflorum*, and bittersweet with, of some note, sneezewort *Achillea ptarmica* and he hybrid mint *Mentha x verticillata* also noted *acutiformis,* water mint, meadow vetchling, compact rush, hoary willowherb *Epilobium parviflorum*, and bittersweet with, of some note, sneezewort *Achillea ptarmica* and he hybrid mint *Mentha x verticillata* also noted.

11.163 In 2018, SLR recorded only a slight recession in water levels during the GCN surveys.

11.164 In 2021, the pond contained water and there was a good amount of emerging and aquatic vegetation, including mint, floating grass and pond weed sp.). The pond was highly turbid and a dog was witnessed jumping in and out stirring up the sediment. An increase in scrub is apparent at the western end.

Pond P5

11.165 Bioscan identified this is an artificial waterbody of recently created origin and set down between steep raised banks. It appears to hold standing water on a semi-permanent basis and has a reasonable complement of emergent vegetation including reedmace *Typha latifolia*, water plantain *Alisma plantago-aquatica,* common spike rush *Eleocharis palustris*, jointed rush *Juncus articulatus,* marsh bedstraw*,* branched bur-reed *Sparganium erectum* and cyperus sedge *Carex pseudocyperus*, with grey willow saplings.

11.166 In 2018, SLR recorded only a slight recession in water levels during the GCN surveys.

11.167 In 2021, the pond contained water and the scrub within and around the margins had greatly increased from previous surveys.

Pond P7

11.168 Bioscan identified this as a complex of small, very shallow depressions within a stand of willow, and supporting sparse but tall growth of common reed *Phragmites australis*. They all dry up by late spring/early summer.

11.169 In 2018, SLR recorded only a slight recession in water levels during the GCN surveys.

11.170 In 2021, this pond contained very low water levels and is likely to dry up entirely.

Pond P8

11.171 Bioscan identified this waterbody, close to Popefield Farm at adjoining the southern boundary of the application site, pre-dates the airfield and appears on 19th Century maps. It was a moderate size but silted, shallow and heavily shaded feature by virtue of the adjoining outgrown hedgerow and associated dense scrub. It retained little emergent vegetation. It appeared to also receive surface water run-off from the adjoining A1057 which may affect its water quality.

11.172 In 2018, SLR recorded only a slight recession in water levels during the GCN surveys.

11.173 In 2021, the pond contained water, moderate levels of aquatic vegetation and there has been an increase in the amount of scrub around the perimeter.

Pond P9

11.174 Bioscan identified that this was a section of the surface water drainage ditch system that carried the flow of the Nast watercourse. This section was immediately upstream of the culvert that takes the Nast below the airfield, and the frequency of standing water here may be a symptom of backing up of flow (for example if the culvert capacity was compromised by collapse or silting up). Mostly it was densely overshaded with no aquatic or emergent vegetation, but there were unshaded lengths with dense stands of great willowherb *Epilobium hirsutum,* lesser pond-sedge and/or reed canary grass.

11.175 In 2018, the water levels started to recede during the second GCN survey visits and by the third visit the pond was completely dry.

11.176 In 2021, this pond was dry and was therefore assigned Primary Habitat codes of the habitat adjacent to the feature.

r1a, 191 – Eutrophic Standing Waters, Ditch (Previous Phase 1 Habitat Designation - Watercourse / Wet Ditches)

11.177 Crossing the northern part of the application site is a narrow ditch carrying a minor watercourse known as the Nast. South of Home Covert this watercourse enters a culvert which takes it beneath the main area of the former airfield, to re-emerge at a point adjacent to the A1057 Hatfield Road. The remaining sections of open channel are for much of the year dry or only damp; although, locally holding ponded lengths of static water in the spring (see P4 and P9 above).

11.178 Where not densely overshaded by adjoining scrub, the dampest areas support wetland vegetation distinct from the surrounding grasslands. In places this is merely stands of great willowherb, but there are also sections dominated by lesser pond sedge and reed canary grass with associates including clustered dock, soft rush and false fox-sedge *Carex otrubae*. In other (typically no more than damp)

stretches, species include creeping bent, tufted hair-grass, bittersweet, water mint and meadow vetchling. In the section described above as P4, sneezewort and the hybrid *Mentha x verticillata* were recorded.

11.179 In 2021, apart from the main section of ditch at Pond 4 and a short section of ditch in the north east of the site, the remaining ditches were dry. The main change across all sections of ditch is the increase in scrub at the perimeters.

g3c, 17, 73 - Other Neutral Grassland, Ruderal/Ephemeral, Bare Ground (Previous Phase 1 Designation: Recently disturbed / bare ground)

11.180 This habitat occurs in two distinct areas of the site – a patch of ground in the northern part of the site which appears to have been recently stripped and laid to hardcore, and a fenced-off mounded area, and adjacent spoil heaps, in the central part of the site comprised of crushed concrete and other materials, and which is evidently still being regularly treated with herbicide to address Japanese knotweed contamination. The complement of pioneer species found in these areas is close to that described under 'Early Succession Communities' above, but with certain ruderals and opportunists such as teasel, colt's-foot, buddleia and American willowherb being particularly prevalent. These areas have been assigned a UKHab Primary Habitat code based on the most dominant adjacent habitat, grassland.

11.181 These areas are still largely bare ground in 2021 with sparse vegetation. Additional species recorded include; black medick, sticky mouse-ear, bird's-foot trefoil, dog violet, scarlet pimpernel, ribwort plantain, thyme-leaved speedwell, red fescue, annual meadow-grass, and sheep's sorrel.

11.182 Planted daffodils *Narcissus* sp. are also present around the area in the northern part of the site.

11.183 Other areas with ephemeral/bare ground include the footpaths present throughout the site. These areas receive a relatively high footfall and are maintained, keeping the vegetation low.

u1b Developed Land; Sealed Surface (Previous Phase 1 designation: Hard surfaces)

11.184 This habitat type is restricted to the still-sealed concrete surface of the former taxiway and a series of compacted unbound aggregate footpaths/pathways throughout the site. Some of the aggregate pathways have become vegetated with short sward grassland but are still well-used and maintained. No additional plant species were recorded that haven't already been recorded elsewhere within the site. Apart from the former taxiway, footpaths/pathways have not been mapped on the 2021 UK Habitat Classification map (Drawing HQ 11/1) as the majority are less than 1m wide or are becoming vegetated and incorporated into the adjacent grassland. These have therefore been assigned Primary Habitat codes of the habitat adjacent to the feature.

Bats

Desk Study

11.185 In 2015, HERC provided a total of 71 bat records for the search area, with these records relating to soprano pipistrelle *Pipistrellus pygmaeus*, common pipistrelle *Pipistrellus pipistrellus*, pipistrelle sp., brown long-eared bat *Plecotus auritus*, *noctule Nyctalus noctula*, Natterer's bat *Myotis nattereri* and unspecified 'bat species'. No bat records were listed as specific to the application site itself, although

brown long-eared bat, Natterer's bat and common pipistrelle records were provided for the three 1km squares[29] in which the site sits. These are the only pre-existing data obtained - none of the previous surveys of the airfield reviewed earlier in this chapter incorporated specialist bat surveys.

11.186 In 2021, HERC provided a total of 430 bat records for the search area with these records relating to Chiroptera sp., Western barbastrelle *Barbastella barbastrellus*, serotine *Eptesicus serotinus*, Natterer's bat, Whiskered/Brandt's bat *Myotis mystacius/brantii,* Daubenton's bat *Myotis daubentonii, lesser noctule Nyctalus leisleri*, *Nyctalus Sp.,* Myotis Sp., common pipistrelle, pipistrelle sp., brown long-eared, long-eared Plecotus sp. and unidentified species records.

11.187 The majority of records related to field observations and aural detector records with a lesser number of records of grounded bats, road casualties, other casualties and roosts. The roosts related to the following species: common pipistrelle, soprano pipistrelle and brown long-eared bats including one maternity roost of the latter.

Bat Activity Surveys

2015

11.188 Figures 4 to 6 (**Appendix 11/2**) afford an appreciation of the distribution of bat registrations recorded on each of the three transect surveys carried out in June, July and September 2015. Table 11-8 below lists the species recorded and the number of sound files for each recorded on each survey visit.

Table 11-8:
Species and Number of Sound Files Recorded for each Species during each Bat Transect Survey

Species	Scientific Name	23/06/2015	29/07/2015		07/09/2015		Total	Percentage of Files
Area		All	South	North	South	North		
Common Pipistrelle	*Pipistrellus pipistrellus*	35	39	40	31	16	161	69.1
Pipistrelle sp. (Nathusius'/common)[30]	*Pipistrelle sp.*	1	8	4	4	5	22	9.4
Pipistrelle sp. (common/soprano)[31]	*Pipistrelle sp.*	6	1	0	4	0	11	4.7
Soprano Pipistrelle	*Pipistrellus pygmaeus*	13	1	3	3	1	21	9
Noctule	*Nyctalus noctula*	3	4	1	2	3	13	5.6

[29] TL1907, TL2008 and TL1908

[30] Where Pipistrelle calls were around 40kHz these have been noted to genus level only, as the calls could not be definitively attributed to either Nathusius' or common pipistrelle.

[31] Where Pipistrelle calls were at approximately 50kHz these have been noted as Pipistrelle sp. Both species can produce calls at or around 50kHz and as such it is not possible to directly attribute a call of this frequency to either species.

Long-eared bat[32]	*Plecotus sp.*	1	0	0	1	0	2	0.9
Daubenton's bat[33]	*Myotis daubentonii*	0	0	0	1	0	1	0.4
Whiskered/Alcathoe/ Brandt's bat[33]	*Myotis mystacinus/ Myotis alcathoe/ Myotis brandtii*	0	0	0	0	2	2	0.9

11.189 By far the most frequently recorded species on the transect surveys was common pipistrelle, which accounted for at least 69% of all registrations. Much less frequently encountered were soprano pipistrelle (at least 9% of registrations), noctule (5.6%), Daubenton's bat (0.4%) and whiskered/Alcathoe/Brandt's bat (0.9%). A significant number of registrations around the 40kHz frequency were made, but none were conclusively attributable to the rare Nathusius' pipistrelle, and it remains possible that the species labelled as 'Pipistrelle sp. (Nathusius'/common)' in Table 11-8 may be common pipistrelle bats calling at unusually low frequency.

11.190 Figure 7 (**Appendix 11/2**) shows the locations of confirmed foraging and other constant activity recorded across the study area over all of the surveys. The areas of the site most frequently utilised by bats were, not surprisingly, locations which held water, mature trees and/or shelter (e.g. hedgerows).

2021

11.191 Bat activity surveys were not updated in 2021. Habitat quality in relation to bat foraging and commuting potential is not considered to have altered significantly in the 5 years since 2015 and therefore the baseline conditions described above are considered relevant to the current assessment.

Automated Bat Survey

2015

11.192 Table 11-9 below provides the results of the automated bat surveys carried out on the site during each of June, July and September 2015.

Table 11-9:
Number of Files for each Species at each Automated Survey Point

[32] Almost certainly brown long-eared bat.

[33] The use of the 'slope' function in Analook is used to aid in the identification of *Myotis* species (*Myotis* calls are generally difficult to attribute to species); however, where slope is ambiguous these have been noted as *Myotis* sp. Calls attributed to Daubenton's bat and to the WAB group (whiskered/Alcathoe/ Brandt's bat) are 'probable' identifications.

Survey Period	June 2015		July 2015		September 2015		Total	
Detector Location (see Figure 2)	A1		A2		A3			
Species	No. of Files	%	No. of Files	%	No. of Files	%	No. of Files	%
Common pipistrelle	124	59.62	1512	84.19	69	41.07	1705	78.5
Pipistrelle (Nathusius'/common)[34]	44	21.15	106	5.90	0	0.00	150	6.9
Noctule	12	5.77	30	1.67	32	19.05	74	3.4
Pipistrelle (common/soprano) [35]	5	2.40	83	4.62	27	16.07	115	5.3
Long-eared bat[36]	7	3.37	4	0.22	15	8.93	26	1.2
Natterer's bat[37]	0	0.00	2	0.11	19	11.31	21	1.0
Myotis sp.[37]	5	2.40	21	1.17	3	1.79	29	1.3
Soprano pipistrelle	5	2.40	28	1.56	1	0.60	34	1.6
Nathusius' pipistrelle	4	1.92	2	0.11	1	0.60	7	0.3
Whiskered/Alcathoe/Brandt's bat[37]	1	0.48	0	0.00	0	0.00	1	0.0
Bat (unidentified)[38]	1	0.48	2	0.11	1	0.60	3	0.1
Daubenton's bat[37]	0	0.00	1	0.06	0	0.00	1	0.0
Serotine/Noctule[39]	0	0.00	5	0.28	0	0.00	5	0.2

11.193 Broadly speaking, the automated results mirror those obtained on the transect surveys with again by far the most frequently recorded species being common pipistrelle (at least 78% of all registrations). Non-Pipistrellus species cumulatively make up less than 10%; they include noctule, long-eared bat (almost certainly brown long-eared), Daubenton's, Natterer's and whiskered/Alcathoe/Brandt's bat, with five sound-files (0.28% of the total) possibly attributable to serotine.

[34] Where calls were around 40kHz these have been noted to genus level only, as the calls could not be definitively attributed to either Nathusius' or common pipistrelle.

[35] Where Pipistrelle calls were at approximately 50kHz these have been noted as Pipistrelle sp. Both species can produce calls at or around 50kHz and as such it is not possible to directly attribute a call of this frequency to either species.

[36] Likely to be brown long-eared bat.

[37] The slope function in Analook is used to aid in the identification of *Myotis* species (*Myotis* calls are generally difficult to attribute to a specific species); however, where slope is ambiguous these have been noted as *Myotis* sp. The *Myotis* species above (Daubenton's bat, Natterer's bat, whiskered/Alcathoe/ Brandt's bat) are probable identifications and are in addition to the number of *Myotis* files.

[38] This label has been used where it is possible to identify that a bat was present, but where there was insufficient call data to attribute the registration to Family or Genus level.

[39] This label was used where a 'big bat' (Eptesicus/Nyctalus sp) was present but due to the quality of the call it was difficult to determine the species.

2021

11.194 No automated bat surveys were conducted in 2021.

Assessment of Roosting Potential

2015

11.195 Table 11-10 below provides the results of the bat tree roost assessment of the two mature trees near the centre of the site (T1 and T2), and of the Airfield Radio Beacon / Aerial Lighthouse building adjoining the eastern boundary (B1).

Table 11-10
Bat Roosting Assessment

Tree/Building Reference	Bat Roosting Potential	Notes
T1	High	Two woodpecker holes- 12m east. Decaying branch on south-east with raised bark and cracks present.
T2	Medium/high	Decaying branch on south side, with knot holes at end of branch and at fork. Rotted knot hole on south side of main trunk
B1	Negligible	Brick built single storey structure, with a flat roof and no void. Small gaps behind barge-boarding filled with cobwebs or too narrow for bat access. No bat droppings noted inside and interior signs of both vandalism and use by cattle.

11.196 The two trees (T1 and T1) were additionally subject to emergence surveys in July and September 2015, with no bats found to emerge.

2021

11.197 In 2021, SLR noted the presence of a single Schwegler 2F bat box on a hornbeam during the habitat survey. The box was not inspected due to it being out of reach from a ground survey. However, the positioning of the box on the tree reduces its suitability for roosting bats substantially; at almost a 45-degree angle, tilted backwards, which would allow the box to fill up with water when it rains.

11.198 The BRP of the building was not re-assessed with the previous assessment of Negligible value being taken forward in this assessment.

Evaluation of Bat Interest of the Application Site

11.199 By far the most frequently detected bat species during the bat activity and automated surveys was common pipistrelle. This species is Britain's and Hertfordshire's[40] most common bat species and can be

[40] http://hmbg.org.uk/bats-in-hertfordshire-middlesex/

found in a wide range of habitats[41]. Common pipistrelle is showing long-term (and short-term) increases in population trends in the UK[42]. This species is a generalist being found in a wide variety of habitats, and its occurrence on the site is entirely to be expected.

11.200 Soprano pipistrelle was also encountered on the site, but to a substantially reduced degree compared with common pipistrelle. This is likely to be due to the relative lack of this species' preferred foraging habitats, which tend to be more focused on riparian and wetland habitats than the more generalist common pipistrelle. As with common pipistrelle, this species is a common bat in both Britain and Hertfordshire[36].

11.201 There were low levels of activity indicated for Nathusius' pipistrelle on the site, with seven registrations recorded during the automated bat survey element. Nevertheless, there were approximately 170 records/files of pipistrelles calling within the 40kHz range, some of which could also be Nathusius' pipistrelle. This species is considered by Hertfordshire and Middlesex Bat Group (HMBG) to be widespread, but scarce. Nationally this species is considered rare, and confirmed roosts are not often found, but there has been an increase in records in recent years. This may be due to an increase in bat surveyors looking for this species coupled with advances in technology and analysis software.

11.202 Noctule was regularly though sparsely recorded during the surveys, with most registrations being of bats flying high over the site, often very soon after sunset, and possibly indicative of transient bats commuting over the site to more favoured foraging habitats (possibly the gravel pit settling ponds to the north). HMBG describes the status of this species as "*widespread, but relatively scarce*". The species has shown population declines in Britain in the past due to the loss of good feeding habitats, mainly from agricultural intensification. However, there does not appear to currently be a significant change in the population trend for this species.

11.203 Due to the difficulty of identifying bats from the Myotis genus to species level, especially where foraging in terrestrial environments rather than over open water, many of the Myotis species records from the site have been identified to genus level only. However, probable identification to species level was attempted using the recordings from the Anabat and the 'slope' feature in Analook. This analysis identified probable Daubenton's bat, probable Natterer's bat and probable whiskered/Alcathoe/Brandt's bat, but it should be stressed that these are probable identifications; the most conclusive method of identifying these species is through capture and identification in the hand. Of these species, Natterer's has been recorded from the locality in the past [source: HERC data].

11.204 Different *Myotis* species prefer different habitats but the habitat requirements of the above species assessed to be present on the site are met, particularly given the presence of mature woodland adjoining the application site to the north. On balance it is considered likely that the majority of the unspecified Myotis registrations made wouldbe from, Natterer's, Daubenton's and whiskered or Brandt's bats.

11.205 Daubenton's bat population trends are showing a very slight steady increase, whilst for whiskered/Brandt's bat the trend has shown an increase with a slight decrease in the last few years[43].

[41] Hundt (2012). Bat Surveys- Good Practice Guidelines, 2nd Edition. Bat Conservation Trust, London.

[42] Bat Conservation Trust (2014) The State of the UK's bats- National Bat Monitoring Programme Population Trends 2014. BCT

[43] Bat Conservation Trust (2014) The State of the UK's bats- National Bat Monitoring Programme Population Trends 2014.BCT

Daubenton's bat is fairly widespread in Hertfordshire[44] and the UK, whilst whiskered bat is assumed to be rare[45].

11.206 Although there were 28 registrations of long-eared bats encountered on the site, this is likely to be unrepresentative due to the difficulty that bat detectors have in picking up the very quiet calls from the Plecotus genus. The most likely Plecotus on the site, brown long-eared bat, is one of the UK's and Hertfordshire's commonest bat species. Its habitat preferences include woodland, as well as rivers, lakes and grassland. Brown long-eared bats are currently showing a slight long-term and short-term decrease in population; the reasons for this are unknown but may be related in part to the management neglect of woodlands and the loss of traditional agricultural buildings to neglect or conversion.

11.207 Overall, the bat activity recorded on the site was comparatively low in consideration of the site area. This is not unexpected given the open nature of the site, the relative lack of upstanding features and habitat 'edges' and the sparseness of favoured foraging resources such as woodland, waterbodies, and hedgerows.

Other Protected/Notable Mammals

Desk Study

11.208 In 2021, HERC provided four historical records of water vole *Arvicola amphibius* from between 1967 and 1987 with nothing more recent. Similarly, one historical record of red squirrel Sciurus vulgaris was noted from 1945. Due to the historical nature of the records and the lack of specific location these are considered not to be relevant in this assessment. No records of otter *Lutra lutra* were returned.

Field Survey

11.209 No signs of presence of these species was detected in surveys of the site.

Great Crested Newt Survey

Desk Study

11.210 In 2015, HERC provided fifteen great crested newt records for the search area, with the nearest relating to a site 0.4km to the west, and the latest record from 2006.

11.211 The 2008 Cresswell Associates report stated that in 1999, two ponds (P1 and P3 on Figure 3) contained a small population of great crested newts. A site walkover in 2010 by Cresswell Associates also encountered a great crested newt under a refugium near a bund approximately 30m south-east of P3. An update survey by Cresswell in 2010 again found great crested newts in P1 and P3, with this species also confirmed in P5 and P8 (see Figure 3). It was assessed at this time that there was a 'medium-sized' population on the site.

11.212 In 2015 LDA Design undertook a great crested newt eDNA survey of 13 waterbodies within the vicinity

[44] http://hmbg.org.uk/bats-in-hertfordshire-middlesex/

[45] Bat Conservation Trust (2010) BCT Brown long-eared - Species information leaflet. Bat Conservation Trust

of the northern part of Ellenbrook Fields. Two of the surveyed waterbodies (P7 and P10 on Figure 3) were also encompassed within the scope of the great crested newt surveys undertaken by Bioscan in 2015. The results from the eDNA survey confirmed the presence of great crested newt within three of the waterbodies; these comprised a waterbody to the north of Home Covert, a pond within the Ellenbrook Linear park at the eastern edge of the airfield and P7 immediately east of the application site. A negative result was also returned for P10 (off-site and within Home Covert).

11.213 Further great crested newt records for ponds to the north and north-west of the application site were obtained from a review of the St Alban's District Council planning portal. These relate to a live planning application for restoration of part of the CEMEX Hatfield Quarry, the supporting information for which refers to positive records for great crested newts in ponds at Beech Farm (c.300m NW of the application site) and Ball's Copse (just under 375m north of the application site).

11.214 In 2021, HERC provided 72 records of this species with the most recent from 2020 to confirm their local presence in recent years.

Ponds Surveyed

2015

11.215 Habitat descriptions of each waterbody within the application site are given earlier in this section. Table 11-11 below lists further details of the suitability of each of these for great crested newts, including HSI scores, as well as equivalent details for three further waterbodies outside the application site, but which were also included within the great crested newt surveys carried out in 2015 by Bioscan and/or LDA Design. The locations of each of these waterbodies are indicated on Figure 3 (**Appendix 11/2**).

Table 11-11:
Waterbody Information and HSI Results - 2015

Waterbody Reference	Approximate Size (m^2)	Notes/Brief Description (see also habitat descriptions above)	HSI Score	Suitability for GCN
P1a and P1b	P1a- 190 P1b- 100	The water level in P1a became very low by the end of the newt surveys, whilst P1b had dried up by the fifth visit.	P1a- 0.78 P1b- 0.58	P1a- Good P1b- Below average
P2	3	Two to three crater-like depressions to the east of P1. These had dried up by the third newt survey visit.	0.36	Poor
P3	30	Few suitable egg laying plants were noted. The water level decreased through the newt surveying season, and by the sixth visit no water remained.	0.59	Below average
P4	30	Part of the Nast ditch system. It was very shallow and became dry by the third visit.	0.55	Below average
P5	70	A deep linear feature near Home Covert. A wide variety of invertebrates were noted. The water level decreased during each survey visit, but it did not dry out.	0.75	Good

Waterbody Reference	Approximate Size (m^2)	Notes/Brief Description (see also habitat descriptions above)	HSI Score	Suitability for GCN
P6	480	A linear feature just outside of the site boundary. Surrounded by young willows, although the waterbody is still relatively open. Dry by the summer. Appears to be used by the grazing cattle as a watering resource.	0.79	Good
P7	40	Shallow depressions in a stand of trees. Dried up by the fourth visit.	0.40	Poor
P8	200	Immediately adjacent to the A1057 (Hatfield Road). It is fairly shallow and looks to be fed from surface water run-off from the road.	0.63	Average
P9	150	Part of the Nast ditch system and on the edge of Home Covert. Large parts of the periphery of waterbody are overgrown with vegetation. Dry by the second visit.	0.51	Below average
P10	1900	A large long-established pond in Home Covert. The waterbody has a small island. Due to the large amounts of leaf litter the depth of the waterbody could not be determined. The presence of spent shotgun cartridges suggests this waterbody is used for shooting waterfowl. It may also have fish.	0.65	Average
P11	80	Two shallow depressions next to a path. Likely to be used by the grazing cattle as a water resource. Dried up by the fourth visit.	0.49	Poor

2018

11.216 Great crested newt surveys were undertaken at ponds within and adjacent to the application site in accordance with standard survey methods between 12th April and 2nd May 2018. Pond survey methods included torching, bottle trapping where water depths allowed and egg searching of suitable vegetation. Surveys in some ponds were constrained by their ephemeral nature, meaning that ponds dried during the survey period, even though this limitation was mitigated as far as possible by conducting surveys early in the season. Water turbidity and vegetation cover is highlighted as a possible survey limitation at 5 ponds, although GCN were reported as present in 2 of these ponds. In the context of the survey results, neither of these limitations identified are considered to significantly affect interpretation of the results. Table 11-12 summarises GCN survey data collected in 2018.

Table 11-12:
Summary GCN Survey and HSI Results (2018)

Pond Ref.	Gt. Crested Newts Detected?	Peak Adult Count	Pop Size Class	HSI	Low Detect-ability Warning*	Peak Count Visit Number	Eggs
P1	Yes	7	Small	0.78	Caution	3	Yes

Pond Ref.	Gt. Crested Newts Detected?	Peak Adult Count	Pop Size Class	HSI	Low Detect-ability Warning*	Peak Count Visit Number	Eggs
P1b (note same pond basin as P1 above)	No	0		0.58			
P2	No	0		0.36	Caution		No
P3	No	0		0.54	Caution		No
P4	Yes	1	Small	0.55		3	No
P5	Yes	0		0.73	Caution		Yes
P6	Yes	11	Medium	0.79		2	Yes
P7	No	0		0.40			No
P8	No	0		0.63			No
P9	No	0		0.51			No
P10	Yes	1	Small	N/A	-	2	No
P11	Yes	3	Small	N/A	Caution	2	Yes

*Low detectability warning is an automatic warning relating either to high turbidity or dense vegetation cover, which may inhibit detection of GCN in pond surveys. This information is taken directly from the Natural England GCN Method Statement prepared for the previous application.

2021

11.217 Table 11-13 below provides the details of the 2021 HSI survey. Note, that SLR refers to Ponds P1a and P1b as Pond 1.

Table 11-13:
Waterbody Information and HSI Results (2021)

Waterbody Reference	Approximate Size (m^2)	Notes/Brief Description (see also habitat descriptions above)	HSI Score	Suitability for GCN
P1	290	Seasonal pond due to water logging of surrounding area	0.59	Below Average
P2	3	Very small ephemeral pond. Dry	N/A	N/A
P3	3	Ephemeral pond. Very small pond with no vegetation.	0.37	Poor
P4	30	Part of the Nast ditch system. Likely to be a seasonal pond due to the amount of waterlogging in the surrounding area.	0.66	Average

Waterbody Reference	Approximate Size (m^2)	Notes/Brief Description (see also habitat descriptions above)	HSI Score	Suitability for GCN
P5	70	A deep linear feature near Home Covert. Pond with ground and surface water feeds.	0.60	Average
P6	480	A linear feature just outside of the site boundary. Surrounded by young willows, although the waterbody is still relatively open. Used by the grazing cattle as a watering resource, heavily poached. Considered to be a seasonal pond due to the amount of waterlogging of the surrounding area.	0.62	Average
P7	40	Shallow depressions in a stand of trees. Seasonal pond due to water logging of the ground in the surrounding area.	0.52	Below Average
P8	200	Immediately adjacent to the A1057 (Hatfield Road). It is fairly shallow and looks to be fed from surface water run-off from the road. Likely to contain water all year round.	0.76	Good
P9	150	Part of the Nast ditch system and on the edge of Home Covert. Large parts of the periphery of waterbody are overgrown with vegetation. Dry.	N/A	N/A
P10	1900	A large long-established pond in Home Covert. The waterbody has a small island. Due to the large amounts of leaf litter the depth of the waterbody could not be determined. Can be topped up via connecting ditches.	0.76	Good
P11	80	Shallow depression next to a path. Used by the grazing cattle as a water resource, heavy poaching evident. Considered to be a seasonal pond due to water logging in the surrounding area.	0.54	Below Average

GCN Presence/Likely Absence and Population Size Class Survey Results

2015

11.218 Five of the 11 waterbodies surveyed in 2015 within and immediately adjacent to the application site were found to support great crested newt, although only two of these were confirmed as in use for breeding or attempted breeding. Table 11-14 below shows the peak number of great crested newts encountered whilst torching and bottle trapping, together with the results of the egg searches.

Table 11-14:
Peak Number of Great Crested Newts Recorded from Torching and Bottle Trapping over the Survey Period and the Results of the Egg searches for each Waterbody - 2015

Waterbody reference (Fig 3)	Maximum number of GCN recorded during torching	Maximum number of GCN recorded during bottle trapping	Maximum number of GCN recorded from both methods	GCN eggs present?
P1a	26	12	26	Yes
P1b	2	1	2	No
P2	0	0	0	No
P3	2	1	2	No
P4	0	0	0	No
P5	1	1	1	No
P6	8	2	8	Yes
P7	0	0	0	No
P8	0	0	0	No
P9	2	1	2	No
P10	0	0	0	No
P11	0	0	0	No

11.219 Terrestrial surveys for the species were not carried out, but during the reptile survey a great crested newt was found under a reptile refugium along a bank in the western corner of area R1 (see Figure 3, **Appendix 11/2**) during a visit on the 30th April 2015.

11.220 The results of the eDNA sampling undertaken by LDA Design in 2015 of the two off-site waterbodies P7 and P10 corroborate the simultaneous Bioscan surveys of these ponds, with great crested newt confirmed in P7 and a negative result returned for P10.

2018

11.221 2018 survey results are provided in Table 11-12 above.

2021

11.222 Updated great crested newt pond surveys were not undertaken in 2021. The existing baseline information, which includes data from the site from the period 1999 – 2018 is considered sufficient to adequately describe the baseline conditions for the purposes of ecological impact assessment.

Evaluation

11.223 The local meta-population of great crested newts is classed as medium based upon 2015 and 2018 survey results. HSI and habitat surveys conducted in 2021 indicate that conditions are largely unchanged and the status of the population is considered unlikely to have changed since previous surveys.

11.224 There was a peak count of 8 individuals in 3 ponds within the application site (P1, P4, P5) and a peak count of 15 (i.e. a medium population) focussed on neighbouring ponds, e.g. P6, P10 and P11 (2018 survey results presented above). The population is therefore considered to be a medium meta-population at the lower end of this size class. In 2015, GCN were recorded in different ponds, i.e. P1, P3, P9, P5, but with broadly similar population size, i.e. lower end of medium meta-population. These data indicate the breeding adults within this meta-population are relatively small and mobile and not restricted to any specific pond or ponds. GCN are also known to be present at CEMEX Furzefield[46] and CEMEX Cutfield[47] quarries to the north. The latter supports a low medium population, although these are more than 500m from breeding ponds within the application site and therefore there is unlikely to be major dispersal between them, even though there are no major barriers. Andrews' Ecology[48] states "*population within Cutfield is part of a meta-population, with newts recorded in six ponds at Suttons Farm (c. 500m north of Cutfield) and one pond at Sheepfold (c 1.2 km north-east of Cutfield)*". Due to the distance from Cutfield and Furzefield meta-populations, limited connectivity between these two offsite populations is predicted.

11.225 GCN appear to attempt to breed regularly in P1 within the application site, although breeding is unlikely to be successful in all years due to regular drying during summer months, e.g. as observed in June 2017. Other ponds within the development site where GCN have been recorded in recent years, i.e. P3, P4, P5, P9 appear to have been largely unsuitable for successful breeding in recent years and remain largely unsuitable for breeding success, especially P3 and P9. Using the population size class assessment system[49] , the results from collated field data indicate that the site supports a 'medium' population of great crested newts, widely distributed in habitats of low-moderate suitability.

Other Amphibians

11.226 In 2008 Cresswell Associates reported the presence of common frog *Rana temporaria* and common toad *Bufo bufo* on the site. These species were also recorded by Bioscan in 2015 whilst carrying out the great crested newt surveys, along with good numbers of smooth newts. Table 11-15 provides the peak count of smooth newt and the results of the egg searches for each waterbody shown on Figure 3 (**Appendix 11/2**).

Table 11-15
Peak Count of Smooth Newt and the Results of the Egg Search for Each Waterbody

Waterbody Reference	Maximum Number of Smooth Newt Recorded During Torching	Maximum Number of Smooth Newt Recorded During Bottle Trapping	Maximum Number of Smooth Newt Recorded from Both Methods	Smooth Newt Eggs Present?
P1a	18	32	32	Yes
P1b	4	0	4	No

[46] eDNA positive in one Pond, reported in baseline data supplied by Andrews Ecology (2015)

[47] GCN reported as present in 3 ponds outside the application site to the north (Playdell-Smithyman, 2015)

[48] Ref: Andrew Ecology, Natural England Method Statement EPSL 2017-32651-EPS-MIT

[49] English Nature (2001) Great crested newt mitigation guidelines. English Nature

Waterbody Reference	Maximum Number of Smooth Newt Recorded During Torching	Maximum Number of Smooth Newt Recorded During Bottle Trapping	Maximum Number of Smooth Newt Recorded from Both Methods	Smooth Newt Eggs Present?
P2	0	0	0	No
P3	18	35	35	Yes
P4	2	0	2	No
P5	36	32	36	No
P6	18	6	18	Yes
P7	3	1	3	No
P8	2	7	7	No
P9	0	0	0	No
P10	2	3	3	No
P11	3	1	3	No

11.227 In total, smooth newts were encountered in nine waterbodies, with a 'medium' population[43] of this species on the site. Higher numbers of individuals were found in P5, P3 and P1a.

Reptile Survey

Desk Study

11.228 In 2015, HERC provided 14 records of reptiles for the search area. Of these records, eleven relate to grass snake *Natrix natrix*, three for slow-worm *Anguis fragilis* and one for common lizard *Zootoca vivipara*. The closest records to the application site relate to grass snake, the nearest being 0.65km to the south-west of the application site boundary. The most recent reptile record provided by HERC is from 2007.

11.229 Creswell Associates reported in their 2008 report on the results of a survey of the whole Ellenbrook Fields site in 1999 when *"small numbers of slow-worm were … recorded within the grassland and a single grass snake was also found".* It is unknown which part of Ellenbrook Fields these individuals were recorded from. However a later reptile survey undertaken in 2010 by Cresswell Associates of 'strategic locations across the site' did not confirm the presence of any reptiles.

11.230 In 2021, 17 records of reptiles were returned including; three of common lizard, 13 of grass snake and one slow worm record.

Field Survey

2015

11.231 Table 11-16 provides a summary of the results of the reptile survey carried out during 2015. Just one reptile, a grass snake, was encountered on the site during the total of seven surveys (the location of this individual is provided on Figure 3, **Appendix 11/2**). This individual was found on the last reptile survey visit, 24th June 2015, in the eastern part of R4.

Table 11-16:
Results of the Reptile Survey during 2015

Reptile Area	Number of Grass Snake Recorded
R1	0
R2	0
R3	0
R4	1
R5	0
Total	**1**

2021

11.232 No incidental records of reptiles were noted in surveys conducted within 2021.

Evaluation

11.233 Whilst population sizes derived from refugia data are notoriously unreliable, the results from the survey would suggest, based on Froglife's population score system[50], that the site supports a 'low' population of grass snake. At first pass this is somewhat surprising given the presence of large areas of what appears to be suitable reptile habitat on the site. A combination of factors could explain the apparent absence of reptiles, including the historic use of the site as an aerodrome (and the likely intensive mowing of any grassland at that time), the lack of reptile populations within the vicinity from which colonisation of the site could occur once it became neglected and more suitable, the presence of roads surrounding the site which may act as further barriers for reptile colonisation, and the regular waterlogging of the site during the winter which may reduce opportunities for reptile hibernation.

Bird Survey

Desk Study

11.234 The results from the data request from HERC in 2015 produced 18,168 bird records for the search area (nearly 93% of all the records provided by HERC). A total of 402 of these records relate directly to either 'Ellenbrook Fields' and/or 'Hatfield Aerodrome'. It should be noted that both Ellenbrook Fields and Hatfield Aerodrome comprise a larger area than the application site; nevertheless, all records with

[50] Froglife (1999) Reptile Survey: an introduction to planning, conducting and interpreting surveys for snakes and lizard conservation. Froglife Advice Sheet 10. Froglife, Halesworth

these site names have been included in the analysis given below. In addition, 113 bird records are made at a coarser 1km scale, and relate to the three 1km squares in which the application site sits, not necessarily to the site itself.

11.235 In total, 75 species were noted for Ellenbrook Fields, Hatfield Aerodrome or for the three 1km squares straddled by the application site. This is broken down into 54 species for Ellenbrook Fields/Hatfield Aerodrome and 43 for the three 1km squares as shown by Table 11-17 below.

Table 11-17:
Number of Records relating to Ellenbrook Fields and Hatfield Aerodrome, and for the three 1 km squares in which the Sit sits

Species	Number of records pertaining to 'Ellenbrook Fields' and/or 'Hatfield Aerodrome'	Number of records for the three 1km squares in which the site sits
Barn Owl	13	0
Black Redstart	2	0
Black-headed gull	0	7
Black-tailed Godwit	1	0
Blue tit	0	5
Bullfinch	4	1
Buzzard	9	3
Canada goose	0	1
Coal tit	0	1
Common gull	0	2
Cuckoo	58	1
Curlew	1	0
Dunnock	0	6
Fieldfare	21	2
Goldcrest	0	1
Goldfinch	2	5
Grasshopper Warbler	20	0
Great spotted woodpecker	0	3
Great tit	0	6
Green Woodpecker	4	5

Species	Number of records pertaining to 'Ellenbrook Fields' and/or 'Hatfield Aerodrome'	Number of records for the three 1km squares in which the site sits
Grey Partridge	8	0
Grey Plover	1	0
Grey Wagtail	3	0
Hen Harrier	1	0
Herring gull	0	2
Hobby	4	1
House Martin	6	0
House Sparrow	1	6
Kestrel	4	0
Lapwing	5	1
Lesser black-backed gull	0	1
Lesser Redpoll	1	1
Lesser Spotted Woodpecker	2	0
Linnet	4	2
Little owl	0	1
Mallard	0	3
Mandarin Duck	16	0
Marsh Harrier	1	0
Meadow Pipit	10	0
Moorhen	0	2
Peregrine	1	0
Pied wagtail	0	5
Pochard	0	1
Quail	1	0
Red Kite	24	1
Redshank	5	0
Redstart	5	0
Redwing	11	2

Species	Number of records pertaining to 'Ellenbrook Fields' and/or 'Hatfield Aerodrome'	Number of records for the three 1km squares in which the site sits
Reed Bunting	3	0
Ring Ouzel	4	0
Robin	1	7
Sand Martin	1	0
Short-eared Owl	16	0
Skylark	12	0
Snipe	10	0
Song thrush	0	3
Sparrowhawk	4	1
Spotted Flycatcher	5	0
Starling	3	5
Stock dove	0	1
Stonechat	3	0
Swallow	7	2
Swift	2	1
Tawny Owl	2	0
Teal	0	1
Tufted duck	0	1
Waxwing	2	0
Wheatear	24	1
Whinchat	16	0
Whitethroat	14	1
Willow Warbler	9	1
Woodcock	4	0
Wren	0	5
Yellow Wagtail	5	0
Yellowhammer	1	3

11.236 The background records listed at Table 11-17 above indicate that the site is fairly well monitored by local ornithologists and that it supports a range of resident and transient species that is typical of inland airfield sites. This includes scarcer wintering species not uncommonly found on airfield sites by virtue of their open nature, such as short-eared owl, barn owl and peregrine, as well as passage migrants attracted to open country such as wheatear and ring ouzel, and scarcer or declining breeding species present at least in some years by virtue of the large expanses of grassland, such as grasshopper warbler, grey partridge and cuckoo.

11.237 The 2008 Cresswell Associates report stated that "*in 2001 the site supported a number of bird species of conservation concern, including song thrush, skylark and lapwing. The presence of these species on the site was reconfirmed in 2008*".

11.238 A breeding bird survey was undertaken by Cresswell Associates in 2010 of the northern part of Ellenbrook Fields. The 2010 report stated "*The collated results suggest that the site of County Importance for ground nesting birds including skylark, meadow pipit and cuckoo; and scrub-nesting species including whitethroat. This is indicated by the large numbers of these species recorded on site during each survey visit and can be attributed to the extent of suitable nesting and foraging habitat and the relative lack of disturbance.*"

11.239 An annual report (2014) produced for Goodman by Barry Trevis in relation to the barn owl and kestrel nest boxes erected on the site revealed that of the four barn owl boxes on the site three were used to successfully rear barn owls in that year. Other species noted to be nesting in the boxes include stock dove *Columba oenas*, and Mandarin duck *Aix galericulata* (with 25 eggs present- probably from two females); however, this nest was abandoned, possibly due to the box having been taken over by a pair of barn owls. No kestrels were reported to have nested on the site in 2014. It was stated in the report that in previous years barn owl use and occupation of the nest boxes on the site "*was considered to be generally low taking into account the amount of suitable foraging habitat*". However, 2014 was more successful, and this appears to have mirrored the national trend for this species for that year, with the Barn Owl Trust stating that "*2014 turned out to be an exceptional year for barn owls across the UK*[51]". The reason/s for the breeding success of barn owl in 2014 could have been due to the larger small mammal populations, the previous milder winter, and a dry and warm spring and summer.

11.240 The Birds of Hertfordshire publication[52] (largely incorporating data from the 2007-2011 BTO-run bird atlas survey) reports that short-eared owls have been regular at Ellenbrook Fields (along with other sites such as the adjacent Beech Farm Gravel Pits) and the site now has a certain notoriety for this species amongst local ornithological circles, albeit with concerns that increasing public use may be suppressing its interest for disturbance- sensitive species.

11.241 The desk study in 2021 returned 16,838 records of birds within 2km of the application site exhibiting a largely comparable species assemblage to the previous desk study.

11.242 Records of note that are near to the Hatfield/Ellenbrook Fields area and not captured in the previous desk study included:

[51] http://www.barnowltrust.org.uk/wp-content/uploads/State-of-the-UK-Barn-Owl-Population-2014-updated-links.pdf

[52] Smith, K., Dee, C., Fearnside, J. & Ilett, M. (2015) Birds of Hertfordshire. *Hertfordshire Natural History Society*

- the most recent record of barn owl was from 2018 (exact location not disclosed). Recent records from Hatfield Aerodrome site and Ellenbrook Fields were provided from 2016.
- two counts of red crossbill *Loxia curvirostra* observed flying overhead in close proximity to site.
- 32 counts of kingfisher *Alcedo atthis* including three records from Ellenbrook Fields and four from Hatfield Aerodrome site.
- 141 records of green sandpiper *Tringa achropus* including from Ellenbrook Fields.
- one record of greylag goose *Anser anser* flying overhead near the site.
- one record of nightingale *Luscinia megarhynchos* flying over Ellenbrook Fields.
- one record of crane *Grus grus* flying overhead Ellenbrook Fields.
- one barnacle goose *Branta Leucopsis* flying over Ellenbrook Fields.
- two, potentially up to five, records of little egret *Egretta garzetta* from the Hatfield area.
- numerous records of non-native ring-necked parakeet *Psittacula krameri* and Canada goose *Branta canadensis.*

11.243 In 2021, additional baseline ecology information relating to avifauna was provided from a 2019 Ellenbrook Fields ES submission[53]:

> *'Immediately adjacent areas do not provide suitable habitat for any of the Schedule 1 species except red kite and barn owl. Red kite could breed in woodland at the west of the Site. However, no signs of nests of this species were seen during the survey. Barn owl was recorded hunting in grassland at the Application Site in surveys carried out in 2010 (Cresswell Associates, 2010), and was recorded as nesting in Home Covert and Round Wood LWS and roosting in a derelict radar building south of the Application Site (Cresswell Associates, 2010).*
>
> *A barn owl nest box is present on the western boundary of the grassland area in adjacent woodland but was in use by stock dove Columba oenas in 2016 and was full of woody nesting materials (making it unsuitable for barn owl) in 2018. A barn owl was heard in the south-western part of the Application Site [Ellenbrook Fields] in April 2016 (during bat surveys), confirming that this species is present in the area. The grassland at the Application Site provides suitable foraging habitat for this species.*
>
> *Short-eared owl, which is not listed on Schedule 1, but which is an amber-listed species in Eaton et al. (2015)[54] is noted as a regular winter visitor to Ellenbrook Fields, i.e. the Application Site (Smith et al. 2015)[55].'*

11.244 The barn own box being referred to above is at this location (approx. grid reference TL 2018 0937);

[53] R Moxon, pers comm

[54] *Eaton MA, Aebischer NJ, Brown AF, Hearn RD, Lock L, Musgrove AJ, Noble DG, Stroud DA and Gregory RD (2015) (2015) Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. British Birds 108, 708–746.* https://www.britishbirds.co.uk/wpcontent/uploads/2014/07/BoCC4.pdf *[accessed 20/04/17].*

[55] *Smith K. W., Dee C. W., Fearnside J. D. and Ilett M. (2015) Birds of Hertfordshire. Hertfordshire Natural History Society.*

immediately north west of the Hatfield Aerodrome site.

Figure 11-1:
Figure 1: Location of Barn Owl Box[56]

Wintering and Breeding Bird Surveys

2015

11.245 A total of 57 bird species were noted on the site over the wintering and breeding bird survey visits. This is broken down into 41 species recorded during the wintering bird survey, and 47 species recorded during the breeding bird survey. Figures 8 to 11 (**Appendix 11/2**) provide the results of each wintering bird survey, and figures 12 to 14 provide the results of each breeding bird survey visit. Table 11-18 below summarises the number of individuals recorded during the wintering bird survey, and the number of territories assessed to be present during the breeding season.

[56] R. Moxon – pers. comm.

Table 11-18:
Results of the Wintering (2014/15) and Breeding Bird Survey (2015)

Common Name[57]	Conservation status*	Number of individuals during wintering bird survey				Breeding bird survey	
		28/11/2014	15/12/2014	20/01/2015	25/02/2015	Estimated number of territories in 2015	Highest breeding evidence
Barn owl	Sch1	0	0	1	2	1-3	Pair occupying box
Blackbird		29	34	21	14	4-8	Permanent territory
Blackcap		0	0	0	0	5-8	Permanent territory
Blue Tit		18	30	31	16	8-12	Fledged young
Bullfinch	SPI/Amber	3	5	2	1	2-3	Suitable habitat
Buzzard		0	0	1	0	0-1	Suitable habitat
Carrion Crow		1	0	1	3	0-1	Suitable habitat
Chaffinch		2	2	2	9	4-7	Permanent territory
Chiffchaff		0	0	0	0	4-6	Permanent territory
Coal tit		0	0	2	0	-	-
Cuckoo	SPI/Red	0	0	0	0	0-1	Permanent territory
Dunnock	SPI/Amber	17	8	8	18	12-17	Permanent territory
Fieldfare	Sch1/Red	37	1	8	0	-	-
Garden warbler		0	0	0	0	0-1	Singing
Goldcrest		2	0	0	1	1-2	Singing
Goldfinch		18	2	10	13	0-1	Suitable habitat
Great Spotted Woodpecker		1	0	0	0	0	Suitable habitat
Great Tit		11	7	31	20	2-4	Fledged young
Green Woodpecker		5	5	2	3	0-1	Suitable habitat
Greenfinch		2	0	1	0	0-1	Suitable habitat
Grey Heron		2	0	0	0	0	Flying over
Jackdaw		0	0	0	0	0	Not breeding

[57] See Appendix 11/2 for the scientific names of each species

Common Name[57]	Conservation status*	Number of individuals during wintering bird survey				Breeding bird survey	
		28/11/2014	15/12/2014	20/01/2015	25/02/2015	Estimated number of territories in 2015	Highest breeding evidence
Jay		3	5	0	2	0	Flying over
Kestrel	Amber	2	1	2	1	0-1	Flying over
Lapwing	SPI/Red	0	0	0	0	0	Flying over
Lesser whitethroat		0	0	0	0	0-1	Singing
Linnet	SPI/Red	4	0	1	6	8-10	Permanent territory
Long-tailed Tit		11	4	9	7	1-3	Suitable habitat
Magpie		16	8	11	17	5-8	Suitable habitat
Mallard	Amber	4	0	0	4	0-1	Suitable habitat
Meadow Pipit	Amber	7	17	18	56	0-1	Suitable habitat
Moorhen		0	0	0	0	1	Suitable habitat
Partridge sp.		0	0	3	1	-	Suitable habitat
Pheasant		3	6	4	2	1-3	Suitable habitat
Pied Wagtail		6	1	2	1	-	Suitable habitat
Red-legged partridge		0	0	0	0	1-2	Suitable habitat
Red Kite	Sch1	0	1	0	1	0	Flying over
Redwing	Sch1/Red	17	4	10	6	-	Not breeding
Reed Bunting	SPI/Amber	8	4	2	6	6-8	Permanent territory
Reed warbler		0	0	0	0	0-1	Singing
Robin		18	11	13	21	10-14	Permanent territory
Sedge warbler		0	0	0	0	0-1	Singing
Skylark	SPI/Red	1	3	1	12	8-11	Permanent territory
Snipe	Amber	1	0	3	1	-	Not breeding
Song Thrush	SPI/Red	10	8	13	15	1-2	Permanent territory
Sparrowhawk		2	0	0	0	-	Not breeding
Starling	SPI/Red	0	0	0	0	0	Not breeding

Common Name[57]	Conservation status*	Number of individuals during wintering bird survey				Breeding bird survey	
		28/11/2014	15/12/2014	20/01/2015	25/02/2015	Estimated number of territories in 2015	Highest breeding evidence
Stock Dove	Amber	0	3	2	3	1-3	Pair
Stonechat		2	0	3	3	-	Not breeding
Swallow		0	0	0	0	0	Flying over
Wheatear		0	0	0	0	0	Migrant
Whitethroat		0	0	0	0	26-31	Permanent territory
Willow warbler	Amber	0	0	0	0	5-7	Permanent territory
Woodcock	Red	3	2	3	4	-	Not breeding
Woodpigeon		13	24	9	5	2-3	Permanent territory
Wren		16	23	12	8	6-8	Permanent territory
Yellowhammer	SPI/Red	1	1	0	0	-	Not breeding

***Notes:**

Sch.1: Schedule 1 species that are specially protected under Part 1 of the Wildlife and Countryside Act 1981 (as amended)

SPI: Species of Principal Importance further to s.40 of the Natural Environment and Rural Communities Act 2006.
Red/Amber List: Species having undergone a decline of >50% in the 25 years to 2009 (Red List) or a 25-49% decline over the same period (Amber List). (After Eaton *et al.* (2015)[58]

11.246 During the targeted owl survey undertaken in the late afternoon/early evening of the January visit, two barn owls were noted. The first bird was noted at 15:30 hunting over a small field of rough grassland immediately north-west of the application site (outside the site boundary). The second bird was noted at 16:08 hunting in the south-east of the application site. No short-eared owls were noted.

11.247 Whilst undertaking the targeted owl visit in January, a relatively large number of corvids, particularly jackdaw as well as magpie, were noted to enter a roost within the dense scrubby area in the south-west of the site.

11.248 Birds were also recorded just outside the site boundary whilst undertaking the bird survey visits, and these species may overfly or otherwise use the site on occasion. Such species included common gull *Larus canus* (sitting on the University playing fields to the south-east), great spotted woodpecker *Dendrocopos major*, jay *Garrulus glandarius*, nuthatch *Sitta europaea*, treecreeper *Certhia familiaris*

[58] Eaton MA, Aebischer NJ, Brown AF, Hearn RD, Lock L, Musgrove AJ, Noble DG, Stroud DA and Gregory RD (2015) Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. British Birds 108, 708–746

and woodpigeon (>1000 leaving roost) in Home Covert and both coot *Fulica atra* and water rail *Rallus aquaticus* in the reedbed/ gravel pits to the north of the site. Species of note recorded just outside the site during the breeding bird survey include great spotted woodpecker, jay and treecreeper (in Home Covert), and little grebe *Tachybaptus ruficollis* and reed warbler *Acrocephalus scirpaceus* in the CEMEX reedbeds to the north.

2018

11.249 In 2018, whilst conducting great crested newt surveys, SLR surveyors recorded barn owl quartering the fields in the north of the site at dusk on 12th April and at dawn on 13th April 2018.

2021

11.250 SLR undertook three wintering bird survey visits in 2021 and the results are presented below.

11.251 A total of 37 bird species were noted within or flying over the site during the wintering bird survey visits and the results are present in **Appendix 11/6** (Visits 1-3). An additional five bird species were recorded during the UKHab survey in April 2021. Table 11-19 below summarises the number individuals recorded during the wintering bird survey.

Table 11-19:
Results of the Wintering Bird Survey (2021)

Common Name	Conservation status*	Number of Individuals during wintering bird survey			Other species encountered during UKHab survey (April)	Comments
		15/01/21	09/02/21	09/03/21		
Blackbird		12	8	10		
Blue Tit		21	8	15		
Black-headed Gull	Amber	1	1	4		
Bullfinch	Amber/S.41	5	1	1		
Buzzard		-	1	4		
Carrion Crow		30	5	20		
Chaffinch		6	13	5		
Chiffchaff		-	-	-	10	
Collard Dove		1	-	1		
Cuckoo	Red/S.41	-	-	-	1	
Dunnock	Amber/S.41	5	4	9		

Common Name	Conservation status*	Number of Individuals during wintering bird survey			Other species encountered during UKHab survey (April)	Comments
		15/01/21	09/02/21	09/03/21		
Fieldfare	Sch1/Red	4	6	-		Winter migrant
Goldfinch		4	4	6		
Great Tit		5	2	8		
Green Woodpecker		4	1	2		
Grey Wagtail	Red	-	-	-	1	
Jackdaw		-	-	12		
Jay		-	-	1		
Lesser Black-backed Gull	Amber	1	4	-		
Linnet	Red/S.41	3	-	5		
Long-tailed Tit		-	-	10		
Magpie		6	9	12		
Meadow Pipit	Amber	17	12	8		
Moorhen		2	-	-		
Pheasant		-	-	2		
Pied Wagtail		-	2	-		
Red-legged partridge		3	-	-		
Red Kite	Sch1	2	1	3		
Redwing	Sch1/Red	13	5	2		Winter migrant
Reed Bunting	Amber/S.41	-	-	-	1	
Ring-necked Parakeet		-	-	2		Introduced
Robin		3	6	10		
Skylark	Red/S.41	-	-	3		
Snipe	Amber	1	-	-		
Song Thrush	Red/S.41	1	2	5		
Starling	Red/S.41	13	-	-		

Common Name	Conservation status*	Number of Individuals during wintering bird survey			Other species encountered during UKHab survey (April)	Comments
		15/01/21	09/02/21	09/03/21		
Stock Dove	Amber	-	-	1		
Stonechat		1	1	3		
Whitethroat		-	-	-	3	
Willow Warbler	Amber	-	-	-	2	
Woodpigeon		6	1	10		
Wren		16	10	13		

***Notes:** Sch.1: Schedule 1 species that are specially protected under Part 1 of the Wildlife and Countryside Act 1981 (as amended) Section 41 (41) of the Natural Environment and Rural Communities (NERC) Act. Red/Amber List: Species having undergone a decline of >50% in the 25 years to 2009 (Red List) or a 25-49% decline over the same period (Amber List). (After Eaton *et al.* (2015)[59]

11.252 Bioscan recorded a total of 41 wintering bird species over four surveys conducted in 2014 and 2015. Birds recorded within the site in 2014 and 2015 but not in 2021 by SLR include coal tit, goldcrest, great spotted woodpecker, greenfinch, grey heron, kestrel, mallard, reed bunting (although recorded in April 2021), sparrowhawk, woodcock and yellowhammer.

11.253 A grey wagtail *Motacilla cinerea* was also recorded just outside of the site, adjacent to Pond 11. Grey wagtail is a Red List species.

11.254 Other species encountered on site during the habitat survey on 22nd April 2021 includes a cuckoo *Cuculus canorus* heard in calling in the northeast of the site, Chiffchaff *Phylloscopus collybita* calling from the various locations within woodland and hedgerows, willow warbler *Phylloscopus trochilus* and reed bunting *Emberiza schoeniclus* in the southern half of the site. Cuckoo is a Red List and S.41 species. Willow warbler and reed bunting are Amber List. Reed bunting is also a S.41 species.

11.255 There is reference to the building on site being used as a barn owl roost (http://www.hatfield-herts.co.uk/aviation/dh_reminders.html): however, there was no evidence of use by barn owl at the time of survey. No owl boxes have been installed internally or externally and no other nests were recorded. There are no suitable ledges for nesting inside the building, as the only surface, comprising of metal cabinets, are approx. 1m high and barn owls generally roost at least three metres above ground level.

[59] Eaton MA, Aebischer NJ, Brown AF, Hearn RD, Lock L, Musgrove AJ, Noble DG, Stroud DA and Gregory RD (2015) Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. British Birds 108, 708–746

11.256 In 2021, during the wintering bird surveys conducted by SLR, three owl boxes were observed within the application site. There is understood that a fourth owl box and the single kestrel box are also present on the site, although locations are unconfirmed. Of the boxes identified, a single owl pellet was recorded beneath one owl box and a further two owl pellets were recorded beneath a second owl box. The locations of the boxes and owl pellets are shown in the Drawing within **Appendix 11-4.**

Evaluation

11.257 In order to place the results into the local context, the species list and the numbers present on the site were assessed against the requirement for record submission by Hertfordshire Bird Club (HBC). This revealed that no species found on the site are considered to be 'rare'. There are, however, seven species that fall within the 'All' category (i.e. all records of a species are required). The presence on the 'All' list is likely to indicate that a species is uncommon in the county or otherwise of elevated local interest. These species comprise barn owl, cuckoo, red kite, snipe, stonechat, wheatear and woodcock. Records of breeding for selected species are also requested by HBC; with these species on the site comprising bullfinch, goldcrest, kestrel, linnet, reed bunting, skylark and stock dove (and possibly buzzard, green woodpecker, meadow pipit, red-legged partridge and reed warbler). HBC also request records of minimum numbers of individuals of certain species; the following species were found to exceed the quoted numbers on the site; blue tit, fieldfare, goldfinch, great tit, long-tailed tit, magpie, meadow pipit, reed bunting and skylark.

11.258 No short-eared owls were recorded during the bird surveys of the site, and it would appear based on the data from HERC and from BirdTrack[60] that this species has not been regularly recorded at Hatfield Aerodrome since the end of 2011. The reason/s for the absence of this species from what appears to have been a regular site is not known but could be related to the increase in scrub cover and/or the increasing levels of diurnal human activity.

11.259 Overall, the bird interest of the site is not atypical of what would be expected on any inland airfield site of equivalent size that has undergone transition from a more intensively managed operationally active site with short grass to a neglected site with coarse grassland and developing scrub. That transition is likely to be implicated or a contributing factor in the loss of breeding lapwing from the site since the early 00s, but is likely to have increased the suitability of the site for other species, including barn owl, snipe, stonechat and woodcock. The breeding bird assemblage is again typical of the habitats present, although the high number of whitethroat territories is of note, as well as the number of breeding territories of dunnock, linnet, reed bunting and willow warbler. Other breeding species of elevated interest include cuckoo and barn owl. The site also evidently receives passage use by species such as wheatear and, in some years, ring ouzel.

Badger Survey

Desk Study and Field Survey

2015 and 2021

11.260 Refer to the Hatfield Aerodrome Confidential Badger Report in **Appendix 11/5** for detail relating to this

[60] http://app.bto.org/birdtrack/main/data-home.jsp

species.

Evaluation

11.261 Refer to the Hatfield Aerodrome Confidential Badger Report for detail relating to this species.

Invertebrates

Desk Study

11.262 In 2015, a total of 1,140 invertebrate records were provided by HERC for the search area. Approximately half of the records relate to butterflies, with the other half largely relating to moths. Of the 1,140 records, 12 relate to 'Ellenbrook Fields'/'Hatfield Aerodrome' with all 12 of these pertaining to the small heath *Coenonympha pamphilus* butterfly.

11.263 In 2021, 2,604 records of moths, 772 records of butterfly, and 123 other invertebrates (including caddis flies, grasshoppers, damselfly, dragonflies, lacewings, grass ants, true bugs, true flies and beetles) were returned by HERC for the 2km study area.

Field Survey

2015

11.264 A total of 806 terrestrial invertebrate species were recorded on the site, of which 248 were moths. **Appendix 11/4** provides the full invertebrate species list obtained, with a summary of the more notable species set out below under the relevant tiers of formal conservation status:

<u>Species of Principal Importance/ Priority Species/Section 41 species (former UK BAP species).</u>

11.265 UK BAP priority species were those that were identified as being the most threatened and requiring conservation action under the UK Biodiversity Action Plan (UK BAP). The original list of UK BAP priority species was created between 1995 and 1999. In 2007, a revised list was produced, following a 2-year review of the priority species and habitats lists. Following the review, the list of UK BAP priority species increased from less than 600 to 1150.

11.266 As a result of devolution, and new country-level and international drivers and requirements, much of the work previously carried out by the UK BAP is now focussed at a country-level rather than a UK-level, and in July 2012, the UK BAP was succeeded by the UK Post-2010 Biodiversity Framework. However the UK list of priority species remains an important reference source and was used to draw up statutory lists of species and habitats of principal importance in England, Scotland, Wales and Northern Ireland pursuant to the obligations levied by the Natural Environment & Rural Communities Act, 2006 (sections 40-42).

11.267 No UKBAP priority invertebrates or invertebrate species of principal importance were noted to be present on the site.

Red Data Book

11.268 Eight of the species recorded are listed in the British Red Data Books[61],[62]. Table 11-20 below provides each of these Red Data Book species along with notes regarding their ecology and current conservation status.

Table 11-20:
Red Book Data Book Species Recorded on the Site

Species	English Name	Notes
Hecatera dysodea	Small Ranunculus moth	This species has re-colonised Britain after one hundred years of apparent extinction. Caterpillars feed on developing seeds of prickly lettuce *Lactuca serriola* and great lettuce *Lactuca virosa*. The species is now widely recorded on neglected and brownfield land in the home counties and the formal Red Data status is no longer warranted.
Stictopleurus abutilon	A ground beetle	Another species formerly believed to be extinct in Britain. It is now recorded fairly widely in warm open flower rich grassland in the south-east. The Endangered status is no longer warranted; a review of the conservation status of several invertebrates is currently in progress and the status of this species may be formally reduced to Nationally Local when it is published.
Stictopleurus punctatonervosus	A ground beetle	As for above species.
Cistogaster globosa	A tachinid fly	This species is known from a few localities in southern England, and given its distinctiveness it is unlikely to be overlooked; it is thus probably genuinely rare, though very recently there seems to be an expansion in range and frequency of both host and fly. It parasitises shield bugs, especially *Aelia acuminata*. The fly appears to favour dry grassland where the host is usually found. Adult flies have been seen nectaring on wild carrot but other species of plant are also likely to be visited.
Datonychus urticae	A weevil	This species is found in tall herb communities and at woodland edges and may be a component of the fauna that occupies transitional zones (edge habitats). The larvae feed in hedge woundwort *Stachys sylvatica*, almost certainly internally within the stems. It is present in southern England and is apparently rare; however, it might be overlooked in some places as it closely resembles another more common species.
Lygus pratensis	A plant bug	This species has apparently always been a polyphagous species in Europe, found in weedy species, but in Britain it has long been regarded as an indicator of quality ancient woodland. In the last few years, however, this species has been widely recorded away from woodland in the south of England. The status of Near Threatened is currently unwarranted.
Tephritis matricariae	A picture-winged fly	This species has until recently been recorded in Kent and Essex only. Its

[61] Shirt, D. B., (1987). "*British Red Data Books: 2. Insects.*" NCC

[62] Bratton, J. H., (1991). *"British Red Data Books: 3. Invertebrates other than insects."* NCC

Species	English Name	Notes
		host plants are probably *Crepis vesicaria* ssp. *Taraxacifolia* and *Crepis capillaris*. It is currently provisionally classified as a Red Data species within the 'unknown' category K.
Liorhyssus hyalinus	A bug	This species has historically regarded as a rare vagrant to Britain, it has appeared much more frequently since the 1990s and has become established in some areas. Foodplants include storksbill and various composites.

Nationally Scarce Species.

11.269 Twenty-six Nationally Scarce species were recorded on the site, with eight of these in the former Nationally Notable Na category. Table 11-21 below provides the Nationally Scarce species in the former Nationally Notable Na category.

Table 11-21:
Nationally Scarce Species in the former Nationally Notable Na category recorded on the site

Species	English Name	Notes
Eupithecia millefoliata	Yarrow Pug	Mainly confined to the south-east of Britain. There were no records for this species prior to 1987, and it is now likely to be expanding its range.
Hylaeus cornutus	Yellow-faced Bee	This species is largely confined to the south-central and south-eastern counties of Britain. It is largely found where wild carrot and other white umbellifers are numerous.
Lasius brunneus	Banded Tree Ant	There are insufficient historic records of this species to plot changes in abundance and distribution; however the overall impression is that it has become more common in the south-east in recent years.
Phalacrus championi	Smut Beetle	There is little known information regarding this species beyond the fact that it seems to be rare.
Platynaspis luteorubra	A ladybird	This species is largely found to the south-east of a line between the River Severn and the Wash. The Herts Beetle Recorder has indicated that this is an extremely rare species in this county.
Rhinocyllus conicus	Thistle-head Weevil	This species is widespread, but apparently very localised in the southern coastal counties of Britain. Despite this species largely pertaining to coastal areas, the identification of this species was confirmed by the County Beetle Recorder and therefore represents a significant record.
Rhyzobius chrysomeloides	A ladybird	This species was first found in Britain in 1996 in Surrey. Since then it has spread and therefore its formal conservation status as nationally scarce is probably inappropriate.
Xantholinus elegans	Rove Beetle	This species' precise requirements are unknown, but other members of the group are found in tussocks and the adults may be predatory on other invertebrates.

11.270 A further 18 of these Nationally Scarce species are in the former Nationally Notable Nb category or are uncategorised Nationally Scarce ('Notable') Diptera. These are listed at Table 11-22 below. Several of these species do not appear on the latest version of the JNCC 'Taxon designations' spreadsheet, indicating that they have been demoted from the nationally scarce category following recent reviews, most commonly due to significant expansions in population and range (e.g. in the case of Roesel's bush cricket):

Table 11-22:
Nationally Scarce (Categories Nb and N) Invertebrates Recorded on the Site

Species	English name	Main ecological associations
Agnocoris reclairei	a mirid bug	Willows, especially *Salix alba*, in Fens and gravel pits
Athysanus argentarius	a plant hopper	in a variety of grassland habitats, usually near the coast
Bembecia ichneumoniformis	Six-belted Clearwing	*Lotus*, *Anthyllis* and *Hippocrepis* – in the rootstock
Bianor aurocinctus	a spider	dry, ruderal sites
Drymus latus	a plant bug	amongst vegetation litter, moss etc
Evergestis pallidata	a pyralid moth	cruciferous plants - especially *Barbarea vulgaris*
Hippodamia variegata	variegated ladybird	ruderal or sandy habitats
Idiocerus herrichi	a plant hopper	on Poplars and Willows and also on Alder
Longitarsus dorsalis	a flea beetle	Ragworts (*Senecio* species) – now a fairly common species in the south
Metrioptera roeselii	Roesel's Bush-cricket	tall grassland, now everywhere in the south of England
Microplontus triangulum	a weevil	associated with *Achillea millefolium*; the larvae feed inside flowering stems
Philodromus albidus	a spider	lower branches of broad-leaved trees at the edge of woodland rides
Poecilium alni	a longhorn beetle	larvae feed in small branches and twigs of various tree species
Ptilodon cucullina	Maple Prominent	field maple, very rarely on sycamore
Sibinia primitus	a weevil	dry sandy areas
Sitona waterhousei	a weevil	*Lotus corniculatus*
Trichosirocalus barnevillei	a weevil	Yarrow (*Achillea millefolium*) in ruderal habitats
Merzomyia westermanni	a picture-winged fly	various ragwort species

Nationally Local Species

11.271 Twenty-five species are listed formally as Nationally Local. Table 11-23 below provides a list of the

Nationally Local species recorded on the site.

Table 11-23:
Nationally Local Invertebrates Recorded on Site

Species	English name	Main ecological associations
Acidia cognata	a picture-winged fly	*Tussilago* and *Petasites* plants – mining the leaves
Acupalpus dubius	a ground beetle	damp moss, damp litter and similar habitats
Agalenatea redii	a spider	lower than one metre in heather and gorse, and also in rough grassland
Amara tibialis	a ground beetle	open, sandy areas, especially costal dunes
Anaceratagallia ribauti	a plant hopper	on the ground amongst grasses in dry places - common in the south-east
Anomoia purmunda	a picture-winged fly	Larva feeds in the flesh of hawthorn Berries
Aphrodes bicinctus	a plant hopper	grasses in dry situations
Aphthona euphorbiae	a leaf beetle	widely polyphagous
Apolygus lucorum	a plant bug	low plants
Bruchidius villosus	a leaf beetle	On broom
Byrrhus pilula	a pill beetle	associated with moss or rabbit-grazed turf, in open situations.
Centrotus cornutus	a froghopper	oak, aspen and other sapling trees
Chorthippus albomarginatus	Lesser marsh Grasshopper	grasslands - has spread inland from coastal stations
Chrysotoxum festivum	a hoverfly	grassland with open scrub - the larvae feeding on root aphids
Chrysotoxum verralli	a hoverfly	grassland with associated scrub
Cordylepherus viridis	a beetle	a common grassland species
Coremacera marginata	a snail-killing fly	dry habitats, especially grasslands
Corizus hyoscyami	a plant bug	Stork's-bill, mainly south-western
Crossocerus nigritus	a sand wasp	nests in broken stems of shrubs and reedmace (*Typha*)
Cryptocephalus fulvus	a leaf beetle	possibly on sheep's-sorrel, but adults are found on a variety of flowers
Curculio glandium	a weevil	Oak trees - in developing acorns
Cyclosa conica	a spider	spring species of trees and bushes, preferring damp, dark woodland
Cymus melanocephalus	a plant bug	associated with *Juncus* wherever it grows
Eilema depressa	Buff Footman	lichens and algae on trees

Species	English name	Main ecological associations
Epitrix pubescens	a beetle	associated with Woody Nightshade
Euproctis chrysorrhoea	Brown-tail	rosaceous trees and shrubs - sometimes other trees and shrubs
Hypena rostralis	Buttoned Snout	hops - hibernating as adult in sheds, hollow trees, cellars etc
Hypsosinga pygmaea	a spider	grassland (especially calcareous) and low vegetation
Idaea rusticata	Least Carpet	withered leaves of ivy, *Clematis*, *Alyssum saxatile*, etc
Kalama tricornis	a lacebug	Dry ruderal habitats and sand dunes
Lamprotettix nitidulus	a plant hopper	arboreal species, mostly in the south
Mangora acalypha	a spider	Gorse and Heather in heathland and woodland in southern Britain
Metidiocerus rutilans	a plant hopper	on sallows, but found overwintering in pines
Neoscona adianta	a spider	rough grassland and heathland.
Notiophilus substriatus	a ground beetle	open, usually dry habitats especially if there is minimal vegetation
Oedemera lurida	a beetle	a common grassland species
Olibrus liquidus	a smut beetle	possibly associated with sap runs on trees
Oncotylus viridiflavus	a plant hopper	widespread in grassland habitats, usually on flowering heads of knapweed
Oxystoma craccae	a seed weevil	feeds in the developing seeds of vetches
Pipiza fenestrata	a hoverfly	Edge habitats
Pseudovadonia livida	a longhorn beetle	larvae feed in dead wood of deciduous and coniferous trees
Psylliodes chrysocephala	a leaf beetle	various Cruciferae
Rhamphus oxyacanthae	a weevil	larva mines in leaves of hawthorn
Rhopalus subrufus	a plant bug	St John's Wort (*Hypericum perforatum*)
Sphenella marginata	a picture-winged fly	on various ragwort species, in late summer and autumn
Stigmella aceris	a micro moth	caterpillar mines leaves of maple
Taeniapion urticarium	a weevil	nettles - larvae feed inside stem nodes
Tephritis formosa	a picture-winged fly	larvae gall the flowers of sow thistle
Tetrix subulata	Slender Ground-hopper	bare mud and sparse vegetation in marshy places, especially dune slacks
Tritomegas luctuosus	a plant bug	feeds on forget-me-nots (*Myosotis* species) in dry places
Tychius junceus	a weevil	*Medicago lupulina*

Species	English name	Main ecological associations
Xanthogramma pedisequum	a hoverfly	larvae feed in ants nests

'Research Only' UKBAP moths

11.272 The original list of UK BAP Priority Species of moths was divided into two sections. In the first, a total of 81 species are afforded the status of UK BAP Priority Species; none of these is recorded in the surveyed area nor is any likely to be present. However, the second section is a list of 69 species that have declined in population by a significant amount in the past 25 years. These were defined as "not yet rare" and were flagged as UK BAP species for the purposes of further research only. They may be seen as having equivalence with bird species listed on the UK amber list by virtue of recent population declines as opposed to genuine rarity.

11.273 Table 11-24 below provide the "Research Only" moth species recorded on the site.

Table 11-24:
"Research Only" Moth Species Recorded on the Site

Species	English name	Caterpillar food plant
Acronicta psi	Grey Dagger	deciduous trees and bushes
Agrochola litura	Brown-spot Pinion	deciduous trees and shrubs and herbaceous plants (requires both)
Agrochola lychnidis	Beaded Chestnut	deciduous trees and shrubs and herbaceous plants (requires both)
Allophyes oxyacanthae	Green Brindled Crescent	rosaceous trees and shrubs
Apamea remissa	Dusky Brocade	grasses
Aporophyla lutulenta	Deep-brown Dart	grasses, hawthorn, blackthorn
Atethmia centrago	Centre-barred Sallow	ash - buds then flowers
Callistege mi	Mother Shipton	coarse grasses, including reeds
Caradrina morpheus	Mottled Rustic	herbaceous plants
Chiasmia clathrata	Latticed Heath	*Medicago*, *Trifolium*
Diarsia rubi	Small Square-spot	herbaceous plants
Ecliptopera silaceata	Small Phoenix	willow herbs, enchanter's nightshade
Ennomos fuscantaria	Dusky Thorn	Ash
Hoplodrina blanda	Rustic	herbaceous plants
Scotopteryx chenopodiata	Shaded Broad-bar	vetches and clovers

Species	English name	Caterpillar food plant
Spilosoma lubricipeda	White Ermine	herbaceous plants
Spilosoma lutea	Buff Ermine	herbaceous plants and also trees and shrubs
Timandra comae	Blood-vein	Polygonaceae
Tyria jacobaeae	Cinnabar	Ragwort
Watsonalla binaria	Oak Hook-tip	oak - occasionally birch

2021

11.274 During the surveys conducted by SLR in 2021, anecdotal records of invertebrates were noted. Species recorded include blue-bordered carpet *Plemyria rubiginata* eggs on blackthorn adjacent to Home Covert Wood, peacock butterfly *Aglais io*, large white *Pieris brassicae*, orange-tip butterfly *Anthocharis cardamines* and a number of solitary bee species.

Evaluation

11.275 In order to provide a high level indication of site quality, useful for comparison with other sites with a broadly similar level of recording effort, a Species Quality Index can be calculated. This requires that recorded invertebrate species are scored according to their national status as follows:

- RDB species 100 points
- Notable - Na species 50 points
- Notable - Nb species 40 points
- Notable - N species 40 points
- Local species 20 points
- Common species no score

11.276 These scores are derived from Ball (1986)[63]. Adding together the scores in each category provides an 'Invertebrate Index' which is then calibrated for sampling effort through simple division of the total Invertebrate Index by the total number of species recorded.

11.277 On sites where it is evident that a significant number of the species recorded have exhibited dynamic positive or negative changes in national status that are not always reflected in the formal categorisations, it may be appropriate to revise scorings to better reflect current rarity. This is appropriate here where, amongst other things, three of the species found were considered 'extinct' in Britain prior to 1994 but have since either been re-found or have recolonised, and furthermore gone on to become widespread in south-east England. Revised scorings suggested for this site are indicated

[63] Ball, S. C. (1986) Terrestrial and freshwater invertebrates with Red Data Book, Notable or habitat indicator status. Invertebrate Site Register internal report number 66. NCC

in Table 11-25.

Table 11-25:
Revised allocation of invertebrate scores and calculation of Species Quality Index

Status category	Score in Ball (1986)	Revised score	Number of taxa on this site	Total Score for site	SQI
BAP(Research only)*	-	20	20	400	-
Extinct*	100	20	3	60	-
RDB 1	100	100	1	100	-
RDB 3	100	100	2	200	-
RDB K	100	100	2	200	-
NS(Na)	50	50	8	400	-
NS (Nb & N)	40	40	18	720	-
Local	20	20	25	500	-
Subtotal	-	-	**79**	2580	-
Common	0	0	727	0	-
Totals	**-**	**-**	**806**	**2580**	**3.20**

*specifically the species recorded in this present report only.

11.278 In the context that Species Quality Index outputs can be categorised as indicating a site of national importance where above 7, the total revised Species Quality Index value of 3.20 is fairly low and indicates a site of modest importance to invertebrate conservation. This is despite the inclusion of 'Research only' UKBAP moths, many of which remain very common, and despite no correction being made for certain other species that are undoubtedly abundant but retain a formal 'nationally scarce' status, such as Roesel's bush cricket. On the other hand, the high proportion of the invertebrate species total that relates to moths may skew the result because the vast majority of moths recorded in light traps are common species and for most sites moths are unlikely to have been recorded to an equivalent degree. As a consequence, the analysis of the full species dataset from the application site may not be directly comparable with other areas. This can be corrected for by removing the 248 moth species from the calculation and recalculating using only the remaining 558 non-moth invertebrates. This results in only a modest increase in SQI value, however: to 4.62.

11.279 An alternative means of evaluation commonly employed in modern invertebrate assemblage assessments is the Invertebrate Species-habitats Information System (ISIS). This is a tool introduced by Natural England and used by them to undertake common standards monitoring (i.e. to monitor the condition of invertebrate assemblages), score them based on the invertebrate assemblage types present (similar to how the NVC is used to assess plant communities) and evaluate their conservation value. It is thus a tool designed to measure invertebrate conservation value within the context of certain pre-existing parameters, and must be used on sites outside that context only with care.

11.280 The ISIS assemblage types are defined by lists of characteristic species that are generally found together in assemblages under natural or semi-natural. Broad assemblage types (BATs) are a comprehensive series of assemblages characterised by more widespread species. Specific assemblage types (SATs) are characterised by stenotopic (ecologically restricted) species, and therefore are more likely to be of intrinsic nature conservation value.

11.281 The software can therefore be used to approach the question of invertebrate habitat value assessment from the opposite direction i.e. predicting both the habitat types present, and their quality and value in invertebrate conservation terms, by looking at the full suite of species recorded and cross-checking their habitat requirements. Thus, if a large proportion of the total possible species with a particular specialised habitat requirement are present, the software indicates that the habitat must be both a) present and b) in good (favourable) condition.

11.282 Using the full dataset of 806 recorded invertebrate species, ISIS generates the following results for the application site:

Broad Assemblage Types

11.283 The top Broad Assemblage Types identified as present are presented in Table 11-26 below.

Table 11-26:
The Broad Assemblage Types from ISIS assessment of the invertebrates recorded on the application site

BAT	BAT name	Representation (1-100)	Rarity	Condition	BAT species richness
F2	grassland & scrub matrix	19	123		238
A1	arboreal canopy	9	125		117
F1	unshaded early successional mosaic	5	245	favourable	62
A2	wood decay	2	150		20
W2	mineral marsh & open water	1	111		18
F3	shaded field & ground layer	1	142		12
W3	permanent wet mire	1	100		11

11.284 Not surprisingly, the largest assemblage is associated with the grassland and scrub matrix. The arboreal canopy lies in second place and is undoubtedly so positioned because of the presence of a large number of moths on the list. The unshaded early successional mosaic assemblage of species is in favourable condition; the state of the habitat that supports this assemblage is, therefore, of high quality.

Specific Assemblage Types

11.285 The most important Specific Assemblage Types identified as present from ISIS analysis of the species inventory are presented in Table 11-27 below.

Table 11-27:
The Specific Assemblage Types from the ISIS assessment of the invertebrates recorded on the application site

SAT	SAT name	No.	Condition	Percentage of national species pool	Related BAT rarity score
A215	epiphyte fauna	3		15	150
F001	scrub edge	15	favourable	8	
F112	open short sward	12		6	245
F002	rich flower resource	6		2	
A212	bark & sapwood decay	12		2	150
F003	scrub-heath & moorland	7		2	
F111	bare sand & chalk	6		1	245
A211	heartwood decay	2		1	150

11.286 The results of analysis of the species inventory using ISIS therefore indicate that the site's value for invertebrates is primarily centred on the presence of unshaded early successional mosaic habitats and scrub edge. Thus the areas of the site recovering from past disturbance may hold a disproportionate amount of the invertebrate interest, although it is also clear that the large expanses of grassland in association with scrub also have value, despite the relative absence of 'flower-rich' representations of this habitat.

Other Fauna

Desk Study

11.287 The 2008 Cresswell Associates report stated that in 2001 the site supported up to six brown hares *Lepus europaeus*, with individuals also noted during visits in 2008. Only a single record of this species was made during the survey work carried out in 2014 and 2015, and this was outside the application site in the north-eastern part of the former airfield. It is possible that the increased presence of dogs in the more heavily trafficked areas of the site may be suppressing the site's potential value to this species. Other mammals noted during the course of the fieldwork in 2014 and 2015 included muntjac *Muntiacus reevesi*, grey squirrel *Sciurus carolinensis*, field vole *Microtus agrestis*, fox *Vulpes vulpes* and common shrew *Sorex araneus*.

11.288 The 2021 HERC data included the following of note (those considered historical not included):

- Fish species records; including for brook lamrey *Lampetra planeri* at an undisclosed location.

Field Results

2021

11.289 No additional incidental records were noted in 2021.

EVALUATION AND IDENTIFICATION OF KEY RECEPTORS

Evaluation Criteria

11.290 For the purposes of assessing likely significant effects, key ecological receptors are drawn out from the baseline information set out in the preceding section. The decision as to which ecological receptors are 'key' in this context is to a substantial extent a value judgement, informed by factors such as national and local conservation status and legal protection. The current guidance for Ecological Impact Assessment issued by the Chartered Institute for Ecology and Environmental Management (CIEEM)[64] recognises that professional judgement and a certain level of subjectivity is unavoidable when apportioning value to individual ecological receptors. However certain parameters and points of reference can be used to help ensure consistency – these are discussed below.

11.291 Sites already possessing statutory or non-statutory nature conservation designations would have been subjected to some form of evaluation process in the past, and their importance defined at a geographical scale (e.g. international, national, local). For these, evaluation would generally reaffirm their qualifying attributes, or in some cases may identify where designation may no longer be appropriate.

11.292 Factors such as extent, naturalness, rarity, fragility and diversity are all relevant to the determination of ecological value, and for the evaluation of sites and habitat features outside designated sites, these and other criteria as described by Ratcliffe[65], may be applied. Ratcliffe's criteria are well-established and underpin the procedure for selecting both Sites of Special Scientific Interest and many non-statutory designation systems in the UK, and therefore remain an accepted standard for site evaluation.

11.293 In applying these criteria, attention may be drawn to the relative scarcity or abundance of features within the survey area and in the wider geographical context. Some criteria are however absolute and not relative to scale. Ancient woodland, for example, is fragile irrespective of whether it is being considered in an international or local context. Similarly, the value of an otherwise poor habitat may be elevated if it is central to the survival of a rare species.

11.294 Where evaluation is important for the purposes of informing decisions related to land-use planning and development control, the above approach needs to be supplemented by consideration of whether individual species are subject to legal protection[66], or whether habitats or species are present which have been identified as 'priorities' for biodiversity conservation in the UK[67]. Planning authorities have

[64] CIEEM (2018) *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine, v1.1*. Chartered Institute of Ecology and Environmental Management, Winchester.

[65] Ratcliffe, D.A. (1977) A Nature Conservation Review, Cambridge University Press

[66] Principal legislation being the Wildlife and Countryside Act 1981 (as amended) and the Conservation of Habitats and Species Regulations (as amended) which implements the EC Habitats Directive. Some animals are protected under separate legislation (e.g. the Protection of Badgers Act 1992).

[67] As published by the Secretary of State further to their duties under Section 41 of the Natural Environment and Rural Communities Act 2006

a statutory duty[68] to have regard to protected species and to further biodiversity objectives and the presence of such resources may therefore be material to the determination of development control decisions (ODPM Circular 06/2005). Species and habitats of importance locally may also have been identified in local biodiversity strategies, e.g. through the Hertfordshire Local Nature Partnership.

11.295 Finally, attention may be drawn to species not necessarily subject to legal protection or identified by Government as a priority for biodiversity conservation, but which nonetheless have an 'unfavourable' conservation status as defined by the Red Data Book system[69] or the Red and Amber lists for birds[70], or which are otherwise known to be rare or scarce in a local or regional context.

11.296 Scales of comparison varying from international to the context of the local area may be used to define the measure of importance (or value) attached to individual features. The definition of geographic terms can vary, but in this evaluation the following geographic frame of reference is used:

- International;
- UK;
- National (i.e. England/NI/Scotland/Wales);
- Regional (e.g. relevant Natural Area or area covered by a regional records' centre)
- County (or Metropolitan - e.g. in Hertfordshire);
- District (or Unitary Authority, City, or Borough);
- Local or Parish; and
- Within zone of influence only (which might be the project site or a larger area)

Evaluation and Identification of Key Receptors

11.297 The application site is not subject to any statutory or non-statutory nature conservation designation. The nearest such site is Home Covert, a Local Wildlife Site which adjoins the application site to the north-east. Being in sufficient proximity to fall within the zone of influence of certain potential impacts, this site is identified as a key receptor.

11.298 The application site itself is dominated by essentially dry unmanaged grasslands, with varying amounts of associated scrub, although there are also areas of grassland actively managed by livestock grazing or mowing. These grasslands range from species-poor examples reflecting past 'improvement' or other enrichment to those with a species composition variously indicative of the chemical properties of the underlying substrate. None of these grasslands are exceptional in terms of quality, most being examples of a widespread community commonly found elsewhere on road verges and other marginal land. Rather than their intrinsic interest, it is their unbroken expanse over large areas that is both unusual and worthy of note. Indeed it is this property, in combination with the relative lack of upstanding

[68] Section 40 of the Natural Environment and Rural Communities Act 2006.

[69] Following the British Red Data books published by the JNCC/RSNC and the Nationally Notable (Nationally Scarce) categorisations recognised by the JNCC

[70] Eaton, M.A., *et al*. (2009) *Birds of Conservation Concern 3: the population status of birds in the United Kingdom, Channel Islands and the Isle of Man*. British Birds 102, pp296–341.

features such as hedgerows and other field boundaries, that attracts certain of the more specialist taxa recorded. Prominent amongst these are open country birds, including large breeding populations of whitethroat, as well as breeding cuckoo, barn owl, kestrel, skylark and meadow pipit, and a wintering assemblage that includes good numbers of woodcock, as well as stonechat, snipe, barn owl and in past years short-eared owl. The site's invertebrate interest is also heavily centred on early successional, scrub edge and open grassland species, and amongst other things includes several nationally and locally rare species of Coleoptera.

11.299 Added to this grassland-focused backdrop are a number of small waterbodies that support great crested newts and other amphibians, and along with the few hedgerows and denser areas of scrub, these also act as feeding loci for local bat populations, which although dominated by one or two common species, also appear to include occasional use by uncommon and scarce species such as Nathusius' pipistrelle. The hedgerows and (mainly by virtue of the presence of great crested newts) four of the ponds also qualify as Habitats of Principal Importance further to section 41 of the Natural Environmental and Rural Communities Act 2006, with three of the hedgerows also meeting the criteria of 'Important Hedgerows' further to the Hedgerows Regulations 1997. Other protected species present include a sparse population of grass snake. Refer to the confidential appendix for badgers (**Appendix 11/5**).

11.300 Although the site has no Local Wildlife Site (LWS) designation, the areas surveyed by the Herts and Middlesex Wildlife Trust in 2013, including around half of the application site, were all assessed to qualify against the incumbent criteria for LWS designation, based largely on the presence of other neutral grassland and other lowland dry acid grassland supported by 29 qualifying indicator plant species. Within this, a core area of the richest habitats was identified that included the central-eastern part of the application site, as well as much of the former airfield land outside the application site to the east and north.

11.301 This suggested designation was never ratified and the LWS criteria for Hertfordshire have since been revised[71]; however, it is evident that the site would qualify for designation under the same, and indeed additional, grounds, under the new criteria. Furthermore, the northern part of the application site (which was not surveyed by the Wildlife Sites team in 2013), would probably also qualify for inclusion. This is to a large degree a function of the relatively inclusive nature of the LWS criteria. Based on intrinsic botanical interest alone, it is arguable at best whether the grassland is of sufficient quality to be worthy of designation; however, the unbroken extent of the habitat is unusual and provides carrying capacity for a range of species of fauna that are likely to have rather restricted habitat opportunities elsewhere across the county. For this reason, the unmanaged grassland component of the site, together with its associated scattered scrub, is identified as a key receptor of county importance.

11.302 Taking into account the baseline information amassed, and the overall evaluation above, the key receptors to consider in respect of the potential impacts affecting the application site are considered to be as set out in Table 11-28 below:

Table 11-28:
Key Receptors

[71] Hertfordshire Local Wildlife Sites Partnership (2014) Selection Criteria for Local Wildlife Sites in Hertfordshire (9th version).

Scale	Key Receptor
International	No receptors of international importance are assessed to be within range of any likely significant effects arising from the proposed development.
UK/National	No receptors of national importance are assessed to be within range of any likely significant effects arising from the proposed development.
Regional	No receptors of regional importance are assessed to be within range of any likely significant effects arising from the proposed development.
County	1. The Home Covert & Round Wood Local Wildlife Site abuts the site to the north. This site was designated due to the presence of ancient woodland indicator species; yet, is not ancient woodland. Due to the proximity of this designation, there is the potential for indirect hydrological, dust and noise impacts from the proposals. 2. The unmanaged grassland habitat on the site is collectively assessed to be of county importance due to its unusually large and unbroken extent and interconnectivity, and the carrying capacity this provides for associated fauna species, rather than due to its intrinsic botanical interest, which is limited, even though a very few notable (e.g. county-rare) species are present (green-winged orchid, whorled mint). Where scrub occurs as a loose matrix with this grassland resource, providing shelter and habitat edges, this is included as part of the county-valued mosaic.
District	1. Great crested newts: the population on the site is assessed as falling within the 'medium' size class (towards the lower end of this size class), but it forms part of a wider metapopulation likely to be of District importance. 2. Breeding birds: the site is likely to contain a significant proportion of the total breeding populations of whitethroat and barn owl in the relevant Districts, and in some years also that of other species such as grey partridge and grasshopper warbler. 3. Wintering birds: the site is one of very few in either of the relevant Districts that is likely to be able to accommodate high profile species such as short-eared owl and hen harrier, as well as significant numbers of wintering woodcock. 4. Passage birds: the background records and the site's geography and character suggest it is likely to be a local staging focus for migrating open-country birds and warblers passing between the conurbations of St Albans and Hatfield, especially in Spring. 5. Invertebrates: while county-significant species of Coleoptera have been recorded during the baseline studies, the effect of uneven recording coverage has to be taken into account, and the overall assemblage appears unlikely to exceed the District level of importance given the fairly cosmopolitan habitat preferences of the scarcer species found.

Scale	Key Receptor
Parish	1. Other grassland habitats, including livestock-grazed and mown areas: These are extensive, but include a more restricted range of species weakly indicative of semi-natural circumneutral grasslands, but no rarities, and their structure precludes significant value for the higher fauna associated with the rougher grasslands on the site. 2. Hedges, mature trees, ponds and denser scrub. These habitat components add to the site mosaic, and in the case of great crested newt, underpin the site population, however their intrinsic interest is relatively modest, by comparison with neighbouring and wider areas, with some being recent in origin and therefore of low fragility. Of the hedgerows on the site, three qualify as 'Important' under the Hedgerows Regulations 1997, and all that are still recognisable as hedgerows would qualify as habitats of principal importance, along with (by virtue of the presence of great crested newts) four of the ponds/waterbodies. 3. Bats. In the main, bat use of the site is modest and dominated by a small number of common species, with no roosts found or likely to be affected. However intermittent or localised use of peripheral areas and internal linear or wetland features by a greater range of species evidently occurs, including the nationally uncommon Nathusius' pipistrelle. There are no indications that the site receives any more than transient use by the more uncommon species recorded, and the site's open nature in comparison with surrounding land suggests that it is unlikely to be of elevated importance by comparison. 4. Brown hare. The application site is probably still used by this species of principal importance, although it was only recorded on adjoining airfield land in 2015 and not at the numbers cited in previous surveys.
Immediate local (within zone of influence only)	1. Badgers. Refer to the Confidential Badger Appendix 11/5. 2. Reptiles. One grass snake was found during the survey. The scope for metapopulation level impacts is assessed as negligible but effects on individual animals are possible, and the species is therefore retained as a key receptor. 3. The representations of other habitats within the application site are either small, of negligible value, or both, and are similarly assessed as of only immediate local (i.e. site) value. They are therefore scoped out as a key receptor.

11.303 The remaining sections of this chapter consider the potential for, and the magnitude and significance of, any impacts arising on the above key receptors from the project, along with any mitigation and/or compensation proposed, and its likely efficacy.

AVOIDANCE BY DESIGN AND DESCRIPTION OF PROPOSALS

Ecological Input to Design Process

11.304 Ecological input has been a significant driver in the design of the proposed restoration scheme, including in terms of seeking to reinstate the key habitat elements for which the site has current value, exploiting opportunities created by extraction in terms of the exposure of mineral substrates and their potential to develop semi-natural plant communities, exploiting opportunities created by changes to drainage patterns and responding to local and national initiatives in terms of appropriate habitat creation objectives, including taking account the views of the Hertfordshire and Middlesex Wildlife Trust, as canvassed at three meetings with their representatives (as part of the original application). This has allowed key objectives to be set towards the creation of semi-natural habitats appropriate to

the locality and the geology – in particular acid grassland, and to secure significant opportunities for certain fauna, including birds and invertebrates in particular, but also herpetofauna and other taxa.

Summary Description of The Proposals in the Context of Likely Ecological Effects

11.305 Initial establishment of the quarry would include creation of a new site access onto the A1057, involving removal of a section of hedgerow H6 and the linking of this access to a new processing plant site in the northern part of the application site by means of new haul roads. The road would be set back from the site boundary hedgerows, with an area of landscape screening created. Establishment of the new processing plant would follow the deposition of a layer of sand and gravel extracted from the recharge lagoons (see below) in order to raise levels.

11.306 In contrast to the original 2016 quarry design, the current application avoids the loss of Ponds P1, P2 and P3 in the initial phases of development (they would be removed in future phases of mineral extraction after approximately 10 years of operation). This delay in removal of the main breeding ponds, allows the great crested newt population to continue in existing ponds, and with access to neighbouring terrestrial habitat, whilst new mitigation ponds become established. The diversion of the existing ditch system carrying the Nast watercourse, would result in the removal of Pond P4. New freshwater and silt lagoons would also be constructed in this part of the site.

11.307 Recharge lagoons would be excavated at the eastern boundary of the application site. Once established, soil and overburden stripping and extraction of mineral is anticipated to take place in a sequence of seven phases, with the working 'cells' progressing east to west. Stripped materials would be stored in peripheral storage mounds and restoration of exhausted phases would progress in tandem with the working sequence, using both on-site materials and imported inert fill sourced from the construction and demolition waste sector and imported to the site under the terms of an Environmental Permit.

11.308 On completion of extraction, each worked out cell would be backfilled with inert material to achieve the required contours to ensure surface water flow is broadly re-established in a NW to SE alignment, towards an overflow connecting to an existing pipe which currently takes the ephemeral Nast flows along or under the A1057. The inert fill material would be covered by an engineered barrier / cap comprised of site-won interburden over which a 'restoration soil profile' of around 1.2m depth would be laid. Restoration soils would be carefully screened and selected to ensure they have suitable physical and chemical properties for the intended after-uses, including in particular lowland dry acid grassland, Lowland meadow and other neutral grassland. In the early phases of extraction, restoration materials may have to be stockpiled and stored, but in later phases, direct placement may be possible as part of progressive restoration. Micro-topographical diversity, including 'ridge and furrow' would be created in the final phases of restoration and in conjunction with preparation of soils and substrates for seeding, planting or natural regeneration as appropriate.

11.309 Restoration would comprise active planting interventions, potentially including use of harvested seed or 'green hay' from suitable donor sites in the locality, with hedgerow and tree planting sourced from nurseries able to guarantee native provenance. The recharge lagoons would be retained but remodelled to create a permanent waterbody, with other smaller and more ephemeral waterbodies also created, e.g. through placement and compaction of low permeability materials in shallow depressions. Following an appropriate establishment and aftercare period, the site would be managed in accordance with an approved management plan, likely to major on livestock grazing to maintain

grassland diversity and controlled visitor management to ensure some areas are subject to reduced levels of disturbance as compared with the existing situation.

11.310 The proposed hedgerow planting and ditch creation would follow the historic field pattern associated with Popefield Farm, re-creating the networks of habitats that would have been present prior to the use of the site as an aerodrome.

IMPACT ASSESSMENT

Methodology

Terms of Reference

11.311 The assessment of likely significant ecological effects arising from the project follows the guidelines produced for EcIA by the Chartered Institute for Ecology and Environmental Management (CIEEM)[72]. The approach taken is set out below:

Determining the Sensitivity of Key Receptors

11.312 In order to determine whether a specific effect on the key ecological receptors listed in Table 11-28 above is 'significant', the sensitivity of the affected habitat, site or species must be considered. The sensitivity of an individual receptor is a product of various factors including:

- Habitat extent or population size (at a given geographical level)
- Habitat or population fragility (including ability to recover)
- The rarity of a species or habitat; and
- Susceptibility to environmental change (e.g. from disturbance or pollution).

11.313 Applying the above criteria, the sensitivity of individual receptors can be put into 'High', 'Moderate' or 'Low' categories as follows:

[72] CIEEM (2018) *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine, v1.1*. Chartered Institute of Ecology and Environmental Management, Winchester.

Table 11-29: Sensitivity

Sensitivity	Habitat Example	Species Example
High	Habitat is highly susceptible to nutrient enrichment or invasion from competitive species Habitat has highly specialised hydrological or soil/geology requirements (e.g. eutrophic standing waters and standing open waters with associated grassland habitats) Habitat is present as small and isolated fragments vulnerable to edge effects Habitat takes an extended period to develop full suite of components (e.g. ancient woodland)	Species is highly intolerant of disturbance or pollution Species is present in a small and isolated population and/or has low dispersal rates Species has low recruitment rates and population recovery is likely to be very slow
Moderate	Habitat can tolerate some elevated levels of pollution or would recover within a short-medium term (e.g. <20 years) Habitat has hydrological or soil/geology requirements that can be recreated or are fairly widely met Habitat may be isolated, but is present at an extent that provides resistance to edge effects and is better able to accommodate damage Habitat develops over a moderate timescale given the right conditions (e.g. acid grassland)	Species is able to tolerate some levels of disturbance or pollution (e.g. sub-lethal effects). Species population is restricted, but large enough to accommodate some temporary reduction without long term consequences for viability. Species has moderate recruitment rates
Low	Habitat is highly resistant to nutrient enrichment or other forms of pollution and physical disturbance (e.g. modified grassland) Habitat has non-specific requirements that are readily met elsewhere Habitat is extensive and well able to accommodate localised or more extensive damage Habitat is easily recreated over a short timescale (e.g. arable)	Species is highly resistant to disturbance and pollution (e.g. most urban wildlife) Species' population is widespread and recolonisation in the wake of any localised range reduction likely to occur readily Species has high recruitment rates likely to lead to rapid recovery of population levels

11.314 As with the identification of key receptors, a certain amount of subjectivity and the application of professional judgment is unavoidable when determining sensitivity, however in addition to first-hand experience of the species/habitat and locality in question, a wealth of scientific literature and/or local conservation status information can often be drawn upon to inform such judgements.

Identification of Impacts and their Magnitude

11.315 Impacts arising from the proposals that have the potential to be significant are identified from review

of the scheme details, and tandem assessments for other environmental disciplines based on them, including in this instance the following in particular;

- Environmental Statement Chapter 3 (Development Description) and accompanying drawings showing initial preparation works and extraction phases.
- Proposed final restoration scheme drawing (drawings HQ 3/15).
- Environmental Statement Chapter 6 – Water
- Environmental Statement Chapter 9 – Air Quality
- Environmental Statement Chapter 10 - Noise

11.316 The following terms are used to quantify the 'magnitude' of identified impacts in this assessment:

Table 11-30:
Impact Magnitude

Impact Magnitude	Definition
Very High	An example of a very high magnitude impact would be direct mortality or displacement of a significant proportion of a species' population or loss of habitat at a level likely to remove its continued representation at the given geographical level being considered.
High	An example of a high magnitude impact would be direct mortality, indirect displacement or habitat loss that would be likely to substantially reduce the population level or degree of representation at the given geographical level being considered.
Moderate	Moderate impacts include those likely to result in a net reduction of population or habitat representation (at least in the absence of effective mitigation or compensation) at the given geographical level being considered
Minor	Minor impacts include those that may result in loss of a few individuals from a species' population or minor reduction in habitat extent at the given geographical level being considered.
Negligible	Negligible impacts are those that are not likely to give rise to measurable effects on population level or habitat representation at the given geographical scale.

Significance of Effects

11.317 Whether a potential effect is 'significant' or not at the given geographical level that the receptor is valued at, is determined by quantifying the magnitude of effect on each of the receptors identified. Thus for receptors of national or international value and high sensitivity, negative effects measured at high or very high magnitude are likely to represent a significant impact at that geographical scale. In development control terms, such impacts are very likely to conflict with planning policy. At the other end of the scale, minor magnitude effects on receptors of low sensitivity and only immediate local value are likely to be below significance thresholds, and to merit relatively low weight in planning decisions. Substantial effects on high value receptors that are of low sensitivity may fall either side of the significance threshold - in such cases further avoidance or mitigation may be able to be employed to ameliorate effects. A key consideration is whether the 'integrity' of a site or ecosystem (e.g. the

coherence of its structure and function) and/or the 'conservation status' of a species or habitat (e.g. the ability of a population/habitat to maintain itself at pre-development levels/quality) would be compromised.

Impact Prediction Confidence

11.318 For the impacts identified, confidence levels in the assessments made may be attributed and/or discussed where there is a significant degree of uncertainty.

Assessment

Potential Effects

11.319 Identification of potential effects and their zone of influence has included review of the development description and working scheme (ES Chapter 3) and the results of tandem assessments on water resources (ES Chapter 6), landscape (ES Chapter 8), air quality (ES Chapter 9) and noise and vibration (ES Chapter 10).

11.320 Taking the above into account, the project is considered to have the potential to give rise to a range of potentially significant direct and indirect effects on ecological receptors, including *inter alia*:

- Implementation Phase - direct effects:
  - Direct and permanent loss of existing grassland, hedgerow and disturbed ground habitats to phased top-soil/overburden stripping, materials storage and the establishment of haul routes, highway access and the processing plant site;
  - Loss of waterbodies or waterbody complexes, one of which (P4) is known to support breeding great crested newts would be lost in the establishment phase and another (P1) lost during operation of the quarry;
  - Risk or direct mortality of select protected/notable fauna; including breeding/wintering birds, badger, bats, reptiles and great crested newt (in the absence of any mitigation);
  - Loss of an established, main, badger sett;
  - Loss of habitat for nesting and wintering birds, including loss of current barn owl nesting locations in artificial boxes;
  - Loss of habitat and used by reptiles, invertebrates and localised scarce plants; and
  - Risk of spread of invasive flora leading to reduction in biodiversity, in the absence of management or mitigation measures.
- Implementation phase - indirect effects:
  - Potential effects on retained peripheral and adjoining habitat features (including Home Covert LWS and retained ponds that support great crested newts) from lighting, noise, dust and groundwater drawdown;
  - Displacement and/or disturbance of fauna using application site due to habitat loss and/or operational activities; and

- Development and progressive expansion of temporary early-succession habitats in operational and ancillary areas, with potential colonisation by associated fauna.

- Completed scheme - direct effects:
  - Reinstatement of expansive grassland habitats, with localised scrub and hedgerow and an expanded wetland component.
- Completed scheme - indirect effects:
  - Likely changes in use of the site by fauna already associated with the site; and
  - Likely changes involving other species (e.g. colonisation by species not currently present).

Assessment of Effects in the Absence of Mitigation

11.321 Table 11-31 overleaf sets out the likely significant effects on the key ecological receptors identified prior to the application of any additional mitigation measures for both the implementation phase of the project and the post-completion phase. It thus takes into account the avoidance, mitigation and compensation measures taken as part of the design process, as previously set out in this chapter.

Table 11-31
Predicted Effects on Key Receptors in the Absence of Additional Avoidance or Mitigation

Receptor	Value							Potential Effects	Magnitude	Significance	Additional Avoidance or Mitigation Measures Proposed?
	I	N	R	C	B/D	P	ZoI				
Home Covert and Round Wood Local Wildlife Site (LWS)				*				1) Indirect effects – disturbance to light-sensitive fauna, or disruption of behaviour through introduction of new sources of artificial light.	1) Lighting proposed for plant site only during the winter months (ES Chapter 3). Taking account of design mitigation (directional designs and adherence to industry standards for good design practice), potential for minor magnitude residual impacts of a temporary (medium-long term) nature on western side of LWS concentrated on woodland edge, although unlikely to penetrate far into designated area.	1) Not significant in relation to the integrity of the LWS designation. See also 'bats' below.	1) No
								2) Indirect effects – disturbance to noise- sensitive fauna, or disruption of behaviour through introduction of new sources of significant noise.	2) Taking account of design mitigation (e.g. cladding of processing plant) and the noise-attenuation effect of peripheral storage bunds (where present) residual potential for minor magnitude impacts of a temporary (medium-long term) nature on western side of LWS concentrated on woodland edge, but unlikely to penetrate far into designated area.	2) Not significant in relation to the integrity of the LWS designation. See also 'breeding birds' below.	2) No
								3) Indirect effects – physical impacts on plant communities affected by windborne dust and potentially on contained surface water systems affected by significant deposition.	3) Potential for negligible to minor magnitude impacts of a temporary (medium- long term) nature on western side of LWS and concentrated on immediate woodland edge.	3) Not significant in relation to the integrity of the LWS designation.	3) No
								4) Indirect effects – groundwater derogation with potential related effects on available soil water for LWS vegetation and habitat features.	4) Essentially free-draining nature of soils in south-western part of LWS, re-charge of retained adjoining section of Nast surface water system via diverted ditch, and design mitigation measures (including re-charge during de-watering of Upper Mineral Horizon and subsequent installation of clay bunds – see Chapter 6 - renders the scope for any effects negligible.	4) No likely significant effect on the LWS.	4) None proposed or required.
Unmanaged Other neutral Grassland				*				1) Progressive direct loss of c.90% of existing resource on application site.	1) Impact magnitude ameliorated by phased sequence of extraction and restoration such that development of similar vegetation on land released from current grazing or mowing management, and/or reinstated following progressive completion of restoration, is likely to reduce magnitude of loss to perhaps no more than 50% of the existing resource at any given point in time.	1) Significant unavoidable impact on resource arguably qualifying for LWS status (County importance) but the relatively species-poor nature of the existing resource, in part due to its recent origin, means that replication of value in incidentally developing or post-restoration areas likely to be close to 100%, even in worst case.	1) None practical, achievable or proportionate over and above the adoption of phased removal and compensation (through restoration) as already proposed.

Receptor	Value							Potential Effects	Magnitude	Significance	Additional Avoidance or Mitigation Measures Proposed?
	I	N	R	C	B/D	P	ZoI				
Great Crested Newt					*			1) Loss of 2no breeding ponds through the duration of the quarry operation and de-facto loss of up to 70% of terrestrial habitat within 500m of these, through exclusion and/or operational activities.	1) Major in terms of the on-site population but this is evidently part of a larger metapopulation with a range extending significantly north and east, so metapopulation-level effects no higher than moderate.	1) Potentially significant in terms of maintenance of favourable conservation status at District level. In any event, impact on even one animal would have legal implications and therefore further consideration of avoidance and mitigation techniques is required.	1) Yes. Avoidance of loss of main breeding pond and terrestrial habitats in early years of operation and creation of replacement breeding ponds would be undertaken as part of initial operations. Translocation, including clearance of GCN from aquatic and terrestrial habitat within application site, and exclusion for duration of operations, would be carried out under licence. District Level Licensing (DLL) is not operational in the county. Measures may change if DLL becomes operational or other approaches to mitigation become established.
								2) Potential for groundwater derogation effects on ponds used by the species (P1, P2, P3, P5 and P6) and to be retained in the medium and longer term close to extraction area.	2) Minor. Scope for significant dewatering of P5 and P1 limited by ground-water re-charge through retained (diverted) Nast system and re-charge lagoons. Risk of dewatering P5 and P6 reduced by design mitigation measures (including re-charge during de-watering of Upper Mineral Horizon and subsequent installation of clay bunds – see Chapter 6). P2 and P3 are ephemeral pools currently and unlikely to be important to GCN population currently.	2) Worst case predictions of impact magnitude are for short-term temporary drawdown impacts during earliest phases of operation (e.g. excavation of recharge lagoons). These are unlikely to give rise to significant meta-population level effects but any impact on egg or larval life-stages would have legal implications and therefore further consideration of avoidance and mitigation techniques is required.	2) Yes. Monitoring of water levels in these waterbodies is proposed in order to identify any need for intervention. If critical operations (e.g. excavation of re-charge lagoons) occur outside the period when GCN may breed in these ponds, the scope for impact may be avoided entirely. Measures may change (if DLL becomes operational).
								3) Loss of 30-40% of terrestrial habitat within 500m of off-site breeding pond P6 through exclusion and/or operational activities, although reinstated in medium-long term.	3) Minor. Much of the terrestrial habitat in question is of reduced suitability for terrestrial phase GCN due to grazing and/or likely to be exploited to a lesser degree than other unaffected habitats (e.g. Home Covert).	3) Assessed as likely to fall below significance thresholds in terms of conservation status at District level. However, impact on even one animal would have legal implications and therefore further consideration of avoidance and mitigation techniques is required.	3) Yes. A detailed mitigation programme, following current NE guidance and policies relating to phased development would be developed. Mitigation would include the clearance and/or rescue of GCN from terrestrial & aquatic habitat within application site, and retention an enhancement and creation of new habitats sufficient to maintain the population in favourable condition for duration of operations, Mitigation measures may change (if DLL becomes operational).
								4) Scope for direct mortality or and disturbance to individuals (incl. disturbance from lighting/ noise).	4) Major in terms of the on-site population but this is evidently part of a larger metapopulation with a range extending significantly north and east, so metapopulation-level effects no higher than moderate.	4) Potentially significant in terms of maintenance of favourable conservation status at District level. In any event, impact on even one animal would have legal implications and therefore further consideration of avoidance and mitigation techniques is required.	4) Yes. A detailed mitigation programme would be designed. Measures may change (if DLL becomes operational).

Receptor	Value							Potential Effects	Magnitude	Significance	Additional Avoidance or Mitigation Measures Proposed?
	I	N	R	C	B/D	P	ZoI				
Breeding Birds					*			1) Direct impacts on bird nests, eggs or young through site stripping or other operational activities (direct mortality, displacement/disturbance).	1) Phased nature of workings reduces scope for any more than a minor magnitude impact, even at the site level.	1) Not significant at District level for most species, although potentially approaching or exceeding such levels if restricted site population of certain scarcer species (e.g. barn owl, cuckoo) was impacted.	1) Yes. Impact on any active nest would have legal implications and therefore further consideration of avoidance and mitigation techniques is required.
								2) Progressive direct loss of 90-100% of existing breeding bird habitats on the site compromising breeding success or leading to wholesale displacement.	2) Minor to moderate in the context of the geographical scale indicated. Scope for higher magnitude effects restricted significantly by phased working sequence which would leave extensive areas under rough grassland initially, and by later phases restoration is likely to have generated suitable replacement breeding conditions for a significant proportion of affected species (e.g. skylark, whitethroat).	2) Not significant at District level for most species due to amelioration effect of phasing, although potentially approaching or exceeding such levels if site population of certain species (e.g. barn owl, cuckoo) was impacted in any given operational phase.	2) None, over and above the measures employed to ensure legal compliance as per (1) above and the incorporated design mitigation.
								3) Changes in breeding bird assemblage using the site in response to temporary exclusion of public, and development of ephemeral and subsequent long-term replacement habitats through progressive restoration.	3) Neutral to minor (positive or negative) depending on uptake of ephemeral habitats by species of conservation importance (e.g. sand martin, little ringed plover), and the success of the restoration scheme long-term in reinstating the current level of ecological interest.	3) If minor magnitude positive or negative effects are manifested these would be significant at District level due to the site's relative importance at that geographical scale.	3) No.
Wintering Birds					*			1) Direct impacts on wintering birds through site stripping or other operational activities (dependant on timescales of soil strip) via potential direct mortality, displacement/disturbance.	1) Phased nature of workings reduces scope for any more than a minor magnitude impact, even at the site level.	1) Not significant at District level for most species due to amelioration effect of phasing, although potentially approaching or exceeding such levels if wintering population of certain species (e.g. barn owl) was impacted in any given operational phase.	1) None, over and above incorporated design mitigation.
								2) Progressive direct loss of 90-100% of existing wintering bird habitats on the site compromising site's attractiveness to such species or leading to wholesale displacement.	2) Minor to moderate in the context of the geographical scale indicated. Scope for higher magnitude effects restricted significantly by phased working sequence which would leave extensive areas under rough grassland initially, and by later phases restoration is likely to have generated suitable replacement conditions for a significant proportion of affected species. Given the above, exclusion of public (albeit temporarily) may even temporarily enhance conditions for sensitive species such as short-eared owl.	2) Not significant at District level for most species due to amelioration effect of phasing, although potentially approaching or exceeding such levels if wintering population of certain species (e.g. barn owl) was impacted in any given operational phase.	2) None, over and above incorporated design mitigation.
								3) Changes in wintering bird assemblage using the site in response to temporary exclusion of public, and development of ephemeral and subsequent long-term replacement habitats through progressive restoration.	3) Neutral to minor (positive or negative) depending on uptake of ephemeral habitats by species of conservation importance (e.g. green sandpiper), and the success of the restoration scheme long-term in reinstating the current level of ecological interest, and subsequent management in maintaining that interest.	3) If minor magnitude positive or negative effects are manifested these would be significant at District level due to the site's relative importance at that geographical scale.	3) No.

Receptor	Value							Potential Effects	Magnitude	Significance	Additional Avoidance or Mitigation Measures Proposed?
	I	N	R	C	B/D	P	ZoI				
Passage Birds					*			1) Progressive direct loss of 90-100% of existing bird habitats on the site compromising site's attractiveness to such species or leading to wholesale displacement. 2) Changes in passage bird assemblage using the site in response to temporary exclusion of public, and development of ephemeral and subsequent long-term replacement habitats through progressive restoration.	1) Minor. The nature of passage bird use is that the types of habitat change that would occur during the operational phase and progressive restoration are not likely to significantly affect the openness of the site and its existing attractiveness to passage species. 2) Minor to moderate positive given that the development of ephemeral habitats associated with active extraction is likely to create an additional attractant for species not currently associated with the site. Following restoration, some of this positive change might be retained depending on management and levels of public access.	1) Not significant due to the low magnitude of change and the nature of passage bird use. 2) If minor to moderate temporary or longer-term positive effects are manifested these would be significant at District level due to the site's relative importance at that geographical scale.	1) None, over and above incorporated design mitigation. 2) No.
Invertebrates					*			1) Direct impacts on individuals or populations through site stripping or other operational activities. 2) Progressive direct loss of 90-100% of existing invertebrate habitats on the site. 3) Changes in invertebrate assemblage using the site in response to development of ephemeral and subsequent long-term replacement habitats through progressive restoration.	1) Phased nature of workings and large expanse of macro-habitats reduces scope for any more than a minor magnitude impact, even at the site level. 2) Minor in the context of the geographical scale indicated, and the likely site-wide and local distribution of the species of higher conservation importance. Scope for higher magnitude effects restricted significantly by phased working sequence which would leave extensive areas under rough grassland initially, and by later phases restoration is likely to have generated suitable replacement conditions for a significant proportion of affected species, with some expansion of currently more restricted habitat opportunities (e.g. wetland, acid grassland). 3) Neutral to minor (positive or negative) depending on uptake of ephemeral habitats by species of conservation importance (e.g. solitary bees and wasps), and the success of the restoration scheme long-term in reinstating the current level of invertebrate interest.	1) Unlikely to be significant at the assemblage/metapopulation level for any species. 2) Unlikely to be significant at the assemblage/metapopulation level for any species. 3) Positive impacts up to District level of significance are possible.	1) No. 2) None, over and above incorporated design mitigation. 3) None, over and above incorporated design mitigation.
Other Grasslands						*		1) Progressive direct loss of c.100% of existing resource on application site.	1) Impact magnitude ameliorated by phased sequence of extraction and restoration such that development of similar vegetation through progressive restoration is likely to reduce magnitude of loss to perhaps no more than 25% of the existing resource at any given point in time, with equivalent or expanded resource recreated.	1) Taking into account design mitigation, impacts not significant above the immediate site context, and potentially net positive for this receptor.	1) None, over and above incorporated design mitigation.

Receptor	Value							Potential Effects	Magnitude	Significance	Additional Avoidance or Mitigation Measures Proposed?
	I	N	R	C	B/D	P	ZoI				
Hedges, Disturbed Ground Habitats, Mature Trees, Ponds and Denser Scrub						*		1) Progressive direct loss of up to c.30-40% of existing resource on application site.	1) Minor (ponds, scrub) or negligible (hedges, mature trees) in comparison with Parish resource, with advanced compensatory provision proposed in relation to ponds.	1) Not significant above the immediate site level.	1) None, over and above incorporated design mitigation.
Bats						*		1) Potential indirect habitat fragmentation effects on local bat populations from permanent losses or breaches of hedgerows.	1) Minor (see also under hedges and mature trees above) in terms of the integrity of commuting and foraging routes in the short-medium term and compensated in the long-term by enhanced conditions for the species recorded, as delivered through the restoration scheme.	1) Effects predicted to remain well below significance thresholds in terms of local population integrity for any bat species.	1) Yes – any affected mature trees would be re-surveyed prior to initial operations and prior to each stripping phase to ensure no roosts are established or to inform appropriate mitigation if required in the future.
								2) Temporary loss of foraging area due to removal of vegetation in active extraction areas	2) Minor to negligible. The phased working sequence would limit the extent of land devoid of vegetation at any one time and losses are likely to be compensated or outweighed by benefits as the restoration sequence progresses.	2) Effects predicted to remain well below significance thresholds in terms of local population integrity for any individual bat species.	2) None required.
								3) Increased habitat diversity delivered by progressive restoration through operational phase delivering compensatory or new representations of semi-natural grassland, wetland and scrub.	3) Negligible through to minor positive as restoration progresses in tandem with working.	3) Negative effects predicted to remain well below significance thresholds. Significant positive effects progressing from immediate local to Parish level by the completion of the restoration due to enhanced wetland foraging opportunities.	3) None required.
								4) Potential for killing or injury to individual animals roosting in bat boxes, trees or other features that are within footprint of operational areas.	4) Minor to negligible. Risk of bats roosting on site is low/negligible based on current baseline data. Highly unlikely that any roosts would be of a size or support a species of high conservation significance.	4) Effects predicted to remain well below significance thresholds in terms of local population integrity for any individual bat species.	4) Conduct regular reviews of the risks of roosting bats occurring within the operational or future phases of development and ensure sufficient mitigation or avoidance measures are in place prior to disturbance of any identified potential roosting features.
Brown Hare						*		1) Loss of cover and foraging area due to removal of vegetation in active extraction areas	1) Minor to negligible. The phased working sequence would limit the extent of land devoid of vegetation at any one time and losses are likely to be compensated or outweighed by benefits as the restoration sequence progresses, including temporary benefits from reduced disturbance.	1) Negative effects predicted to remain well below significance thresholds in terms of local population integrity. Significant positive effects at the Parish population level are possible, although these may be rendered temporary depending on the future management of public access.	1) None, over and above incorporated design mitigation.
Badger							*	Refer to Confidential Badger Appendix 11/5	Refer to Confidential Badger Appendix 11/5	Refer to Confidential Badger Appendix 11/5	Refer to Confidential Badger Appendix 11/5

Receptor	Value							Potential Effects	Magnitude	Significance	Additional Avoidance or Mitigation Measures Proposed?
	I	N	R	C	B/D	P	ZoI				
Reptiles							*	1) Small-scale scope for impacts on individuals (direct mortality/disturbance) from sparse local population of grass snake (incl. disturbance from lighting).	1) Minor. Only very low numbers likely to be at risk.	1) Effects not predicted to be significant in terms of local populations. Effects likely to be reduced by recovery in the short-term.	1) Yes – habitat manipulation would be employed out of season to discourage grass snakes (and any other reptiles colonising/re-colonising in the future) from areas affected by works and/or phased translocation would be employed.
								2) Loss of breeding and foraging habitats in ponds and grassland.	2) Negligible through to minor negative effects as restoration progresses in tandem with working. In the longer term, increased habitat diversity for reptile species delivered by progressive restoration through operational phase delivering new representations of semi-natural grassland, wetland and scrub.	2) Not significant.	2) None, over and above incorporated design mitigation.
								3) Fragmentation of commuting routes to move through this wider landscape.	3) Negligible through to minor negative effects as restoration progresses in tandem with phased working. In the longer term, increased habitat diversity for reptile species delivered by progressive restoration through operational phase delivering new representations of semi-natural grassland, wetland and scrub.	3) Not significant.	3) None, over and above incorporated design mitigation.
Invasive Flora							*	1) Potential for invasive, non-native species on site to be spread on and off-site via operation and vehicular activity.	1) Minor to moderate dependant on transmission of invasive species (e.g. New Zealand pigmyweed, Japanese knotweed and snowberry) around site and/or off-site (e.g. via watercourses, roadways, wind-blown plant material mobilised by works etc) and the extent of the future colonisation/degradation of other habitats.	1) If minor to moderate temporary or long-term effects are manifested these would be significant at the District (potentially catchment) level. Has the potential to increase in significance should infestations not be contained, controlled and managed.	2) Yes. Measures are required to identify all potential invasive species and follow avoidance, containment and control mitigation measures to prevent/minimise spread.

FURTHER AVOIDANCE, MITIGATION, COMPENSATION AND ENHANCEMENT

Specially Protected Species

Great Crested Newt

11.322 Further mitigation is required in respect of this European Protected Species (EPS) due to the confirmed loss of breeding ponds and damage to/loss of large areas of terrestrial habitat during the operational phase. A draft EPS licence was prepared for the original 2016 scheme and subject of pre-submission screening advice from Natural England. This mitigation scheme would be revised in the light of comments from Natural England and other consultees and submitted to Natural England for approval. An outline of the proposed mitigation approach for great crested newts is set out below.

11.323 The proposed mitigation approach uses DEFRA Licensing Policy 3, and this is considered to be the best option for GCN, as opposed to the traditional mitigation route. This policy is designed to allow GCN access to temporary habitats, e.g. within the quarry footprint and on soil mounds surrounding the quarry, that they would have otherwise been prevented from accessing. This gives access to a much larger site and reduces the risk of fragmentation of the GCN population compared to the traditional mitigation route. It is considered that allowing GCN on a working site would not be detrimental to the conservation status of the species. In order to do this, a robust population would be first be established/maintained in retained ponds in the receptor/refuge site (P5, P9 and proposed 8 new mitigation ponds) and through enhancement of P1 and terrestrial habitat it surrounding for the early phases of quarry development.

11.324 The mitigation approach has followed the mitigation hierarchy, through the avoidance of direct impacts to P5 and P9; avoidance of impacts to P1, P2 and P3 in the early phases of the quarry; mitigation to reduce risk of killing/injury to GCN during key stages of the project and enhancement to retained and newly created habitats. The mitigation solution for the current application is to establish a core receptor/refuge area on the eastern boundary of the site. This protects on-site ponds that support GCN (P5) and previously supported GCN in 2015 (P9). It also protects core terrestrial habitat for the medium population associated with P6 and maintains the best possible links with off-site populations, including those in P10 and further afield to the north, e.g. at Cemex Cutfield. The receptor site is on the east side of the site, adjacent to Home Covert Woodland and would be enhanced to ensure it is suitable to support the increased numbers of GCN in the long-term (30+ years).

11.325 Existing ponds within the receptor site would be enhanced and 8 new ponds would be created in this receptor/refuge area. New ponds have been designed to maximise the benefits of local groundwater re-charge and surface water runoff, so they are likely to hold water for longer and be more dependable breeding habitats than the ponds currently within the site. Terrestrial habitats in the receptor/refuge area would also be undertaken, i.e.. log piles, hibernacula, 0.5ha of scrub planting and grassland management/enhancement. As the on-site population is relatively small and closely associated with P1, a buffer of 50m around P1 is established in the initial phases of establishment earthworks.

11.326 Systematic GCN capture and clearance (i.e. standard mitigation fencing & pitfall trapping) would be undertaken on a risk-basis, with mitigation designed to capture a high proportion of animals present in

areas that would be lost to early phases of development and to ensure a robust population of GCN is maintained. Before removal of P4, this would be subject to draindown (if required, dependant on water levels) and netting and hand searching to rescue GCN and translocate them to suitable local breeding ponds, e.g. Pond 1. There is no double-handling risk as Pond 1 and surrounding habitat would be protected from development activities for at least 10 years.

11.327 Before earthworks to clear vegetation from P1 and its core terrestrial habitat, which is current proposed at the end of Phase B/Start Phase C in approximately 10 years it is proposed to undertake systematic GCN capture and clearance around core habitats associated with the pond on a risk-basis. The final capture period and extent would be determined by GCN population surveys in advance of clearance. Any newts found would be relocated to the receptor/refuge area to the east of the site. Once the capture period is completed around P1, P2 and P3 all TAF would be removed and all remaining areas would be destructively searched in advance of earthworks commencing. No habitat fragmentation between meta populations is predicted as there would be no long-term TAF retained within the development and internal haul routes would be relatively narrow, unsealed and only in use during daylight working hours.

11.328 The GCN population within the site would have access to large areas of un-developed land to the south of the quarry for the approximately 10 years whilst the quarry is established and earlier phases extracted. Temporary habitat enhancements and management improvement, e.g. creation of scrub and log piles, reduction of public visitor pressure (informal public access around the ponds (P1,P2 P3) and associated terrestrial habitat areas would be reduced whilst quarry is operational by erection of a post and wire fence to restrict access) and a reduction in grassland management intensity, which would allow an increase in over-winter vegetation heights, would temporarily improve habitat quality for GCN in the later phases of proposed development. Water levels in P1 would be monitored during operation and levels would be topped up using ground water if they drop during summer months, increasing chances of successful breeding. There is no risk of double handling as there is at least 10 years before newts associated with P1 would be moved. Immediately prior to final quarry restoration, the potential for soil bunds to support GCN would be considered and selected fencing and pitfall trapping (using standard methods) would be implemented on bunds where they are within 100m of breeding ponds. The final design/layout of newt fencing and capture area would be informed by up to date population data.

11.329 There are not predicted to be any long-term effects resulting from groundwater drawdown. GCN ponds would be subject to regular monitoring and would be topped up with groundwater if water levels drop.

11.330 For the purposes of planning determination, it is necessary to set out how the mitigation approach described above can and would meet the three tests of the Habitats Directive in order for derogation to be given in the form of a licence.

11.331 The case that there is overriding public interest in the development proceeding and that there is no satisfactory alternative to the development relates to the site's allocation for minerals extraction in the adopted Minerals Local Plan and the significant contribution it makes to local supply of sand and gravel and the importance of that supply to the local and regional economy. This is as set out in the planning statement submitted with the application.

11.332 The favourable conservation status of great crested newts, here measured in terms of the site and local metapopulation, would be secured through the mitigation measures described above.

11.333 Full detail of the methodology for the above would be prescribed fully within an EPS licence, which would be sought in advance of ground-breaking works that may lead to licensable activities within the site.

11.334 It should be noted that the District Level Licensing (DLL) scheme is not currently operational in the county. Should this come into effect then proposed mitigation measures may be subject to change.

Bats

11.335 As set out in Table 11-31, no significant effects on bat roosts are predicted due to the absence of evidence of any roosts in the limited number of mature trees and the single structure on the site, as confirmed by specific survey. This assessment is likely to remain current with respect to most vegetation removed during set up operations, but further checks of mature trees that would be removed during this phase (e.g. in and around the plant site) and of the building in the south-eastern edge of the application site, would be made immediately prior to their felling or demolition respectively.

11.336 In relation to the remainder of the site, while current roosting opportunities are absent or highly limited, the elapse of time over the operational phase renders it possible, albeit unlikely, that the baseline situation could change. To address this, a repeat appraisal of the possibility of roosts being present would be made prior to the commencement of site preparation works on each future phase, and if potential roosts sites are identified these would be subject to full surveys (emergence/re-entry or climbing inspections) to ascertain that no bat constraint has developed. If bat roosts are found, appropriate mitigation under licence would be enacted prior to the commencement of preparatory works for that phase. If required, measures would be detailed in a method statement and work schedule to support a licence application.

11.337 As an ancillary and unrelated enhancement for bats, the opportunity would be taken to install bat boxes on a number of retained mature trees at the site margins, including the part of the applicant's lease-holding that extends partly within the edge of Home Covert. This would represent an enhancement in terms of the current poor level of bat roosting opportunities on the site.

11.338 Full detail of the methodology for the above would be prescribed fully within a Species Protection Plan in advance of works proceeding on site.

Badger

11.339 Refer to the Confidential Badger Report (**Appendix 11/5**).

Barn Owl

11.340 To ensure an unbroken continuity of nest and winter roost site opportunities for this Schedule 1 protected species, the existing barn owl boxes on the site would be relocated in the post-breeding / pre-winter period (i.e. once certain any chicks have fledged) prior to their location being affected by any individual working phase. Consideration would be given to the erection of additional permanent pole or tree mounted boxes as part of the final restoration.

11.341 This would be undertaken immediately following inspection by a licensed Ecologist who would be

tasked with monitoring barn owl activity on site. The methodology for this would be prescribed within a Species Protection Plan.

Nesting Birds

11.342 Site clearance and works within the breeding bird season (March to August inclusive) has the potential to incur damage to or disturbance of nesting birds and their nests/young.

11.343 It is intended that vegetation removal, overburden stripping and related groundworks for the preparatory phases (including conveyor construction) and for each working phase, would be precede the main works.

11.344 Site clearance in late winter/early spring (i.e. late February/early March) or mid-Autumn (i.e. September) is most preferable to avoid impacts to nesting birds (and potential hibernating reptiles). No particularly early nesting species are anticipated on this site and so this approach is likely to successfully avoid any impact from this source.

11.345 Immediately in advance of each phase, a suitably qualitied and experienced Ecological Clerk of Works (ECoW) would inspect all vegetation for signs of nesting bird activity. Should any activity be noted within and nearby the works area then the ECoW would advise a buffer area/no works zone to prevent disturbance of or direct mortality to the nest, adult birds and chicks. The ECoW would monitor site conditions until such time that all chicks are confirmed to have fledged the nest(s). Thereafter works can continue for the next 48 hours. Should the site area not be cleared within that time and suitable nesting bird habitat remains then a follow up inspection would be required. The ECoW would advise on areas that are free from constraint and can be subject to habitat manipulation to remove nesting bird habitat for areas that would be subject to works.

11.346 The buffer areas/no works zones would be dependent on the species of bird (5m minimum and can be extensive for species that are highly sensitive to disturbance). This can be a significant factor for programming of works on site so should be factored in to avoid unexpected delays.

11.347 Full detail of the methodology for the above would be prescribed fully within a Species Protection Plan in advance of works proceeding on site.

Reptiles

11.348 In advance of groundworks on any individual phase, suitably timed habitat manipulation (strimming and/or mowing) would be employed to displace and discourage reptile species from habitat with the potential to support them.

11.349 Low density populations are present on the site. Compensatory habitat would develop in short order on peripheral or already restored land as the working sequence progresses. For these reasons, habitat manipulation is considered an appropriate, proportionate and adequate means to negate or minimise the scope for inadvertent killing or injuring of any individual animals from the sparse local population of grass snake on the site, and indeed any residual population of slow worm.

11.350 A full methodology for habitat manipulation would be prescribed within a Species Protection Plan. This would take account of the potential presence of nesting birds on site and shall be programmed

accordingly (as outlined for nesting birds in Section above).

Invasive Flora

New Zealand Pigmyweed and Japanese Knotweed

11.351 A specialist invasive species contractor would be instructed, at the earliest opportunity, to advise on the most effective options for containment, control and management of Japanese knotweed, New Zealand pygmyweed and snowberry on site.

11.352 An Invasive Species Management Plan would prescribe options available to minimise the risk of the Schedule 9 invasive species from being spread around site or on adjacent land/watercourses.

11.353 The specialist can advise on the legal ramifications of containment and treatment options; including, the need for permitting/licensing for transfer of Hazardous Waste should the material be legally transported off-site.

11.354 The most environmentally sensitive option would be sought in the confines of the works programme.

RESIDUAL EFFECTS

11.355 The residual effects anticipated to arise as an overall consequence of the project (i.e. taking into account both the design mitigation set out above, and the further avoidance, mitigation and compensation measures) are summarised for each of the key receptors in Table 11-31 below.

Table 11-32:
Residential Effects

Receptor	Residual Effect
Home Covert and Round Wood LWS	With the adoption of best practice and industry guidance in respect of minimising the indirect effects on the LWS habitats from lighting, noise and dust, no significant residual impacts are predicted in terms of the integrity of this designated site.
Unmanaged Grasslands	The phased nature of extraction, the likely development of ephemeral unmanaged grassland habitats of not dissimilar nature and conservation significance, and the active creation and future management of such habitats following the completion of restoration ensures that any negative impacts would be of minor to moderate magnitude, temporary and fully compensated in the long term. Residual effects after restoration assessed as not significant and may be positive subject to restoration success and future management.
Great Crested Newts	A comprehensive mitigation scheme for this species would be implemented. The scheme would require derogation from the provisions of European and UK legislation in the form of a licence from Natural England. The three tests upon which the grant of a licence is contingent are capable of being met. Residual impacts on the species are assessed to be below significance thresholds on the successful completion of mitigation, with scope for significant positive effects in the long-term due to the enhanced wetland habitat provision forming part of the restoration scheme.

Receptor	Residual Effect
Breeding Birds	The phased nature of extraction and progressive restoration, in conjunction with the incidental development of ephemeral habitats in operational areas and the exclusion of public access from operational areas during the active working or restoration phase, is likely to ensure operational phase impacts on this receptor remain below significance thresholds. Post-restoration, there is scope for significant positive impacts at the District level to be secured, subject to future management.
Wintering Birds	Similarly to the above, the phased nature of extraction and progressive restoration, in conjunction with the incidental development of ephemeral habitats in operational areas and the exclusion of public access from operational areas during the active working or restoration phase, is likely to ensure operational phase impacts remain below significance thresholds. Post-restoration, there is scope for significant positive impacts at the District level to be secured, subject to future management.
Passage Birds	The scope for significant negative effects is assessed as remote due to the transient nature of site use by this group of receptors and the phased nature of extraction and progressive restoration, in conjunction with the incidental development of ephemeral habitats in operational areas and the exclusion of public access from operational areas during the active working or restoration phase. Positive effects significant up to the District level are possible post-restoration, subject to an appropriate management regime being delivered.
Invertebrates	Scope for significant negative effects restricted by phased working sequence which would leave extensive areas under rough grassland/scattered scrub initially, and by later phases restoration is likely to have generated suitable replacement conditions for a significant proportion of affected species, with some expansion of currently more restricted habitat opportunities (e.g. wetland, acid grassland) potentially delivering significant positive effects long-term.
Other Grassland Habitats	Losses anticipated to be below significance thresholds at the relevant (Parish) geographical level, due to progressive nature of site working and restoration and the compensatory (or expanded) provision built in to the restoration scheme.
Hedges, Mature Trees, Ponds and Denser Scrub	Losses anticipated to be below significance thresholds at the relevant (Parish) geographical level, in large part due to progressive nature of site working and restoration and the compensatory (or expanded) provision built in to the restoration scheme in respect of ponds, hedges and scrub.
Bats	Short term effects likely to be neutral or net positive (although sub- significant in relation to conservation status of resident local populations) due to very minor habitat loss or fragmentation effects being outweighed by delivery of improved habitat diversity through extraction and progressive restoration. In medium term, mitigation proposed to militate against and/or address future effects further obviates scope for significant effects. Post completion (long term), effects are likely to be significant positive (Parish level) due to expansion and improvement of habitat resources, including provision of new wetland habitat foraging and roosting opportunities in particular.
Brown Hare	Negative effects predicted to remain well below significance thresholds in terms of local population integrity. Significant positive effects at the Parish population level are possible during the operational phase, due to exclusion of public (and dog) access although these may be rendered temporary depending on the future management regime.
Badger	Refer to Confidential Badger Appendix 11/5.

Receptor	Residual Effect
Reptiles	With precautionary mitigation, no significant effects anticipated due to phased habitat loss being compensated by delivery of improved habitat by progressive restoration. In medium to long term, effects are likely to be significant positive (Parish level) due to expansion and improvement of habitat resources.
Invasive Flora	With early intervention, on the advice of a commissioned Invasive Flora Management Specialist, short significant positive effects at the District/catchment geographical level are possible during the construction and operation phase. The maximum biodiversity benefits would be realised and the greatest opportunity to select the most environmentally sound option would be enabled with prompt action to contain, control and manage invasive flora on site. This would reduce risk of spread of invasive species in the locality. Ongoing monitoring and management would be essential to success. Post completion (long term) effects are likely to be significant positive (Parish level) due to expansion and improvement of habitat resources, upon provision of native habitats.

CONCLUSIONS

11.356 As can be seen from Table 11-31, the net residual effect of the proposals in terms of the key ecological receptors is anticipated to be at worst neutral and at best a positive effect measurable at least at the District level of significance. The difference relates to a degree of residual and unavoidable uncertainty over the success of the restoration scheme and subsequent long-term management in securing similar or enhanced habitats to the baseline position and, in particular, the extent of visitor pressure and its management over the long-term.

11.357 The project would give rise to minor temporary negative effects on certain key faunal receptors (in particular great crested newts) during various stages of the working sequence, but none of these receptors are predicted to be subject to negative effects of high magnitude (e.g. significant in terms of wider local populations), subject to mitigation measures which, in respect of great crested newts, are required under statute in any event. There is no impediment to mitigation proposals being delivered that are in accordance with standard best practice, and in that context there is no cause to believe that the requisite licenses would not be forthcoming in due course. There is also a high certainty that all temporary negative effects on key faunal receptors related to habitat loss would be at least fully compensated in the long-term through the restoration scheme.

11.358 Refer to the Confidential Badger Report (**Appendix 11/5**) for an assessment relating to this species.

11.359 The proposals for restoration focus on replication of the higher-value elements of the site in its baseline condition, including in particular the large expanses of rough circumneutral grassland, but also seek to exploit opportunities to secure expanded representations of other semi-natural vegetation, in particular acid grassland and wetland habitats, providing replacement and expanded opportunities for species of conservation importance, including declining open-country birds, scarce plants and insects, great crested newts and others. Depending on the success of restoration delivery, and the future management of the site, the project has the potential to ultimately deliver significant positive effects at District level or above, and to qualify the restored site for non-statutory designation within a relatively short time frame.