



Appendix 12.2

PROTECTED SPECIES SURVEY METHODOLOGY AND RESULTS

Appendix 12.2

- 12.2.1. Methodology and results for each of the ecological surveys completed at the Site are described below. Where appropriate, methods and results are discussed separately for the Eastern and Western Sites.

Habitat surveys methodology and results

Methodology

- 12.2.2. An extended Phase 1 Habitat survey of the Site was carried out on 17th May 2021 by Tyler Grange Group Ltd and updated in the form of an extended UK Habitat Classification survey on 6th September 2023. The survey covered the entire Site, including boundary features, and was undertaken in appropriate weather (dry and mild conditions with low wind speeds).
- 12.2.3. Habitats were described and mapped following the standard Phase 11/UK Habitat Classification² methodology. The dominant plant species were recorded, and habitats identified according to their vegetation types. Where appropriate, consideration was given to whether each habitat would qualify as a Habitat of Principal Importance under the NERC Act 2006.
- 12.2.4. Target notes were made where specific features of ecological interest (e.g. invasive plants) were identified or where further detail was to be provided for features of ecological interest too small to be mapped.

Results

Eastern Site

- 12.2.5. The Phase 1 habitat survey identified several habitat types within the Eastern Site as described below. The locations and extent of these habitats are illustrated in Appendix 12.4.

Arable and Horticulture - Cereal crops

- 12.2.6. The majority of the Eastern Site is formed of arable fields containing cereal crops. Arable fields are of limited inherent ecological value and are considered to be of negligible ecological importance. The potential for this habitat type to support protected species (e.g. birds) is discussed separately below.

Grassland - Modified Grassland

- 12.2.7. Modified grassland formed the margins of the arable fields, dominated by perennial ryegrass *Lolium perenne* with Yorkshire fog *Holcus lanatus* and white clover *trifolium repens*. Modified grassland is of limited inherent ecological value and is considered to be of negligible ecological importance.

Hedgerows

- 12.2.8. Five hedgerows are present within the Eastern Site, forming the boundaries around the Eastern Site and partly demarcating the boundaries between arable fields:
- Hedgerows H10, H11, H12 and H13 are species-poor defunct hedgerows with multiple gaps. These hedgerows are dominated by common hawthorn *Crataegus monogyna* and blackthorn *Prunus spinosa* located on the eastern and southern

boundaries of the Eastern Site and demarcating field boundaries in the centre of the Eastern Site; and

- Hedgerow 9 is an intact species-rich hedgerow with trees forming the western and northern boundaries of the Eastern Site. Tree species comprised pedunculate oak *Quercus robur*, ash, hazel and field maple. Shrub species included hawthorn, blackthorn, elder *Sambucus nigra*, holly *Ilex aquifolium* and dog rose *Rosa canina*.

12.2.9. Hedgerows are listed in Section 41 of the NERC Act 2006 as a priority habitat and based on the criteria listed in the UK BAP Priority Habitat Descriptions³, the species-rich hedgerow H9 is likely to qualify as such. Although widespread in the wider landscape, the hedgerows present at the Site provide a network for mobile species and are irreplaceable in the short-term. The hedgerows are considered to be of local ecological importance.

Other standing water - Ponds

12.2.10. One waterbody is identified within the Eastern Site, waterbody WB1. WB1 is a small waterbody located within an arable field. The waterbody had limited aquatic and bankside vegetation at the time of the extended Phase 1 habitat survey. Ponds do offer some ecological value although this pond is unlikely to qualify as a priority habitat under the JNCC criteria for ponds⁴ and, as such, this habitat is considered to be of local ecological importance.

Dense Scrub - Bramble Scrub

12.2.11. One small area of dense scrub is present surrounding waterbody WB1. This habitat is primarily comprised of bramble *Rubus fruticosus* with common hawthorn and hazel. Given the small area and the prevalence of this habitat type in the wider landscape, this habitat is considered to be of negligible ecological importance.

Trees

12.2.12. Semi-mature ash trees are located along the north east boundary of the Eastern Site, within hedgerow H9. These trees are considered to contribute to providing habitat connectivity between the Site and the wider landscape although, given the prevalence of mature trees in the wider landscape and that the species present are common and widespread, these trees are considered to be of local ecological importance.

Ancient Woodland

12.2.13. There is no ancient woodland located within the Eastern Site. The closest ancient woodland to the Eastern Site is located approximately 330m south of the Eastern Site at Stoke Wood LWS. Ancient woodland is an irreplaceable habitat although it occurs frequently throughout the county. It is therefore considered to be of up to county ecological importance. Two areas of ancient woodland are present within 200m of the B4100 which is anticipated to be utilised by traffic associated with the Development, at Stoke Wood LWS and Stoke Little Wood LWS (c.1.4km southeast of the Eastern Site).

Western Site

Arable

12.2.14. The majority of the Western Site is formed of arable fields. Arable fields are of limited inherent ecological value and are considered to be of negligible ecological importance. The potential for this habitat type to support protected species (e.g. birds) is discussed separately below.

Buildings

- 12.2.15. One barn building is present within the Western Site, hereafter referred to as building B1. Buildings are of limited inherent ecological value and are considered to be of negligible ecological importance. The potential for buildings to support protected species (e.g. bats) is discussed separately below.

Grassland

- 12.2.16. Modified grassland forms the margins of the arable fields, dominated by perennial ryegrass *Lolium perenne*. Modified grassland is of limited inherent ecological value and are considered to be of negligible ecological importance.

Hedgerows

- 12.2.17. Nine hedgerows are present within the Western Site, forming the boundaries around the Western Site and partly demarcating the boundaries between arable fields. A description on their structure and species composition is provided below:

- Hedgerows H3, H4, H5 and H6 are species-poor defunct hedgerows, demarcating field boundaries in the centre of the Western Site and dominated by common hawthorn;
- Hedgerows H1, H2, and H8 are intact species-rich hedgerows with trees forming the western, southern and northern boundaries of the Western Site and primarily comprised of field maple, blackthorn, hawthorn, hazel and sycamore *Acer pseudoplatanus* with honeysuckle *Lonicera periclymenum*; and
- Hedgerow H7 is an intact species-poor hedgerow with trees forming the majority of the north eastern boundary of the Western Site comprised primarily of common hawthorn, blackthorn, ash and holly.

- 12.2.18. Hedgerows are listed in Section 41 of the NERC Act 2006 as a priority habitat and based on the criteria listed in the UK BAP Priority Habitat Descriptions, the species-rich hedgerows are likely to qualify as such. Although widespread in the wider landscape, the hedgerows present at the Western Site provide a network for mobile species and are irreplaceable in the short-term. The hedgerows present are considered to be of local ecological importance.

- 12.2.19. A small length of coniferous hedge is also present on part of the north east boundary of the Western Site which is considered to be of negligible ecological importance.

Scrub

- 12.2.20. One small area of dense scrub is present in the south west corner of the Western Site. This habitat was primarily comprised of bramble *Rubus fruticosus*. Given the small area and the prevalence of this habitat type in the wider landscape, this habitat is considered to be of negligible ecological importance.

Tall ruderal

- 12.2.21. One small area of tall ruderal habitat is present in the Western Site (indicated by TN1 in Appendix 12.4), located in the south-west corner and the centre. This habitat is dominated by nettle *Urtica dioica*. Given the small area and the prevalence of this habitat type in the wider landscape, this habitat is considered to be of negligible ecological importance.

Trees

12.2.22. Semi-mature and mature trees are present within the Western Site, primarily located along the northern and eastern boundaries, within the hedgerows. These trees are considered to contribute to providing habitat connectivity between the Site and the wider landscape although, given the prevalence of mature trees in the wider landscape and that the species present are common and widespread, these trees are considered to be of local ecological importance.

Ancient woodland

12.2.23. There is no ancient woodland located within the Western Site. The closest ancient woodland to the Western Site is located approximately 590m south of the Western Site at 'Stoke Wood'. Ancient woodland is an irreplaceable habitat although it occurs frequently throughout the county. It is therefore considered to be of up to county ecological importance. Two areas of ancient woodland are present within 200m of the B4100 which is anticipated to be utilised by traffic associated with the Development, at Stoke Wood LWS and Stoke Little Wood LWS (c.1.8km southeast of the Western Site).

Badger Survey Methodology and Results

Methodology

Badger survey

12.2.24. A badger survey was completed on 16th June 2021 by Tyler Grange Group Ltd and updated on 6th September 2023. The badger survey followed standard best practice methodologies^{5,6,7}.

12.2.25. The badger survey aimed to identify the presence or likely absence of badgers within and in close proximity to the Site by walking through the Site and identifying signs of badger activity, including the following:

- Badger setts (a single or multiple connected tunnel/s and chamber/s where badgers rest or breed, with entrances typically formed of a hole in the ground of at least 25cm diameter);
- Footprints, hairs and paths;
- Dung pits or latrines (multiple dung pits closely spaced);
- Foraging signs such as 'snuffle holes' where badgers have been digging for food; and
- Scratching posts.

12.2.26. Where badger setts were identified, each sett entrance (hole) was categorised as well-used, partially used or disused, determined by evidence of recent use as shown in Table 12.2.1. Identified badger setts were then further categorised according to the type of use, as shown in Table 12.2.2.

Table 12.2.1: Badger sett activity categories, adapted from best practice guidance

Level of use category	Description
Well used	Holes clear of debris or vegetation, obviously in regular use and may or may not have been excavated recently. Often with fresh soil, footprints and bedding present outside the hole.

Level of use category	Description
Partially used	Holes that appear not in regular use and have debris such as leaves or twigs in the entrance or have moss and/or other plants growing in or around the entrance. Partially used holes could be in regular use after a minimal amount of clearance by a badger.
Disused	Holes that appear not to have been in use for some time, are partially or completely blocked and cannot be used without a considerable amount of clearance. Sometimes all that is visible is a depression in the ground and the remains of a spoil heap, which may be covered by moss or plants.

Table 12.2.2: Badger sett type categories, adapted from best practice guidance

Sett type category	Description
Main	Typically comprised of a large number of holes with conspicuous spoil heaps. There will be well used paths visible leading to and from the sett and connecting sett entrances. An active main sett typically appears well used and would be used for breeding.
Annexe	Setts that are located close to a main sett, normally less than 150m away and are usually connected to the main sett by one or more obvious well-worn paths. Annexe setts usually have several holes but may not be in use all the time, even if the main sett is well used.
Subsidiary	Setts with a small number (typically 3-5) of holes which are at least 50m from a main sett and do not have an obvious path connecting to another sett. Not continuously active.
Outlier	Setts with only one or two holes, often with little spoil outside the hole and with no obvious path connecting them with another sett. Only used sporadically and when not in use by badger may be taken over by other mammal species such as foxes <i>Vulpes</i> or rabbits <i>Oryctolagus cuniculus</i> .

Badger camera monitoring surveys

- 12.2.27. Following the identification of a suspected badger setts within the Site, badger camera monitoring was completed on all potential badger setts within the Eastern and Western Sites respectively between August and September 2022 and updated in January and February 2024.
- 12.2.28. Badger camera monitoring involved placement of motion-sensor cameras at each potentially active sett entrance for three- or four-week periods.
- 12.2.29. In 2022, following the initial three-week monitoring period, cameras were moved to cover alternative sett entrance holes and a further three-week monitoring period was completed. This ensured all badger sett entrances which appeared potentially active were covered over the monitoring period. Sett entrances which appeared entirely disused (as defined in table 12.2.1) were not subject to camera monitoring but were monitored for signs of activity during each deployment and collection of cameras.

12.2.30. In 2024, all potentially active sett entrances were monitored within the same four-week period. Table 12.2.3 shows the results of the camera monitoring surveys in 2022 and 2024.

Results – badger survey and badger camera monitoring

Eastern Site

12.2.31. Two outlier setts (Sett 5 and Sett 6) were identified on the eastern boundary of the Eastern Site during badger survey in 2021, and confirmed to still be present in 2023. Both setts were found to be active during camera monitoring in 2022 and 2024 with infrequent badger use and a small amount of fresh spoil outside the entrance.

12.2.32. Incidental records of two mammal holes (MH4) were identified during other surveys at the site. These holes were regularly inspected during surveys in 2022 and 2024 and are not considered to form badger setts given their small size and lack of badger activity signs

Western Site

12.2.33. The badger survey identified a main sett (sett 2) with 14 potential entrances, located adjacent to the eastern boundary of the Western Site during the badger survey in 2021 and confirmed to still be present in 2023. Signs of activity were also recorded including fresh spoil heaps outside sett entrances, a badger carcass at the main sett in 2022 in addition to dung pits and badger guard hairs.

12.2.34. Camera monitoring of Sett two in 2022 found the sett to be active and this was confirmed in 2024 with frequent use of at least two entrances confirmed.

12.2.35. Incidental records of other mammal holes (MH1 and MH3) were identified during other surveys at the site. These holes were regularly inspected during surveys in 2022 and 2024 and are not considered to form badger setts given their small size and lack of badger activity signs.

Barn owl Survey Methodology and Results

Methodology

12.2.36. Two barn owl survey visits were completed, on 29th July 2021 and 12th August 2021 by Tyler Grange Group Ltd, lead by a holder of a Natural England Class CL29 survey licence for barn owl or their accredited agent. The survey focussed on the barn (building B1) on the Western Site as the only structure considered to have potential to support nesting barn owls. The survey involved an internal and external inspection of the barn to identify and record features which could offer potential for use by breeding barn owls, to record any evidence of current or historic use as nest or roost sites, and to assess the current status of barn owl at the site.

12.2.37. Surveys were completed in accordance with best practice guidance⁸. Care was taken to minimise disturbance, keeping noise levels low. Weather conditions were mild and dry at the time of survey.

12.2.38. Buildings were inspected externally, with the aid of a high-powered torch, ladder and binoculars where necessary, looking for features that barn owls may use to access potential roost and/or nest sites or signs of use of the features themselves.

12.2.39. The following signs were looked for:

- Pellets;

- White wash;
- Nesting remains;
- Eggs / unsuccessful eggs / egg shells;
- Feathers;
- Down; and
- Prey caches.

Results

12.2.40. No signs of barn owl were identified during either of the barn owl survey visits. The habitats within the Site are considered to be sub-optimal for barn owl being predominately comprised of arable habitat with narrow grassland margins.

12.2.41. It is therefore concluded that barn owl are likely absent from the Site.

Bat Survey Methodology and Results

Methodology

Bat species codes

12.2.42. Bat species codes used in this section are provided in Table 12.2.4.

Table 12.2.4: Bat species code key

<i>Pipistrellus</i> Species	<i>Myotis</i> Species	<i>Nyctalus</i> species	Other
Ppi = common pipistrelle <i>Pipistrellus pipistrellus</i>	Myo <i>Myotis</i> species, unidentifiable to species level ¹	Nn = Noctule <i>Nyctalus noctula</i>	Bb = Western barbastelle <i>Barbastella barbastellus</i>
Ppy = soprano pipistrelle <i>Pipistrellus pygmaeus</i>		Nyc = <i>Nyctalus</i> species unidentifiable to species level	BLE = Brown long-eared bat <i>Plecotus auritus</i>
PIP = <i>Pipistrellus</i> species, unidentifiable to species level			Myo/Plec = either a <i>Myotis</i> species or <i>Plecotus</i> species, unidentifiable to species level
			Unknown = not identifiable ²

¹ *Myotis* species calls are similar in frequency and composition and it is therefore not considered possible to identify *Myotis* species to species level with certainty.

² Where sufficient sound data was not gathered due to distant or brief bat calls and it was therefore not possible to identify a bat, 'unknown' is stated

Preliminary Bat Roost Assessment

12.2.43. A ground level preliminary bat roost assessment ('PBRA') of all buildings and trees present within both the Eastern and Western Site was completed on 17th May 2021. The PBRA followed the Bat Conservations Trust's (BCT) best practice guidelines current at the time of survey^{9,3} and was updated on 6th September 2023.

12.2.44. The PBRA for the buildings followed standard methodology which comprised an external inspection to assess the buildings potential to support roosting bats. In summary, this required the following:

- A visual inspection of the exterior of the building, examining features such as brickwork, lead flashing, and tiles for evidence of use/potential use by bats, including the presence of bat droppings and staining from fur-oil or urine; and
- A number of other factors were considered, including the presence of features suitable for use by bats, proximity to foraging habitats or cover, and potential for disturbance from lighting and other sources.

12.2.45. The PBRA of trees required the surveyor to assess the trees present within and on the boundaries of the Site, in line with the latest best practice guidance criteria provided in Table 12.2.5.

Table 12.2.5: Tree Assessment Criteria (adapted from Collins 2016^{Error! Bookmark not defined.})

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

Bat Activity surveys: transects

12.2.46. Bat activity surveys were completed in accordance with best practice guidance current at the time of survey^{Error! Bookmark not defined.} for low suitability habitat as far as possible, which recommends one dusk activity survey per season (spring: April/May, summer: July/August and autumn: September/October). It was not possible to complete the spring transect visit in 2021 given that ecological surveys began in late May 2021 and therefore two of the recommended three bat activity survey visits (summer and autumn) were completed in 2021 and the remaining spring visit was completed in May 2022.

³ It is acknowledged that an updated version of this best practice guidance was released in October 2023. As this was released after the survey date, it was not possible to complete surveys fully in accordance with the updated guidance. However, this is considered unlikely to affect the outcomes of this assessment and this is therefore not considered a limitation on the conclusions of this ES chapter.

- 12.2.47. Surveys were completed on 19th August 2021, 13th September 2021 and 24th May 2022 by suitably qualified ecologists from Tyler Grange Group Ltd. The bat activity transect route is shown in Appendix 12.4.
- 12.2.48. Surveyors used a combination of visual observation and echolocation detection techniques to identify any bat activity on the Site. The surveys started approximately at sunset and ended approximately three hours after sunset.
- 12.2.49. The same transect routes were walked for each of the survey visits. These covered all Site boundaries and potential habitat features suitable for foraging or commuting bats, namely hedgerows and trees. The transects were walked at a constant speed along a planned route recording visual and sound observations such as number of bats, flight directions and type of activity (e.g. commuting / foraging). The bat activity transect route is shown in Appendix 12.6.
- 12.2.50. Elekon batlogger M bat detectors were used for sound recordings during the dusk activity surveys with an Echometer Touch Pro 2 used as an additional aid and in case of batlogger detector error. Recordings were analysed using Bat Explorer software to examine bat activity found on-site.

Bat Activity surveys: Static Monitoring

- 12.2.51. As part of the manned activity survey data, automated static monitoring surveys of both the Eastern and Western Site were also conducted.
- 12.2.52. Best practice guidance current at the time of survey^{Error! Bookmark not defined.} recommends that static detectors to be set out for five consecutive nights once each season (spring: April/May, summer: July/August and autumn: September/October). It was not possible to complete the spring bat activity survey in 2021. Therefore, two of the three (summer and autumn) recommended⁹ static detector deployments were completed in 2021, with the spring visit completed in May 2022.
- 12.2.53. Two static detectors (one on each transect route) were placed on the northern boundaries of the Site, between 12th-17th August 2021, 1st-6th September 2021 and 18th-24th May 2022. Static bat detectors used were Anabat Express and Anabat Swift. The placement of the static bat detectors was focussed on the northern hedgerow boundaries in locations due for removal as part of the Development. The location of static detector deployment is shown in Appendix 12.6
- 12.2.54. The static bat detectors were set to begin recording half an hour before sunset and to continue until half an hour after sunrise. Echolocation calls were later analysed in Bat Explorer or Analook software to identify calls characteristic of different bat species or group of species present.

Emergence/re-entry surveys

- 12.2.55. One dusk emergence and one dawn re-entry surveys were completed respectively on a barn and a tree within the Western Site, in accordance with best practice guidelines for moderate suitability structures and trees^{Error! Bookmark not defined.}. No emergence/re-entry surveys were required within the Eastern Site because only trees of 'low' suitability for roosting bats were identified which require no further survey in accordance with best practice guidance⁶.
- 12.2.56. A dawn re-entry survey was completed on 25th August and a dusk emergence survey was completed on 13th September in mild, dry weather conditions. Table 12.2.6 presents survey dates and timings.

Table 12.2.6: Emergence/re-entry survey data

Date	Start time	End time	Sunset / sunrise time
25/08/2021	04:34	06:19	Sunrise: 06:04
13/09/2021	19:01	20:52	Sunset: 19:22

12.2.57. Surveyors were positioned to provide adequate visual coverage of all suitable features present on the building. Surveyor locations are shown in Appendix 12.6.

12.2.58. For the dusk emergence surveys, the surveyors were in position 15 minutes before sunset and observed the building until 1.5 hours after sunset. For dawn re-entry surveys, the surveyors were in position 1.5 hours before sunrise until 15 minutes after sunrise.

12.2.59. Surveyors used a combination of visual observation and echolocation detection to identify any bats emerging from or re-entering the building. Elekon Batlogger M and M2 detectors were used throughout the surveys. Bat Explorer software was subsequently used to analyse sonograms of any calls which could not be identified in the field.

Results

Preliminary Bat Roost Assessment

Eastern Site

12.2.60. Three trees of low suitability for roosting bats were identified on the northern boundary of the Eastern Site. No other structures or trees with suitability for roosting bats were identified. Details are provided in Table 12.2.7 below and locations are shown in Appendix 12.4.

Table 12.2.7: tree PBRA assessment results, Eastern Site

Tree no	Species	Feature	Suitability
T30	Ash	Ivy cover	Low
T31	Ash	Ivy cover	Low
T32	Ash	Ivy cover	Low

Western Site

12.2.61. One building B1 was identified within the Western Site. This building was identified to be a barn of brick construction with timber roofing panels and a steel-frame extension. A small number of cracks in the brickwork were noted in addition to small gaps in the timber roofing panels, gaps between wooden timber frame and brickwork. Building B1 was classified as of low suitability for roosting bats.

12.2.62. 23 trees of low suitability for roosting bats were identified within the hedgerows on the boundaries of the site. Six trees of moderate suitability were identified, with five (T4, T5, T19, T26 and T29) located on the boundaries of the site and one (T1) located within the

south west of the Western Site. Further details are provided in Table 12.2.8 below and locations are shown in Appendix 12.4.

Table 12.2.8: tree PBRA assessment results

Tree no	Species	Feature	Suitability
T1	Ash	Numerous knot holes and splits, severely decayed	Moderate
T2	Ash	Ivy cover	Low
T3	Ash	Ivy cover	Low
T4	Ash	Dense Ivy cover	Moderate
T5	Oak	Split in decaying branch at 4m height on south aspect, Ivy	Moderate
T6	Field maple	Ivy cover	Low
T7	Ash	Ivy cover	Low
T8	Ash	Ivy cover	Low
T9	Ash	Ivy cover	Low
T10	Field maple	Ivy cover	Low
T11	Ash	Ivy cover	Low
T12	Ash	Ivy cover	Low
T13	Field maple	Ivy cover	Low
T14	Ash	Ivy cover	Low
T15	Ash	Ivy cover	Low
T16	Field maple	Ivy cover	Low
T17	Ash	Ivy cover	Low
T18	Ash	Ivy cover	Low
T19	Oak	Knot hole at 3m height on western aspect, crack in dead branch at 4m height on the southern aspect.	Moderate
T20	Field maple	Ivy cover	Low
T21	Field maple	Ivy cover	Low

Tree no	Species	Feature	Suitability
T22	Field maple	Ivy cover	Low
T23	Ash	Ivy cover	Low
T24	Ash	Ivy cover	Low
T25	Ash	Ivy cover	Low
T26	Oak	Knot hole at 6m height on north-eastern aspect, ivy cover	Moderate
T27	Field maple	Ivy cover	Low
T28	Ash	Ivy cover	Low
T29	Field maple	Crack in dead limb, knot hole at 7m height on eastern aspect.	Moderate

Bat Activity Surveys: Transects

12.2.63. Results are presented below in tables 12.2.9 and 12.2.10 for the Eastern and Western Sites respectively. Location references to be reviewed in conjunction with the tables are shown in Appendix 12.6.

Eastern Site

12.2.64. A summary of the results of bat activity observed by the surveyors during the activity transect surveys is shown in table 12.2.9 below.

Table 12.2.9: Activity transect results: surveyor recordings, Eastern Site

Summer survey 19/08/2021 – Eastern Site

Time	Species	Location	Activity (HNS = heard not seen)
22:03	Ppi	A - B	Foraging from A toward B
22:07	Ppi	A-B	Foraging between A and B
22:12	Ppi	B	Foraging
22:18	Ppi	B-C	Foraging
22:39	Nn	E-D	Foraging
22:43	Ppi	D-F	Foraging
22:47	Ppi	F	Foraging
22:52	Ppi	H	Foraging

Summer survey 19/08/2021 – Eastern Site

<i>Time</i>	<i>Species</i>	<i>Location</i>	<i>Activity (HNS = heard not seen)</i>
22:57-58	Ppy, Ppi	H-I	At least three bats, foraging
23:02	Ppi	I-A	Foraging
23:04	Nn	I-A	Foraging
23:09	Nn	A	Constant foraging
23:13	Myo	A-B	Commuting
23:17-19	Nn	B	Constant foraging

Autumn survey 13/09/2021 – Eastern Site

<i>Time</i>	<i>Species</i>	<i>Location</i>	<i>Activity</i>
19:20	Unknown	A	HNS, brief pass, unidentified
19:28-30	Unknown	B	HNS, brief pass, unidentified
19:39-41	Unknown	C	HNS, brief pass, unidentified
19:50-52	Unknown	D	HNS, brief pass, unidentified
19:57-20:00	Unknown	E	HNS, brief pass, unidentified
20:09-13	Pip	F	2 bats seen foraging back and forth along hedgerow
20:18-20	Unknown	G	HNS, brief pass, unidentified
20:22-24	Ppi	H	Foraging along hedgerow heading south
20:26	Ppi	H-I	Foraging
20:28	Ppi	H-I	Foraging
20:30	Ppi	I	Foraging
20:31-32	Myo, Ppi	I	Brief pass from Myo. Ppi foraging.
20:33	Ppi	I-A	Foraging
20:34-36	Myo, Ppi	I-A	Foraging
20:39-44	Unknown	A	HNS, brief pass, unidentified

Summer survey 19/08/2021 – Eastern Site

<i>Time</i>	<i>Species</i>	<i>Location</i>	<i>Activity (HNS = heard not seen)</i>
20:44	Unknown	A-B	HNS, brief pass, unidentified

Spring survey 24/05/2022 – Western Site

<i>Time</i>	<i>Species</i>	<i>Location</i>	<i>Activity</i>
23:03	Ppi	A	Foraging at A
23:13	Ppi	B-3	Foraging between B and C
23:41	Ppy	D-F	Foraging by F, likely Ppy but not confirmed
23:50	Ppi	F	Foraging near F
23:45	Ppi	F-G	Foraging between F and G
23:52	Ppi	F-G	Foraging between F and G
23:55	Ppi	G	Foraging over hedgerow at G
23:58	Ppi	H	Foraging and social calls
00:02	Nn	H	HNS, brief pass, near H
00:04	Nyc, Ppi	H	Foraging near H
00:07	Nyc, Ppi	H-A	Foraging between H and A, HNS
00:09	Ppi	H-A	Foraging between H and A.

Western Site

12.2.65. A summary of the results of bat activity observed by the surveyors during the activity transect surveys is shown in table 12.2.10 below.

Table 12.2.10: Activity transect results: surveyor recordings, Western Site

Summer survey 19/08/2021 – Western Site

<i>Time</i>	<i>Species</i>	<i>Location</i>	<i>Activity</i>
21:02	Ppi	E	Foraging along hedgerow
21:17-18	Nn + Ppi	H	Foraging

Summer survey 19/08/2021 – Western Site

<i>Time</i>	<i>Species</i>	<i>Location</i>	<i>Activity</i>
21:24-27	Ppi	H - I	Foraging
21:40	Ppi	J - A	Foraging
21:44-45	Nn + Ppi	A	Commuting

Autumn survey 13/09/2021 – Western Site

<i>Time</i>	<i>Species</i>	<i>Location</i>	<i>Activity</i>
21:00	Unknown	A	HNS, brief pass, unidentified
21:12	Unknown	B	HNS, brief pass, unidentified
21:23	Unknown	C	HNS, brief pass, unidentified
21:28	Ppi	C (1)	Commuting, HNS
21:31	Ppi	C (2)	Foraging, HNS
21:39	Unknown	D	HNS, brief pass, unidentified
21:44	Ppi x 2 individuals	E	Foraging
21:48	Ppi	E – F	Foraging
21:52-54	Unknown	F	HNS, brief pass, unidentified
21:56-59	Unknown	G	HNS, brief pass, unidentified
22:03-04	Unknown	H	HNS, brief pass, unidentified
22:10-11	Ppi	I	Foraging
22:16-17	Ppy	J	Foraging

Spring survey 24/05/2022 – Western Site

<i>Time</i>	<i>Species</i>	<i>Location</i>	<i>Activity</i>
21:51	Unknown	E	Unseen foraging just north of E
21:57	Ppy	E	Foraging over hedgerow close to E
21:58	Ppi	E	Foraging over hedgerow close to E

Summer survey 19/08/2021 – Western Site

<i>Time</i>	<i>Species</i>	<i>Location</i>	<i>Activity</i>
22:31	Ppi	J	Foraging by large oak tree within hedgerow by J.
22:37	Ppi	J-A	Foraging between J-A around a large oak tree.

Summary across the Development

12.2.66. A summary of the results of data recorded by the Elekon batlogger M bat detector across the summer and autumn bat activity transect surveys completed to date is shown below in Table 12.2.11. The location and relative activity levels of this data is presented in Appendix 12.7.

Table 12.2.11: Activity transect results summary for the Site: Batlogger detector recordings

<i>Date</i>	<i>Total number of records by species</i>								<i>Total</i>
	<i>Bb</i>	<i>Myo</i>	<i>Nn</i>	<i>Nyc</i>	<i>Pip</i>	<i>Ppi</i>	<i>Ppy</i>	<i>Unknown</i>	
Summer: 19/08/2021	2	12	43	0	6	68	0	2	133
Autumn: 13/09/2021	0	9	0	0	23	44	6	0	82
Spring: 24/05/2022	0	0	1	2	0	13	2	1	17

12.2.67. As shown in tables 12.2.9 and 12.2.10, the activity transect surveys recorded a total of six confirmed species in addition to small numbers of unidentified pipistrelle species and unidentified species. The most common species recorded during the activity surveys from both the Elekon batlogger detector recordings and the surveyor observations was common pipistrelle.

Bat Activity surveys: Static Monitoring

12.2.68. The static monitoring results for the Eastern and Western Sites across the two static monitoring surveys are described below.

Eastern Site

12.2.69. The static detectors for the Eastern Site recorded a total of 768 bat passes across both the summer and the autumn data. Of all the calls 41.8% were from soprano pipistrelle and 38.15% were common pipistrelle, the two most prevalent species recorded. Total calls per species, each species' percentage of the total passes from the Eastern Site and the average passes per night for each species is displayed in table 12.2.1 below.

Table 12.2.1: Static detector results, Eastern Site

Passes	Species											Total passes
	<i>Bb</i>	<i>BLE</i>	<i>Myo</i>	<i>Myo/ Plec</i>	<i>Nn</i>	<i>Ppi</i>	<i>Ppy</i>	<i>Ppn</i>	<i>PIP</i>	<i>Nyc</i>	<i>Unknown</i>	
August 2021:	0	0	6	0	32	3	0	0	0	0	1	42
September 2021:	47	4	51	2	10	290	321	1	0	0	0	726
May 2022:	0	0	3	0	0	422	0	0	0	0	0	425
Total passes per species:	47	4	60	2	42	715	321	1	0	0	1	1193
Percentage of total passes:	3.94	0.34	5.03	0.17	3.52	59.93	26.91	0.08	0.00	0.00	0.13	
August passes per night:	0	0	1.2	0	6.4	0.6	0	0	0	0	0.2	
September passes per night:	9.4	0.8	10.2	0.4	2	58	64.2	0.2	0	0	0	
May passes per night:	0	0	0.6	0	0	84.4	0	0	0	0	0	

Key: *Bb* = western barbastelle, *BLE* = brown long-eared, *Myo* = Myotis species, *Myo/Plec* = Myotis or Plecotus species, not identifiable to species level, *Unknown* = not identifiable, *Nn* = noctule, *Ppi* = common pipistrelle, *Ppy* = soprano pipistrelle, *Ppn* = Nathusius' pipistrelle *Pipistrellus nathusii*, *PIP* = Pipistrellus species not identifiable to species level, *Nyc* = Nyctalus species not identifiable to species level, *Unknown* = not identifiable.

- 12.2.70. Western barbastelle bats have a large core sustenance zone of 6km^{Error! Bookmark not defined.}. None of the western barbastelle passes recorded on the static bat detectors were within 1 hour of sunset or sunrise as would be expected if the Site formed an important commuting corridor from a western barbastelle roost. Therefore, it is not anticipated that a western barbastelle roost is present within or in close proximity to the Site.
- 12.2.71. The scoring system found in Wray et al. (2010)¹⁰ was applied. The scoring system gives greater weight to rarer species such as western barbastelle than common species and requires the highest scoring species to determine the result. Given that no barbastelle roosts likely to be present nearby due to the timing records and considering the habitats present and given that the species recorded during the activity surveys were predominately widespread species, the bat assemblage utilising the Eastern Site is likely to be of district ecological importance.

Western Site

- 12.2.72. The static detectors for the Western Site recorded a total of 1805 bat passes across both the summer and the autumn data. Of all the calls 80.5% were from common pipistrelle, the most prevalent species recorded. Total calls per species, each species' percentage of the total passes from the Western Site and the average passes per night for each species is displayed in table 12.2.13.

Table 12.2.13: Static detector results, Western Site

Species:	Species										Total passes
	<i>Bb</i>	<i>BLE</i>	<i>Myo</i>	<i>Nn</i>	<i>Ppi</i>	<i>Ppy</i>	<i>Ppn</i>	<i>PIP</i>	<i>Nyc</i>	<i>Unknown</i>	
August 2021:	3	2	7	12	19	2	0	0	0	0	45
September 2021:	25	3	180	28	1434	39	1	34	4	12	1760
May 2022:	0	0	3	0	422	0	0	0	0	0	425
Total passes per species:	28	5	190	40	1875	41	1	34	4	12	2230
Percentage of total passes:	1.26	0.22	8.52	1.79	84.08	1.84	0.04	1.52	0.18	0.54	
August passes per night:	0.6	0.4	1.4	2.4	3.8	0.4	0	0	0	0	
September passes per night:	5	0.6	36	5.6	286.8	7.8	0.2	6.8	0.8	2.4	
May passes per night:	0	0	0.6	0	84.4	0	0	0	0	0	

Key: *Bb* = western barbastelle, *BLE* = brown long-eared, *Myo* = Myotis species, *Myo/Plec* = Myotis or Plecotus species, not identifiable to species level, *Unknown* = not identifiable, *Nn* = noctule, *Ppi* = common pipistrelle, *Ppy* = soprano pipistrelle, *Ppn* = Nathusius' pipistrelle, *PIP* = Pipistrellus species not identifiable to species level, *Nyc* = Nyctalus species not identifiable to species level, *Unknown* = not identifiable.

12.2.73. Western barbastelle bats have a large core sustenance zone of 6km^{Error! Bookmark not defined.}. None of the western barbastelle passes recorded on the static bat detectors were within one hour of sunset or sunrise as would be expected if the Site formed an important commuting corridor from a western barbastelle roost. Therefore, it is not anticipated that a western barbastelle roost is present within or in close proximity to the Site.

12.2.74. The scoring system found in Wray et al. (2010)¹¹ was applied. The scoring system gives greater weight to rarer species such as western barbastelle than common species and requires the highest scoring species to determine the result. Given that no barbastelle roosts are likely to be present nearby based on the timing of barbastelle sound records and considering the habitats present and results of the bat activity surveys, the bat assemblage utilising the Eastern Site is considered to be of district ecological importance..

Bat Emergence/Re-entry Surveys

12.2.75. The below results refer to the Western Site only as no emergence/re-entry surveys were completed within the Eastern Site.

12.2.76. No bats were observed re-entering either Building B1 or tree T1 during the dawn re-entry survey on 25th August 2021 or the dusk emergence survey on 13th September 2021. Therefore, roosting bats are assumed likely absent from Tree T1 and Building B1. Full data recorded by each surveyor during the surveys is presented in tables 12.2.14 and 12.2.15 below.

Table 12.2.14: First emergence/re-entry survey (25th August 2021), raw data

Building/Tree no.: B1

Date: 25/08/2021

Surveyor initials: JV, position SL1

Site: Western Site

Equipment used: Batlogger M2

Sunrise time: 06:04	Start time: 04:34	End time: 06:19
Weather	At start:	At end:
Cloud cover (%):	70	100
Wind (Beaufort scale):	2	2
Temperature (°C):	15	14
Precipitation:	Dry	Dry

Notes:

No re-entry observed.

No bat activity seen or heard.

Building/Tree no.: B1

Date: 25/08/2021

Surveyor initials and position: EH, position SL2

Site: J10, M40, Western Site

Equipment used: Batlogger M2

Sunrise time: 06:04	Start time: 04:34	End time: 06:19
Weather	At start:	At end:
Cloud cover (%):	70	100

<i>Wind (Beaufort scale):</i>	2	2
<i>Temperature (°C):</i>	15	14
<i>Precipitation:</i>	Dry	Dry

Notes:

No re-entry observed.
One brief Ppy pass, HNS.

Building/Tree no.: T1

Date: 25/08/2021

Surveyor initials and position: BN, position SL3

Site: J10, M40, Western Site

Equipment used: Batlogger M

Sunrise time: 06:04	Start time: 04:34	End time: 06:19
Weather	At start:	At end:
<i>Cloud cover (%):</i>	70	100
<i>Wind (Beaufort scale):</i>	2	2
<i>Temperature (°C):</i>	15	14
<i>Precipitation:</i>	Dry	Dry

Notes:

No re-entry observed.
One distant Nn pass.

Table 12.2.15: Second emergence/re-entry survey (13th September 2021), raw data

Building/Tree no.: B1

Date: 13/09/2021

Surveyor initials: JV, position SL1

Site: J10, M40, Western Site

Equipment used: Batlogger M2

Sunset time: 19:22	Start time: 19:07	End time: 20:52
Weather	At start:	At end:
Cloud cover (%):	90	95
Wind (Beaufort scale):	2	2
Temperature (°C):	17	16
Precipitation:	Dry	Dry

Notes:

No emergence observed.

One brief Nn pass, HNS.

Building/Tree no.: B1

Date: 13/09/2021

Surveyor initials and position: MJ, position SL2

Site: J10, M40, Western Site

Equipment used: Batlogger M2

Sunset time: 19:22	Start time: 19:07	End time: 20:52
Weather	At start:	At end:
Cloud cover (%):	90	95
Wind (Beaufort scale):	2	2
Temperature (°C):	17	16
Precipitation:	Dry	Dry

Notes:

No emergence observed.

No bat activity seen or heard.

Building/Tree no.: T1

Date: 13/09/2021

Surveyor initials and position: DL, position SL3

Site: J10, M40, Western Site

Equipment used: Echometer Touch

Sunset time: 19:22	Start time: 19:07	End time: 20:52
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Weather	At start:	At end:
Cloud cover (%):	90	95
Wind (Beaufort scale):	2	2
Temperature (°C):	17	16
Precipitation:	Dry	Dry

Notes:

No emergence observed.

One Nn pass and one Ppi pass.

Breeding Bird Survey Methodology and Results

Methodology

- 12.2.77. Breeding bird surveys were completed by an experienced bird surveyor and member of CIEEM. Two transect routes were established, one within the Eastern Site and one within the Western Site. Each transect route covered a range of habitats considered suitable for breeding birds (including hedgerow, tree, arable, grassland field margins and building habitats) within the Site. The transect routes are shown on the Breeding Bird Survey Results Plan (Appendix 12.8).
- 12.2.78. Each transect route was walked five times between April and July 2022. Four of the five survey visits as completed at, or soon after, sunrise and one visit was completed immediately prior to sunset. The direction the route was walked alternated on each survey visit to ensure various parts of the Site were surveyed at various times of day.
- 12.2.79. Surveys were completed using an adapted version of the Common Bird Census (CBC) methodology with surveyors walking the transect routes slowly while observing and listening for birds. Birds were identified both visually and from their songs and calls. Birds utilising habitat adjacent to the Site boundary were also recorded where observed. Birds were recorded using standard two-letter codes set out by the British Trust for Ornithology and breeding or nesting activity was also noted, where observed. Behaviour considered likely to indicate breeding included singing, display flights, mating and courtship displays, nesting, carrying of nesting material and birds showing fidelity to a particular area of ground or vegetation.
- 12.2.80. Records from all breeding bird survey visits were combined to enable visualisation of the frequency of records in specific areas and identification of areas most frequently utilised by breeding birds, including those afforded additional protection under Schedule 1 of the Wildlife and Countryside Act 1981 or Birds of Conservation Concern (BoCC)¹².

Results

Eastern Site

- 12.2.81. Table 12.2.16 below displays the survey dates, timing and weather conditions for the Eastern Site.

Table 12.2.16: Survey metadata, breeding bird surveys: Eastern Site

Survey visit number	Date	Sunrise or sunset time	Start time	End time	Weather Conditions	Surveyor Initials
1	30/04/2022	05:35	05:05	07:15	Temperature (°C): 8 Wind (Beaufort Scale): 2 Cloud cover (%): 80 Precipitation: Dry Visibility: Good	PM
2	12/05/2022	20:47	16:40	18:45	Temperature (°C): 16 Wind (Beaufort Scale): 3 Cloud cover (%): 55 Precipitation: None Visibility: Good	PM
3	28/05/2022	04:54	07:50	10:25	Temperature (°C): 12 Wind (Beaufort Scale): 2 Cloud cover (%): 20 Precipitation: Dry Visibility: Good	PM
4	13/06/2022	04:44	08:10	10:20	Temperature (°C): 14 Wind (Beaufort Scale): 2 Cloud cover (%): 30 Precipitation: None Visibility: Good	PM
5	06/07/2022	04:53	07:25	09:20	Temperature (°C): 15 Wind (Beaufort Scale): 1 Cloud cover (%): 90 Precipitation: None Visibility: Good	PM

12.2.82. A total of 19 species of bird were recorded within the Site during the breeding bird surveys. The majority of species were common and widespread with four species on the BoCC¹² Amber list and five species on the BoCC¹² Red List.

12.2.83. Table 12.2.17 shows a summary of bird species recorded, peak counts and conservation status for the Eastern Site. Recorded locations for each species are also displayed on the Breeding Bird Survey Results Plan (Appendix 12.8).

Table 12.2.17: Bird species recorded by survey number and their respective conservation status

BTO two-letter code	Species common name	Species scientific name	Survey visit number							Peak count	Conservation Status			
			1	2	3	4	5	6	7		WCA Sch1	S41	BoCC ¹² Red	BoCC ¹² Amber
B.	Blackbird	<i>Turdus merula</i>	1	2	0	1	0	0	0	2				
BC	Blackcap	<i>Sylvia atricapilla</i>	2	0	0	1	0	0	0	2				
BT	Blue tit	<i>Cyanistes caeruleus</i>	0	0	3	6	9	0	0	9				
CH	Chaffinch	<i>Fringilla coelebs</i>	4	0	2	0	0	0	0	4				
D.	Dunnock	<i>Prunella modularis</i>	3	2	2	3	0	0	0	3		x		x
GO	Goldfinch	<i>Carduelis carduelis</i>	1	1	1	0	0	0	0	1				
GT	Great tit	<i>Parus major</i>	0	0	0	0	1	0	0	1				
LI	Linnet	<i>Carduelis cannabina</i>	10	0	1	2	1	0	0	10		x	x	
LT	Long-tailed tit	<i>Aegithalos caudatus</i>	1	0	0	0	0	0	0	1				

BTO two-letter code	Species common name	Species scientific name	Survey visit number							Peak count	Conservation Status			
			1	2	3	4	5	6	7		WCA Sch1	S41	BoCC ¹² Red	BoCC ¹² Amber
LW	Lesser whitethroat	<i>Sylvia curruca</i>	1	0	0	0	0	0	0	1				
P.	Grey partridge	<i>Perdix perdix</i>	0	0	2	0	0	0	0	2		x	x	
R.	Robin	<i>Erithacus rubecula</i>	3	1	2	0	2	0	0	3				
RL	Red-legged partridge	<i>Alectoris rufa</i>	2	0	0	0	0	0	0	0				
S.	Skylark	<i>Alauda arvensis</i>	7	4	17	5	6	0	0	17		x	x	
SW	Sedge warbler	<i>Acrocephalus schoenobaenus</i>	1	0	0	0	0	0	0	1				x
W.	Wheatear	<i>Oenanthe oenanthe</i>	1	0	0	0	0	0	0	1				x
WH	Whitethroat	<i>Sylvia communis</i>	1	0	0	0	0	0	0	1				x
WP	Woodpigeon	<i>Columba palumbus</i>	0	0	1	1	5	0	0	5				x

BTO two- letter code	Species common name	Species scientific name	Survey visit number							Peak count	Conservation Status			
			1	2	3	4	5	6	7		WCA Sch1	S41	BoCC ¹² Red	BoCC ¹² Amber
Y.	Yellowhammer	<i>Emberiza citrinella</i>	2	3	4	2	1	0	0	4		x	x	

12.2.85. As displayed in Table 12.2.17 above, the Eastern Site supports species a range of species, many of which are common and widespread both regionally and nationally. The majority of species recorded are associated with a variety of habitat types and are not specifically associated with farmland or hedgerow habitats.

12.2.86. The following species are strongly associated with farmland habitat, as listed on the UK Farmland bird indicator and were found in relatively low numbers: greenfinch, grey partridge, goldfinch, linnets, reed bunting, rook, skylark, stock dove, whitethroat, woodpigeon, yellowhammer. Skylark were found in the largest numbers with a peak count of 17 individual birds recorded on the third survey visit. The UK breeding population of skylark is estimated to be 1.6 million territories¹³ and therefore the number of skylark present within the site is not considered to represent a significant proportion of the national population.

12.2.87. No birds listed under Schedule 1 of the Wildlife and Countryside Act 1981 were recorded utilising the Site.

12.2.88. As shown on the breeding bird results plan (Appendix 12.8), the majority of birds recorded were associated with the boundary and central hedgerows within the Site.

Western Site

12.2.89. Table 12.2.18 below displays the survey dates, timing and weather conditions for the Western Site.

Table 12.2.18: Survey metadata, breeding bird surveys: Western Site

Survey visit number	Date	Sunrise or sunset time	Start time	End time	Weather Conditions	Surveyor Initials
1	30/04/2022	05:35	07:25	10:55	Temperature (°C): 9 Wind (Beaufort Scale): 2 Cloud cover (%): 85 Precipitation: None Visibility: Good	PM
2	12/05/2022	20:47	18:58	22:15	Temperature (°C): 15 Wind (Beaufort Scale): 3 Cloud cover (%): 55 Precipitation: None Visibility: Good	PM
3	28/05/2022	04:54	04:56	07:45	Temperature (°C): 8 Wind (Beaufort Scale): 2 Cloud cover (%): 0 Precipitation: None Visibility: Good	PM
4	13/06/2022	04:44	04:55	08:00	Temperature (°C): 12 Wind (Beaufort Scale): 2 Cloud cover (%): 15 Precipitation: None Visibility: Good	PM

Survey visit number	Date	Sunrise or sunset time	Start time	End time	Weather Conditions	Surveyor Initials
5	06/07/2022	04:53	04:45	07:20	Temperature (°C): 14 Wind (Beaufort Scale): 1 Cloud cover (%): 95 Precipitation: None Visibility: Good	PM

12.2.90. A total of 19 species of bird were recorded within the Site during the breeding bird surveys. The majority of species were common and widespread with four species on the BoCC¹² Amber list and five species on the BoCC¹² Red List.

12.2.91. Table 12.2.19 shows a summary of bird species recorded, peak counts and conservation status for the Eastern Site. Recorded locations for each species are also displayed on the Breeding Bird Survey Results Plan (Appendix 12.8).

Table 12.2.19: Bird species recorded by survey number and their respective conservation status

BTO two-letter code	Species common name	Species Scientific name	Survey visit number							Peak count	Conservation Status			
			1	2	3	4	5	6	7		WCA Sch1	S41	BoCC ¹² Red	BoCC ¹² Amber
B.	Blackbird	<i>Turdus merula</i>	2	0	0	1	5	0	0	5				
BC	Blackcap	<i>Sylvia atricapilla</i>	2	0	0	2	0	0	0	2				
BT	Blue tit	<i>Cyanistes caeruleus</i>	4	2	0	5	6	0	0	6				
BZ	Buzzard	<i>Buteo buteo</i>	0	0	0	0	2	0	0	2				
CC	Chiffchaff	<i>Phylloscopus collybita</i>	1	0	0	0	0	0	0	1				
CH	Chaffinch	<i>Fringilla coelebs</i>	3	1	4	0	2	0	0	4				
D.	Dunnock	<i>Prunella modularis</i>	3	3	1	4	1	0	0	4		x		x
FP	Feral pigeon	<i>Columbia livia</i>	1	1	4	1	5	0	0	5				
GO	Goldfinch	<i>Carduelis carduelis</i>	2	1	0	1	2	0	0	2				
GR	Greenfinch	<i>Carduelis chloris</i>	0	0	0	1	0	0	0	1			x	
GT	Great tit	<i>Parus major</i>	4	1	1	3	3	0	0	4				
LI	Linnet	<i>Carduelis cannabina</i>	0	0	1	1	0	0	0	1		x	x	
LT	Long-tailed tit	<i>Aegithalos caudatus</i>	3	0	0	0	0	0	0	3				
LW	Lesser whitethroat	<i>Sylvia curruca</i>	0	0	0	1	0	0	0	1				

BTO two-letter code	Species common name	Species Scientific name	Survey visit number							Peak count	Conservation Status			
			1	2	3	4	5	6	7		WCA Sch1	S41	BoCC ¹² Red	BoCC ¹² Amber
P.	Grey partridge	<i>Perdix perdix</i>	2	0	0	1	0	0	0	2		x	x	
PH	Pheasant	<i>Phasianus colchicus</i>	1	0	0	0	0	0	0	0				
R.	Robin	<i>Erithacus rubecula</i>	6	1	0	5	7	0	0	7				
RB	Reed bunting	<i>Emberiza schoeniclus</i>	0	0	0	1	0	0	0	1		x		x
S.	Skylark	<i>Alauda arvensis</i>	10	4	14	11	0	0	0	14		x	x	
SD	Stock dove	<i>Columba oenas</i>	0	1	0	0	0	0	0	1				x
ST	Song thrush	<i>Turdus philomelos</i>	1	0	0	0	0	0	0	1		x		x
WH	Whitethroat		3	0	5	2	1	0	0	5				x
WP	Woodpigeon	<i>Columba palumbus</i>	3	2	4	4	5	0	0	5				x
WR	Wren	<i>Troglodytes troglodytes</i>	1	1	4	1	0	0	0	4				x
Y.	Yellowhammer	<i>Emberiza citrinella</i>	6	4	5	8	5	0	0	8		x	x	

12.2.92.

- 12.2.93. As displayed in Table 12.2.19 above, the Eastern Site supports species which are common and widespread both regionally and nationally. The majority of species recorded are associated with a variety of habitat types and are not specifically associated with farmland or hedgerow habitats.
- 12.2.94. The following species are strongly associated with farmland habitat, as listed on the UK Farmland bird indicator and were found in relatively low numbers: greenfinch, grey partridge, goldfinch, linnets, reed bunting, rook, skylark, stock dove, whitethroat, woodpigeon, yellowhammer. Skylark were found in the largest numbers with a peak count of 17 individual birds recorded on the third survey visit. The UK population of skylark is estimated to be 1.6 million territories¹³ and therefore the number of skylark present within the Site is not considered to represent a significant proportion of the national population.
- 12.2.95. No birds listed under Schedule 1 of the Wildlife and Countryside Act 1981 were recorded utilising the Site.
- 12.2.96. As shown on the breeding bird results plan (Appendix 12.8), the majority of birds recorded were associated with the boundary and central hedgerows within the Site

Great Crested Newt (GCN) Survey Methodology and Results

Methodology

Habitat Suitability Index (HSI) Assessment

- 12.2.97. A HSI assessment of waterbody WB1 which is located within the Eastern Site, as well as WB2, WB3 and WB4 which are all located within 250m of the Site, was completed in conjunction with the extended Phase 1 Habitat survey. The HSI assessment was completed in accordance with best practice guidance¹⁴.
- 12.2.98. Waterbodies were assessed for their suitability to support great crested newt, in accordance with best practice guidelines⁵ on HSI assessment. The following ten key variables were assessed which are known to influence breeding populations of great crested newt:
- Geographic location;
 - Water body area;
 - Water body permanence;
 - Water quality;
 - Water body shading;
 - Impact of waterfowl;
 - Fish stocks;
 - Number of waterbodies within 1km;
 - Terrestrial habitat around the water body; and
 - Macrophyte cover of the water body.
- 12.2.99. Waterbodies were scored on the above variables which were then used to calculate an overall HSI for each waterbody. Waterbodies were then assigned to one of the following five categories: poor, below average, average, good or excellent.
- 12.2.100. The HSI classifications are provided below:
- < 0.5 Poor;

- 0.5 – 0.59 Below Average;
- 0.6 – 0.69 Average;
- 0.7 – 0.79 Good; and
- ≥ 0.8 Excellent.

12.2.101. Although the HSI cannot be used as confirmation of GCN presence or likely absence, it can be used as a guide to assess waterbodies in terms of their potential to support GCN.

Environmental DNA (eDNA)

12.2.102. Two large waterbodies located approximately 0.1km south of Site were scoped out of further assessment as the waterbodies are separated from the Site by the major roads of the M40 and A43 which are considered to form barriers to the dispersal of great crested newts to terrestrial habitats within the Site.

12.2.103. All waterbodies considered to have potential to support great crested newt following the HSI assessment were subject to environmental DNA (eDNA) analysis. This is an approach approved by Natural England for providing a rapid means of establishing the presence or likely absence of GCN in a waterbody.

12.2.104. eDNA sampling involved water samples being taken from waterbodies on 16th June 2021 by an experienced GCN surveyor. Sterile kits provided by Nature Metrics Ltd were used, following standard methodology to prevent contamination of the samples¹⁵. The eDNA samples were tested for the presence or likely absence of eDNA in a controlled laboratory environment by Nature Metrics Ltd.

Results (Western and Eastern Sites)

12.2.105. Results of the HSI assessment and eDNA sampling are relevant to both the Eastern and Western site and so are discussed jointly below.

Habitat Suitability Index (HSI) Assessment

12.2.106. The waterbody within the Eastern Site, waterbody WB1, was found to be of 'poor' suitability for GCN on HSI assessment. Therefore, GCN are assumed likely absent from waterbody WB1.

12.2.107. Four other waterbodies were identified within 250m of the Site hereafter referred to as waterbodies WB2, WB3, WB4 and WB5. Waterbodies WB2, WB3, WB4 and WB5 are within 250m of the Eastern Site and WB2, WB3 and WB4 are within 250m of the Western Site.

12.2.108. These five waterbodies were subject to HSI assessment, and waterbodies WB2, WB3 and WB5 were found to be of 'poor' suitability for GCN on HSI assessment. Waterbody WB4 was found to be of 'average' suitability on HSI assessment and was therefore subject to presence/likely absence survey, as shown in Table 12.2.20. All waterbody locations are shown in Appendix 12.4.

Table 12.2.20: HSI results

HSI category	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5
Geographic location	1	1	1	1	Unsuitable for HSI assessment as pond was entirely dry
Pond area	0.05	0.6	0.05	0.05	N/A
Pond permanence	1	0.9	0.9	0.9	N/A
Water quality	0.01	1	0.67	0.33	N/A
Shade	0.3	1	1	0.9	N/A
Waterfowl effect	1	0.67	1	1	N/A
Fish presence	1	0.01	1	0.01	N/A
Pond Density	0.65	0.5	0.5	0.5	N/A
Terrestrial habitat	0.01	0.67	0.67	0.67	N/A
Macrophyte cover	0.3	0.7	0.9	0.6	N/A
HSI Score:	0.22 Poor	0.49 Poor	0.62 Average	0.35 Poor	N/A

eDNA

- 12.2.109. The eDNA survey was completed on waterbody WB4 and a negative result for GCN presence was returned following laboratory analysis. Therefore, GCN are assumed likely absent from this waterbody.
- 12.2.110. Based on results of the HSI assessment and eDNA survey, GCN are considered likely absent from the Site and are not considered further within this assessment. A full copy of the result report from Nature Metrics Ltd is included below (note, waterbody WB4 is labelled Pond 2 within the Nature Metrics results).



GREAT CRESTED NEWT DETECTION RESULTS

Company: Tyler Grange
Order number: 101976
Project code: 14047: Land at J10/M40
Date of Report: 9 July 2021
Number of samples: 1

Thank you for sending your sample for analysis by NatureMetrics. Your sample has been processed in accordance with the protocol set out in Appendix 5 of Biggs et al. (2014).

Summary of the results

Results indicate GCN absence in '14047 Pond 2'.

The negative controls were blank, the extraction blank control was negative, and the positive controls and their replicates were standard.

Results are based on the samples as supplied by the client to the laboratory. Incorrect sampling methodology may affect the results. Note that a negative result does not preclude the presence of Great Crested Newts at a level below the [limits of detection](#).

Methods

eDNA was precipitated via centrifugation at 14,000 x g and then extracted using Qiagen Blood and Tissue extraction kits. qPCR amplification was carried out in 12 replicates per sample, using GCN specific [primers](#) and [probes](#) described in Biggs et al. (2014), in the presence of [positive controls](#), [extraction controls](#), and [template negative controls](#). A score is given for the number of positive replicates out of 12.

The qPCR method follows the recommendations set out by NatureMetrics for Natural England in the qPCR validation project and helps improve the reliability of the interpretation of the data. Results from the assay are considered to have a [high](#) rating of confidence according to our [Validation Scale](#) (Harper et al. 2021).

The quality control methods exceed the requirements outlined in Biggs et al. (2014) Appendix 5. These consist of the use of [kit blanks](#), additional [extraction blanks](#) and [template negative controls](#), and [positive controls](#) standards of known concentration in triplicate to generate [limits of detection](#) and give confidence to the low and late amplifications.

www.naturemetrics.co.uk

Nature Metrics Ltd, CABI site, Bakeham Lane, Egham, Surrey, TW20 9TY



Kit ID	Pond ID	Arrived	Inhibition	Degradation	Score	Status
2856	'14047 Pond 2'	25-Jun	No	No	0	Negative

END OF REPORT

Report issued by: **Thomas Shannon**

Contact: **team@naturemetrics.co.uk**

www.naturemetrics.co.uk

Nature Metrics Ltd, CABI site, Bakeham Lane, Egham, Surrey, TW20 9TY

Hazel Dormouse Survey Methodology and Results

Methodology

- 12.2.112. Hazel dormouse presence/likely absence surveys were completed between May and early October 2022 inclusive. Surveys involved placement of 100 hazel dormouse nest tubes at the Eastern Site and 100 nest tubes on the Western Site on 4th and 5th May 2022 and subsequently checking the tubes every alternate month until removal of the tubes on 2nd and 3rd October 2022.
- 12.2.113. The nest tubes comprised approximately 5cm by 25cm lengths of plastic-walled tubes with a plywood insert projecting approximately 5cm beyond the tube's entrance. Tubes were placed in accordance with best practice guidance, suspended beneath horizontal limbs of trees and shrubs.
- 12.2.114. Survey methods followed that set out within best practice guidance and 100 nest tubes were set out at each respective site. The minimum number of tubes recommended by best practice guidance is 50 tubes. Therefore, the 'index of probability' score was doubled, resulting in a score of 48 at each site, in accordance with Natural England's interim advice note . The minimum 'index of probability' score is 20 and therefore both the Eastern Site and the Western Site exceeded the minimum score. The survey results are therefore considered sufficiently robust to inform impact assessment and licensing if required. Table 12.2.21 below shows the index of probability scores for 50 tubes and 100 tubes.

Table 12.2.21: Index of probability^{Error! Bookmark not defined.} of finding hazel dormouse present in nest tubes per month.

Month	Index of probability with 50 tubes	Doubled score with 100 tubes ^{Error! Bookmark not defined.}
April	1	2
May	4	8
June	2	2
July	2	2
August	5	5
September	7	7
October	2	2
November	2	2

- 12.2.115. The nest tube set out and all subsequent surveys were completed by an experienced and licenced hazel dormouse surveyor. Nest tubes were subject to a final check and partial removal on 2nd October 2022 with remaining tubes removed on 3rd October 2022.

Results

- 12.2.116. Table 12.2.22 below displays the survey dates and weather conditions of each survey visit applicable to both the eastern and western sites.

Table 12.2.22: Hazel dormouse survey metadata for both the Eastern and Western Sites

Survey visit number	Date	Weather Conditions	Surveyor Initials
1	8th June 2022	Temperature (°C): 15 Wind (Beaufort Scale): 2 Cloud cover (%): 60 Precipitation: None Visibility: Good	JS
2	9th August 2022	Temperature (°C): 25 Wind (Beaufort Scale): 1 Cloud cover (%): 20 Precipitation: None Visibility: Very Good	JS
3	2nd October 2022	Temperature (°C): 16 Wind (Beaufort Scale): 2 Cloud cover (%): 70 Precipitation: None Visibility: Good	JS

Eastern site

- 12.2.117. No evidence of hazel dormouse was identified during the hazel dormouse survey within the Eastern Site. Evidence of wood mouse *Apodemus sylvaticus*, a common and widespread mouse species, was incidentally found in two locations on the boundaries of the Site.
- 12.2.118. Hedgerows within and on the boundaries of the Eastern Site are not connected to the Western Site, being separated by the A43 road which is considered likely to act as a barrier to dispersal of hazel dormouse utilising the Western Site (see 12.4, Western Site). Therefore, hazel dormouse are assumed likely absent from the Site.

Western site

- 12.2.119. As shown on the hazel dormouse survey results plan (Appendix 12.9) and in table 12.2.23 below, evidence of hazel dormouse was identified in two locations in the south of the Site the form of hazel dormouse nests. Possible hazel dormouse evidence was found in five locations in the form of potential nests and a food cache. Evidence of wood mouse, a common and widespread mouse species, was incidentally found in five locations.

Table 12.2.23: Hazel dormouse survey results summary

Tube number	X coordinates	Y coordinates	Result
A1	454141	229426	Active wood mouse nest
A11	454107	229189	Possible hazel dormouse - green leaf nest identified
B16	454566	229332	Active wood mouse nest
C5	454394	229312	Possible hazel dormouse - green leaf nest identified
C11	454357	229189	Possible hazel dormouse - green leaf nest identified
C14	454334	229123	Possible hazel dormouse - green leaf nest identified
D4	455247	228551	Wood mouse present but no nest
D6	454666	228952	Possible hazel dormouse – potential early-stage nest
E13	454547	228564	Confirmed hazel dormouse nest identified
E18	454489	228657	Confirmed hazel dormouse nest identified
E19	455168	228907	Active wood mouse nest
E20	454510	228669	Possible hazel dormouse - hawthorn berry cache
E5	454746	228510	Wood mouse food cache

- 12.2.120. Hazel dormouse are therefore considered to be present within the Western Site. Removal of hedgerows to facilitate development may disturb or harm hazel dormouse which is a European protected species. Therefore, a mitigation licence should be sought from Natural England prior to works commencement.

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