MKA

Bat activity survey

Land Off Hogshaw Road, Granborough

Site	*Land off Hogshaw Road, Granborough*
Project number	*130322*
Client name / Address	*Statera Energy Limited,* *1st floor,* *145 Kensington Church Street,* *London,* *W8 7LP*

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Reviewed by	*Felix Bird*	
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Declaration of compliance

The bat activity survey has been undertaken in accordance with British Standard 42020:2013 'Biodiversity, Code of practice for planning and development'.

The information which we have provided is true, and has been prepared and provided in accordance with the Chartered Institute of Ecology and Environmental Management's (CIEEM) Code of Professional Conduct. We confirm that the opinions expressed are our true and professional bona fide opinions.

MKA Ecology Ltd is a CIEEM Registered Practice. This means that MKA Ecology Ltd are formally recognised for high professional standards, working at the forefront of our profession.

Validity of data

For sites that require a European Protected Species Licence in respect of bats, the licensing authority in England (Natural England) will expect data from the most recent survey season. The information about non-roosting bat activity provided within this report is valid for a maximum period of 24 months from the date of survey. If works at the site have not progressed by this time an updated site visit may be required in order to determine any changes in site composition and ecological constraints.

CONTENTS

1. SUMMARY

In May 2023 MKA Ecology Ltd was commissioned to undertake a bat activity survey of the Land Off Hogshaw Road, Granborough. Site visits were undertaken on 17 May, 25 July and 11 September 2023. The purpose of the bat activity survey was to identify the bat species present and their use of the Site.

The Site consists of agricultural fields surrounded by hedgerows, with a stream running along the north-western boundary. The proposed development is for a 500MW Battery Energy Storage System (BESS) site. The proposal involves the installation of 1,204 battery containers, 38 inverter buildings, seven control rooms and substation compound. The proposed soft landscaping includes areas of wildflower grassland, new woodland planting, native shrub planting and pond creation.

A series of bat activity surveys was undertaken following the Bat Conservation Trust's Good Practice Guidelines between May and September 2023, comprising of three transect and static bat detector surveys. This survey effort is based on a site which has low suitability for bats.

The Site was found to support at least four bat species, with one identifiable only to genus level (*Myotis*). Common pipistrelle was the most frequently occurring species, with noctule and soprano pipistrelle present at lower numbers. *Myotis* species were recorded infrequently by the automated bat detector. This is a low diversity of bat species for this region.

Bat activity levels were low throughout the survey period. Relatively higher levels of activity were identified along the north and west boundaries of the site, where there is a stream, and along a hedgerow containing trees running through the centre of the Site. Bat activity at the south and east boundaries of the Site was very low.

The site design proposes to retain the stream and the majority of hedgerows, avoiding the risk of direct impacts to bats, however inappropriate lighting would impact on bat activity on the Site. Managing the impacts of lighting will be critical to ensure that retained habitats remain suitable for bat activity. An ecologist should be consulted throughout the lighting design process.

The proposed wildflower meadow, pond, woodland and scrub creation is likely to provide a significantly enhanced foraging resource for bats in the local area. To further enhance the local bat populations, it is recommended bat boxes are installed on new buildings, in close proximity to the new habitats and existing features which have been identified as important for bats.

2. INTRODUCTION

2.1. Aims and scope

In May 2023 MKA Ecology Ltd was commissioned to undertake a bat activity survey of the Land Off Hogshaw Road, Granborough. Site visits were undertaken on 17 May, 25 July and 11 September 2023. The purpose of the bat activity survey was to identify the bat species present and their use of the Site. The survey was commissioned following recommendations arising from a Preliminary Ecological Appraisal completed in October 2022 (MKA Ecology Ltd, 2023).

The aims of the bat activity surveys were to:

Complete a bat activity survey using transects and automated detectors;
Identify the assemblage of bat species present and level of bat activity throughout the Site;
Locate any key foraging and commuting areas;
Assess the impacts of the proposed development on bat activity; and
Detail recommendations for mitigation and propose any suitable habitat enhancements for bat species, if required.

This report must be read in conjunction with the Preliminary Ecological Appraisal (PEA, MKA Ecology Ltd, 2022).

2.2. Site description and background

The survey area is shown on the map in Figure 1. Within this report this area is referred to as the Site or Land off Hogshaw Road, Granborough. The Site is located west of the village of Granborough within Buckinghamshire (grid reference: SP 75515 25296) and falls under the authority of Buckinghamshire Council. The Site consists of arable fields, surrounded by hedgerows, with a stream running along the north-western boundary.

The aforementioned PEA report identified several features of the Site that are of potential value for foraging and commuting bats, particularly eight trees which were identified as having **moderate** potential to support roosting bats, due to the presence of knotholes, woodpecker holes and cavities. In addition, two trees (T2, T8) were identified as having **low** potential to support roosting bats. The hedgerows containing trees and stream present on the Site provide foraging opportunities for bats, as well as potentially acting as an important commuting corridor between the surrounding landscape, which is dominated by large arable fields. A network of hedgerows and ditches is present in the wider area, however the Site does not link any potential significant foraging areas with significant roosting locations. Overall, the Site has been assessed as having **low** suitability for foraging and commuting bats.

2.3. Proposed development

The proposed development is for a potential 500MW Battery Energy Storage System (BESS) facility. The proposal involves the installation of 1,204 battery containers, 38 inverter buildings, seven control rooms and an attenuation pond. Access to the site will be provided by crushed stone tracks from an existing road to the east. The proposed development also includes areas of wildflower grassland, new woodland, scrub and pond creation. The indicative masterplan is shown on Figure 2.

2.4. Legislation and planning policy

This bat activity survey has been undertaken with reference to relevant wildlife legislation and planning policy. Relevant legislation considered within the scope of this document comprised the following:

The Environment Act 2021:
The Conservation of Habitats and Species Regulations 2017 (as amended);
The Wildlife and Countryside Act 1981 (as amended); and
The Natural Environment and Rural Communities (NERC) Act 2006.

In addition to obligations under wildlife legislation, a revised National Planning Policy Framework (NPPF) was published on 5 September 2023 setting out the Government's planning policies for England and the process by which these should be applied. The key principle of the NPPF is a presumption in favour of sustainable development, with sustainable development defined as a balance between economic, social and environmental needs. Further information is provided in Appendix 1.

Buckinghamshire and Milton Keynes Natural Environment Partnership have developed a Biodiversity Action Plan (BAP) which includes targets for the creation and restoration of priority habitats. Suggested action includes connecting quality habitats across the landscape and ensuring biodiversity is a key factor in the design of urban environments. The Buckinghamshire and River Ouzel Internal Draining Board (IBD) has suggested sympathetic tree management as a measure for maintaining or increasing species populations or ranges. The extent of woodland in the Chilterns means that bats are a common protected group of species in Buckinghamshire.

Figure 1: Site location and survey area

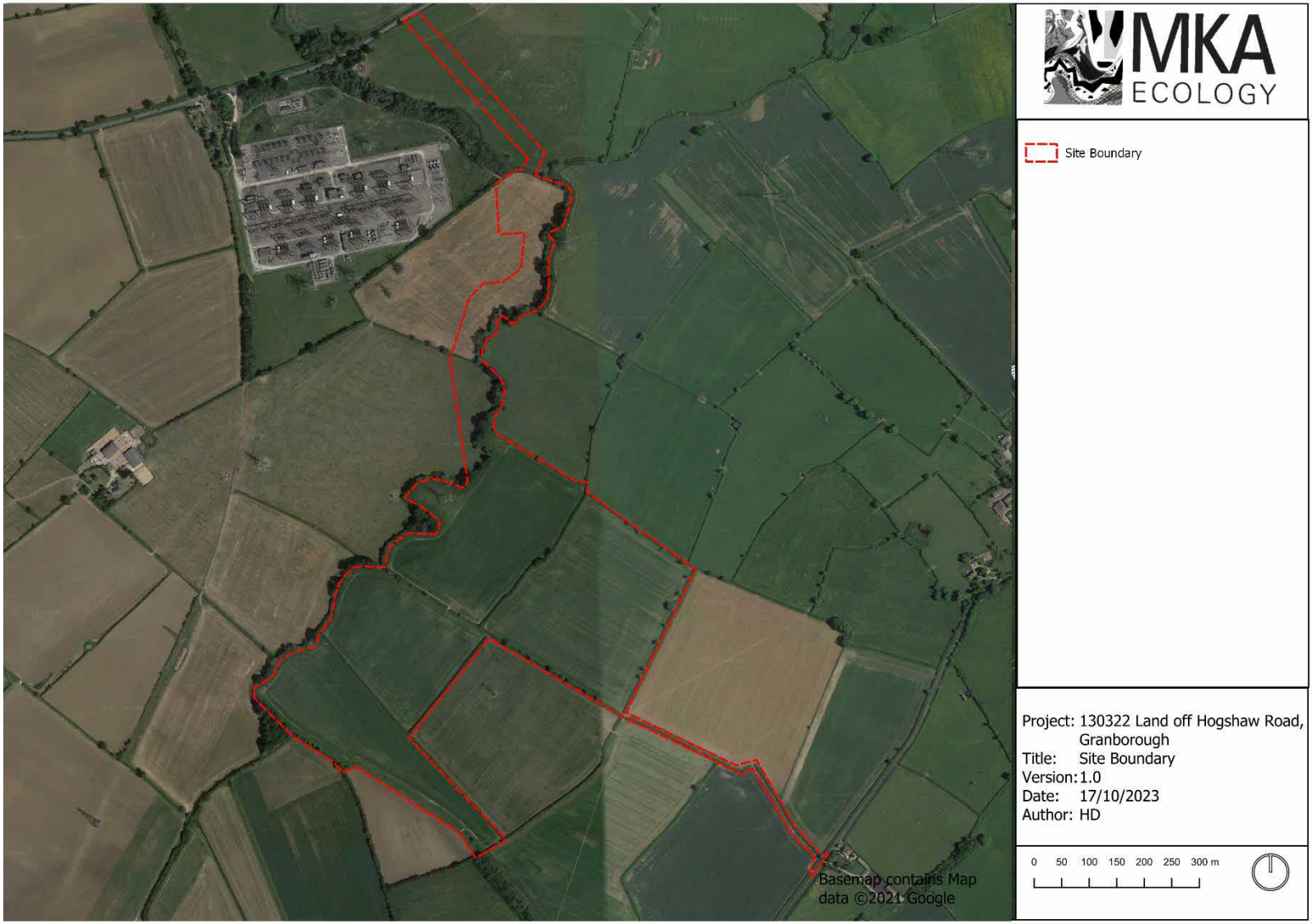


Figure 2: Indicative Masterplan for Land off Hogshaw Road, Granborough

3. METHODOLOGIES

3.1. Survey requirements and survey effort

The Bat Surveys for Professional Ecologists Good Practice Guidelines (Collins, 2016) set out guidelines for the number of bat activity surveys recommended for habitat of different suitability for bats. The Site was categorised as having low suitability for bat activity. There is habitat suitable for a small number of foraging bats on site, including a stream and scattered trees, however the surrounding landscape is dominated by agricultural fields which are unlikely to support a significant number of bats. Bats may use the hedgerows and stream to commute across the wider landscape however these are not connected any areas which may be of significant foraging value or support a large number of roosting bats.

For habitats of low suitability for bats, good practice guidelines recommend one transect survey per season (spring, summer and autumn). For low suitability habitat for bat activity, automated detector surveys should be completed each season, for a minimum of five consecutive nights.

3.2. Bat transect survey

A transect survey was undertaken at the proposed development site to establish:

Which bat species are using the site and activity levels for each;
Key foraging areas;
Key commuting routes; and
Relative levels of activity across the survey area.

The survey methodology followed the good practice guidelines (Collins, 2016). One transect route was designed to survey all key features for bats which may be impacted by the development. The transect also incorporated five-minute listening stops in eight locations to allow more time to assess bat activity at areas considered most suitable. The route and locations of listening stops are shown in Figure 3.

The transect was walked at a steady pace allowing good coverage of all key habitats. The transect was started around sunset, always starting with the north section. This was to ensure that likely commuting routes using the hedgerow network would be detected earlier in the evening.

All bat passes, including information on time and species, were recorded on to standard activity survey recording forms and a base map of the site. Where possible the behaviour of the bat was also recorded, including direction of flight, distance from linear feature and type of behaviour. Foraging behaviour was identified and social calls indicated communication between bats. The start and finish time of each

transect, the date, name of recorder, detector type, wind direction and force, temperature, precipitation and cloud cover were also recorded.

Surveyors used full spectrum bat detectors (Elekon Batlogger M) with integrated digital recording and GPS. Sound recordings were later analysed using BatExplorer software. Identification of bat calls was undertaken using the parameters set out by Russ (2012).

The dates and prevailing weather conditions of the surveys are shown in Table 1 below.

Table 1: Transect survey dates and weather conditions

Survey visit	Date	Start time	Weather conditions
1	17 May 2023 (dusk 20:53)	20:53	Wind: 1; Cloud: 8/8 Start temperature: 13°C End temperature: 11°C Precipitation: None
2	25 July 2023 (dusk: 21:04)	21:04	Wind: 2W; Cloud: 3/8 Start temperature: 16°C End temperature: 13°C Precipitation: None
3	11 September 2023 (dusk 19:29)	19:29	Wind: 3; Cloud: 3/8 Start temperature: 20°C End temperature: 18°C Precipitation: None

*Wind as per Beaufort Scale / Cloud cover given in Oktas.

3.3. Automated bat detector survey

Automated detector surveys were completed in each session. This involved an AnaBat Express automatic bat detector being deployed for a minimum of five consecutive nights in each session. The location at which the automated detector was deployed is shown in Figure 3. The detector was placed west of the centre of the Site, alongside a hedgerow containing trees which provides suitable habitat for foraging and commuting bats.

The AnaBat Express is a frequency division bat detector which records bat calls on to an internal memory card. Sound analysis was completed using AnaLook software and bat call parameters from Russ (2012). The AnaBat Express is activated by high frequency bat calls which trigger a 15 second recording. For the purposes of analysis, a bat pass correlates to a single 15 second recording.

The dates and prevailing weather conditions for the monitoring sessions are shown in Table 2, below.

Table 2: Dates for automatic bat detector monitoring sessions and prevailing weather conditions

Session	Dates	Weather description*
1	7 June- 12 June (5 nights)	Overall: Good Average night-time temperatures: 11.1°C Average night-time wind speed: 9.2 mph Precipitation: 0.00mm
2	25 July- 30 July (5 nights)	Overall: Good Average night-time temperatures: 16.0°C Average night-time wind speed: 11.2 mph Precipitation: 0.00mm
3	11 September – 17 September (5 nights)	Overall: Good Average night-time temperatures: 17.2°C Average night-time wind speed: 8.3 mph Precipitation: 00.00 mm

*Weather records obtained from Buckingham weather station (Weather Underground, 2017)

3.4. Surveyors, author and reviewer

The bat transect surveys were undertaken by MKA Ecology Ltd staff:

Felix Bird, Senior Ecologist at MKA Ecology Ltd. Felix has five years' experience in completing bat activity surveys;

Rebecca Haines, Ecologist at MKA Ecology Ltd. Rebecca has two years' experience in completing bat activity surveys;

Matthew Simmons, Graduate Ecologist at MKA Ecology Ltd. Matthew has two years' experience in completing bat activity surveys;

Callan Denham, Graduate Ecologist at MKA Ecology Ltd. Callan has one years' experience in completing bat activity surveys; and

Hazel Dudley, Graduate Ecologist at MKA Ecology Ltd. Hazel has one year's experience in completing bat activity surveys

Bat call analysis was completed and the report authored by Hazel Dudley, Graduate Ecologist at MKA Ecology Ltd. Hazel has one years' experience in undertaking analysis of bat activity and the authoring of corresponding reports. The report has been reviewed by Felix Bird.

3.5. Constraints

Two active red kite *Milvus milvus* nests were identified onsite. Red kite are protected under Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), which makes it an offence to disturb an active nest. A buffer zone around each nest was established and the bat activity transect route amended to

avoid disturbing these nests. No impacts are predicted within the areas within which the red kite were nesting, as these will be retained within the site design. Therefore, whilst coverage of the Site was slightly reduced, the absence of this data is not considered a significant constraint on assessing the potential impacts of the development on foraging or commuting bats.

The results taken from bat detector recordings are biased towards bats that use louder echolocation calls. Some species, such as brown long-eared bat *Plecotus auritus*, are known to echolocate quietly on occasions. Therefore, some species may be under recorded due to the limited recording range of the equipment. This is particularly evident during the automatic bat detector surveys where there is no surveyor to record visual cues for these species.

Some groups of bat species use echolocation calls of a very similar structure. These similar calls make identification through call analysis difficult, particularly in cluttered environments where positive identification is often impossible to achieve. In cases where the bat cannot be confidently identified to species level it is identified to genus level, such as *Myotis sp*. Similarly, it can be difficult to distinguish between common pipistrelle *Pipistrellus pipistrellus* and soprano pipistrelle *Pipistrellus pygmaeus* due to a certain degree of overlap in call structure. In this instance the call is described as *Pipistrellus sp.* This should not be taken as a description of other pipistrelle species, particularly Nathusius' pipistrelle *Pipistrellus nathusii* which, where thought to be present, is directly referenced. Similar overlap of calls apply to the genus *Nyctalus* (noctule and Leisler's bat *N.leisleri*).

Acoustic surveys allow representative sampling of bat activity across the site which facilitates an understanding of species presence and patterns of activity. However, the measurements of activity can only be used to provide an index of activity and cannot be used to determine absolute abundance of bats using the site. Therefore, the number of bat passes encountered cannot be used to determine numbers of individuals present. The results of the survey can only be taken as an assessment of the risk of there being high concentrations of bats within the Site or around particular habitat features and provide an indication of how bats are using the available habitats.

Due to an issue with equipment, the first attempt at the spring static bat detector survey failed. The static bat detector survey was repeated as soon as possible with the recording period running into June. As a result, this report may have missed some activity associated with the spring-time. However, considering there was a consistently low level of activity recorded during each session it is not likely that this delay has had a significant impact on the results obtained.

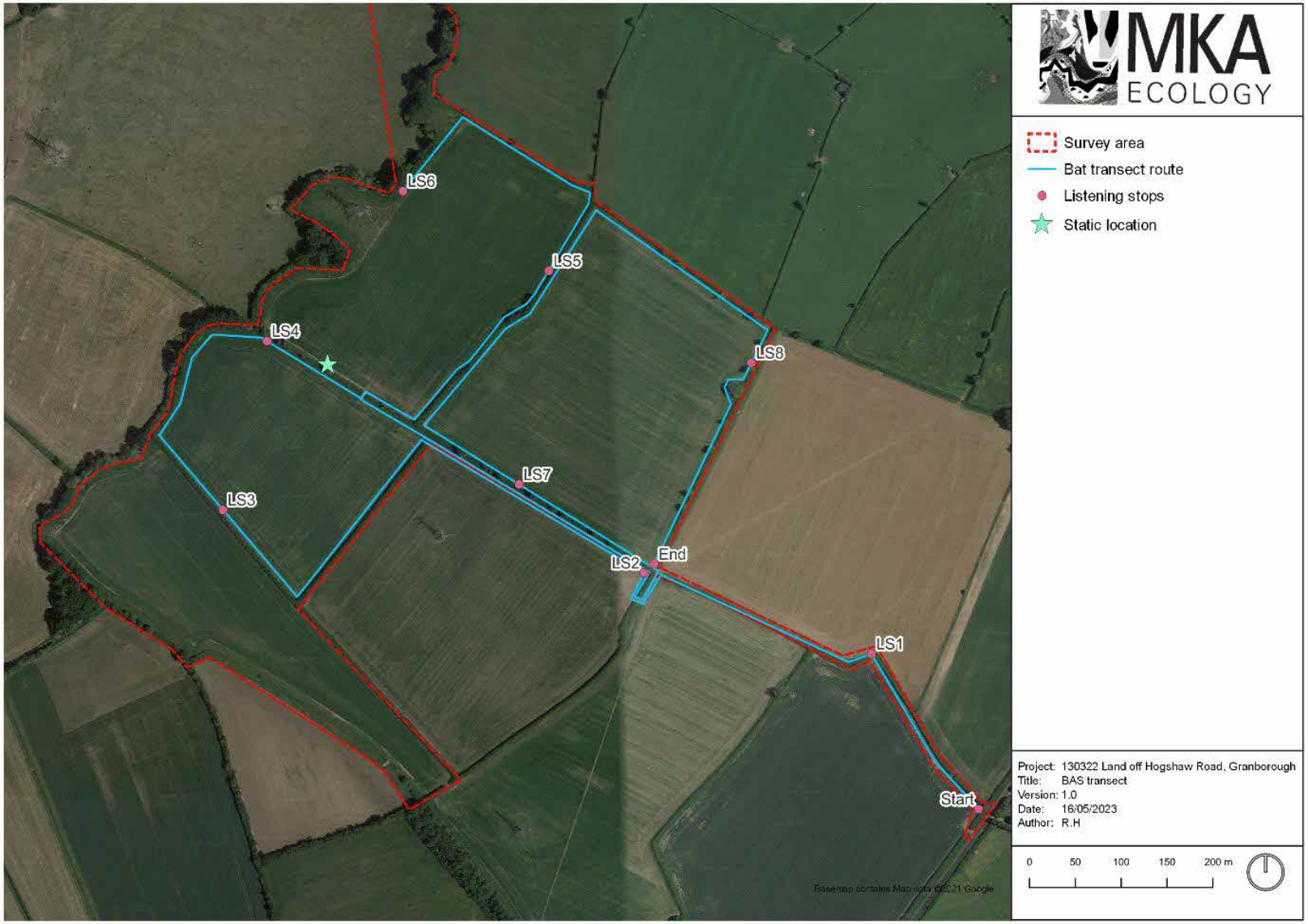
3.6. Assessment for bats

The rarity of any bats detected during the transect and automated detector surveys were evaluated using the methodology developed by Wray *et al*. (2010). In this assessment methodology bat species are classified as either common, rarer or rarest species (see Table 3).

Table 3: Categorising bats by rarity

Rarity within England	Species
Rarest (population under 10,000)	Greater horseshoe bat *Rhinolophus ferrumequinum* Bechstein's bat *Myotis bechsteinii* Alcathoe's bat *Myotis alcathoe* Greater mouse-eared bat *Myotis myotis* Barbastelle *Barbastella barbastellus* Grey long-eared bat *Plecotus austriacus*
Rarer (population 10,000 – 100,000)	Lesser horseshoe bat *Rhinolophus hipposideros* Whiskered bat *Myotis mystacinus* Brandt's bat *Myotis brandtii* Daubenton's bat *Myotis daubentonii* Natterer's bat *Myotis nattereri* Leisler's bat *Nyctalus leisleri* Noctule *Nyctalus noctula* Nathusius' pipistrelle *Pipistrellus nathusii* Serotine *Eptesicus serotinus*
Common (Population over 100,000)	Common pipistrelle *Pipistrellus pipistrellus* Soprano pipistrelle *Pipistrellus pygmaeus* Brown long-eared bat *Plecotus auritus*

Figure 3: Transect route and listening stops



4. RESULTS

4.1. Bat transect survey

During the bat transect survey at least four species were recorded, with common pipistrelle being the most frequently observed species (Table 4). Soprano pipistrelle and noctule were also recorded frequently. All three species were recorded during each visit, with Visit 1 recording the most activity and Visit 3 recording the least activity.

Common pipistrelle was the most frequently encountered species during the transect surveys, accounting for 60% of all recorded passes. Soprano pipistrelle and noctule were recorded less frequently and together accounted for 30% of all bat passes. The remaining passes were from unidentified pipistrelles species and together accounted for 10% of bat passes throughout the entire survey effort. A broadly similar pattern of activity was recorded at the listening stops.

Table 4: Summary of total passes for each species during transect survey visits including listening stops

Species	Visit			Total
	Spring	Summer	Autumn	
Common pipistrelle	8	12	8	28
Soprano pipistrelle	1	3	1	5
Pipistrellus sp.	3	2	0	5
Noctule	6	1	2	9
Total	**18**	**18**	**11**	**47**

The data for the listening stops is presented in Table 5 below. As with the wider transect survey dataset common pipistrelle was the dominant species, with the spring and summer visits each providing 43% of the recorded activity. The most bat passes were recorded at Listening Stop 4 (30%) with a further 43% of bat passes recorded at Listen Stops 3 and 6. No activity was recorded at Listening Stops 1 and 7. The relative activity of the bat species recorded is summarised graphically in **Error! Reference s ource not found.**.

Table 5: Bat passes recorded at listening stops

Visit	Species	Listening stop								Total
		1	2	3	4	5	6	7	8	
Spring	Common pipistrelle	0	0	0	0	0	3	0	0	3
	Soprano pipistrelle	0	0	0	2	1	0	0	0	3
	Noctule	0	0	2	2	0	0	0	0	4
	Total	**0**	**0**	**2**	**4**	**1**	**3**	**0**	**0**	**10**
Summer	Common pipistrelle	0	1	3	3	0	1	0	0	8
	Soprano pipistrelle	0	1	0	0	0	1	0	0	2
	Total	**0**	**2**	**3**	**3**	**0**	**2**	**0**	**0**	**10**
Autumn	Common pipistrelle	0	0	0	0	1	1	0	1	3
	Total	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**1**	**3**
Total		**0**	**2**	**4**	**7**	**2**	**6**	**0**	**1**	**23**

Temporal distribution of activity

The temporal pattern of bat activity is fairly typical in that the highest levels of activity would usually be expected in summer. Consistent levels of bat activity were recorded in spring and summer, followed by a drop in levels of activity recorded in autumn. However, due to low levels of bat activity throughout the surveys, a drop in activity levels in autumn may not be significant. There was an equal diversity of species recorded during each visit, with all three species (common pipistrelle, soprano pipistrelle and noctule) being recorded on each visit.

Spatial distribution of activity

Due to low levels of bat activity recorded at this Site it is difficult to state any spatial variation in bat activity. There is a trend for activity in spring being predominantly concentrated along the stream at the west of the Site. Activity during summer was mostly recorded in the centre of the Site and autumn was characterised by activity along a line of trees on the north perimeter of the Site. Common pipistrelle and soprano pipistrelle, in keeping with their higher levels of activity, were found in all parts of the Site. Noctule were recorded along the north and west perimeter waterways. *Myotis* species were recorded in the centre of the Site, although this distribution is only represented by three passes. It is important to note that during acoustic surveys it is very difficult to identify the specific number of bats, so these three passes could be the same bat recorded three times.

Figure 4: Activity of all bat species on all visits (excluding listening stops)

Figure 5: Activity of all bat species per visit (excluding listening stops)

Figure 6: Species breakdown of recordings at each listening stop

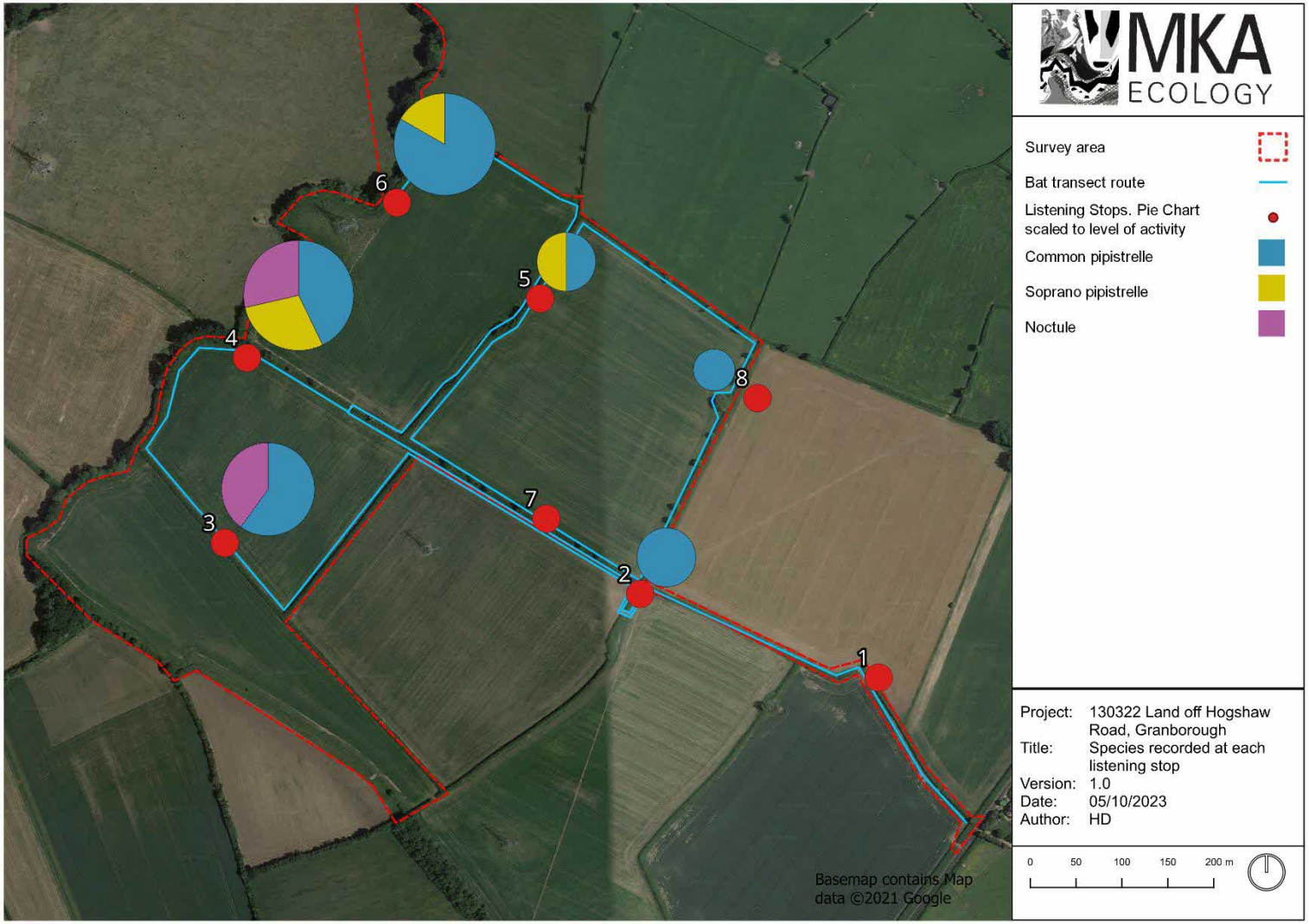


Figure 7: Common pipisrelle activity, excluding listening stops

Figure 8: Noctule activity, excluding listening stops

Figure 9: Soprano pipistrelle activity, excluding listening stops

Figure 10: *Myotis* species activity, excluding listening stops

4.2 Automated bat detector survey

A total of 319 bat passes were recorded during the automatic bat detector survey. The same species found during the transect surveys were also recorded during these sessions. *Myotis* species were recorded and identified to the genus level but activity from these bat species was relatively low throughout the surveys.

Table 6: Number of species passes recorded by the automated static detector

Visit	Common pipistrelle	Soprano pipistrelle	Noctule	*Myotis* sp.	Total
Spring	127	20	2	2	**151**
Summer	87	2	6	6	**101**
Autumn	45	5	4	13	**67**
Total	**259**	**27**	**12**	**21**	**319**

Common pipistrelle was the most frequently recorded species, accounting for 81% of all passes. Soprano pipistrelle records accounted for 8%. Noctule recordings accounted for 4% of calls and *Myotis* species (identified to the genus level) accounted for 7% of calls.

The amount of activity across the three sessions also mirrored that found during the transect surveys, with the highest activity levels found in spring and the lowest levels of activity recorded in autumn.

5. EVALUATION AND RECOMMENDATIONS

The following evaluation and recommendations are based on the bat activity survey carried out at The Land off Hogshaw Road, Granborough between May and September 2023.

5.1. Evaluation

Three species were recorded within The Land off Hogshaw Road, Granborough, with additional recordings from *Myotis* species that could only be identified to genus level. This is considered to be a low diversity of species for this region. The species confirmed present by the transect and statics datasets, together with their perceived rarity (Wray et al., 2010) and the frequency at which they were encountered, are shown in Table 7 below.

Table 7: Species, perceived rarity and frequency of encounter at The Land off Hogshaw Road, Granborough Road

Species	Rarity**	Activity levels
Common pipistrelle*	Common	Moderate to Low
Noctule	Rarer	Low
Myotis sp.	Rarer	Very low
Soprano pipistrelle*	Common	Low

***** Recordings from unidentified *Pipistrellus* bats will either be common or soprano pipistrelle.
****** Rarity is assessed at species level, this represents the range for these genera. Whilst some *Myotis* species are considered within the 'Rarest' category, the site is outside of their known distributions.

Common pipistrelle bats are frequently encountered species and can be described as widespread across the UK. Common pipistrelle were the most abundant species at the Site, accounting for 64% and 80% of recorded passes in the transect and static detector datasets, respectively.

The second highest recorded species was soprano pipistrelle. Soprano pipistrelle are common and widespread but show a preference for more riverine and aquatic habitats. The stream and pond provides some suitable habitat, however aquatic habitats are relatively scarce in the wider landscape which may explain why this species was not more frequently encountered. *Myotis* species (identified to the genus level) and noctule were recorded less frequently. Noctule is considered a rarer species within the UK, however is fairly widespread within Buckinghamshire (North Bucks Bat Group, 2010). Noctule activity was considered to be low. As a rarer species, it would be expected to encounter it less frequently in the survey effort. *Myotis* species which are likely to be recorded in the habitats present on site are Natterer's bat and Daubenton's bat, with whiskered bat and Brandt's bats a less likely possibility.

Overall bat activity varied spatially across the Site, with activity largely recorded along the north and west perimeters, which are defined by a stream, and around a hedgerow containing a line of trees in the centre of the Site. Relatively few passes were recorded in the south west of the Site.

The Preliminary Ecological Appraisal (MKA Ecology Ltd, 2022) highlighted the potential risk of the hedgerows containing trees and the stream bordering the Site as features of value for both commuting and foraging bats. It is concluded from the combination of data from transect and automated detector and surveys that the stream and lines of trees along the perimeter of the Site, as well as a hedgerow containing a line of trees running through the centre of the Site are valuable features for a low number of common bats and individual rarer bats. Whilst the full length of the stream was not surveyed due to access constraints, the habitat is relatively consistent throughout, and it is assumed a similar level of activity would be present. A map highlighting important areas for bats is shown in figure 11.

The level of activity through the survey period for the transect surveys was fairly typical. It would be normal to observe the highest levels of activity during the late summer. Instead, the highest levels of activity were recorded during spring, possibly due to higher-than-average temperatures and low levels of precipitation, followed by summer. Activity levels were lowest in autumn, which is expected as bat activity levels decline during the transition from late summer to autumn.

Figure 11: Important areas for bats

5.2 Impacts in the absence of mitigation

Given the scale of the proposed development, in the absence of mitigation there are a number of impacts which this development may have on bats. These are described below along with recommendations for mitigation.

Habitat loss

The majority of activity was associated with the northern and western perimeter and a hedgerow containing trees running along centre of the Site. The proposed development will retain the majority of these areas which will significantly reduce potential adverse impacts. A small section of hedgerow will be removed in the centre of the Site for a crushed stone access track. Bat activity was consistently recorded around this section of hedgerow during the surveys. The proposed access track is 5.5 metres wide so if the gap created in the hedgerow is limited to under 10 metres, adverse impacts should be limited. Additional planting of trees alongside the existing hedgerows, which is proposed in the development plan, is likely to enhance these habitats as linear features, which will be beneficial to commuting and foraging bats. A large area of arable land will be removed, which may have a minor negative impact on foraging bats although this is highly unlikely to be significant for local populations.

Lighting

Artificial lighting is known to have detrimental impacts on bat activity. Lighting can create barriers to commuting routes and cause bats to avoid certain well-lit areas. If a high intensity lighting scheme was incorporated in the final design, with light spill onto the remaining areas of grassland and bordering hedges, then there would be detrimental impact to bat activity at an immediate local level. Given the extent of the proposals, lighting is likely to have site-wide impacts.

5.2. Proposed Mitigation and Enhancement Measures

Habitat loss and habitat fragmentation

The stream which defines the north and west perimeters of the Site boundary and the hedgerow running through the centre of the Site are evidently important foraging areas, most likely providing important habitats for invertebrates. Whilst the proposed development is likely to require to removal of a central portion of hedgerow, it should remove only the absolute minimum length and limit removal along the Site perimeter. Hedgerows, particularly those with trees, are known to be beneficial to bats, particularly in their role in maintaining connectivity within the landscape. This habitat should be retained, protected with Heras fencing during construction and enhanced post-development, for example by increasing hedgerow width and planting native trees.

Proposed Mitigation Measure 1

Retain, protect and enhance the hedgerow habitat.

Lighting

The proposed development is likely to result in additional lighting during the construction phase and post development. Artificial lighting is known to have detrimental impacts to bat activity (BCT 2023). The lighting of key habitat features for bats would impair their ability to move around the landscape and forage within the site boundary, thus reducing their ability to survive. Therefore, a sensitive lighting strategy should be implemented at the Site with the following specific recommendations made with respect to lighting design:

Minimise the lighting levels across the Site, particularly avoid light spill onto the perimeter stream and hedgerows onsite;

The important areas for bats highlighted in Figure 11 must remain in complete darkness, measured at 0.2 lux on the horizontal plane and 0.4 lux on the vertical plane;

All other hedgerows and key landscaping features such as the woodland, ponds and scrub should also be maintained at this light level;

The point at which the road passes through the hedgerow should remain unlit to help ensure it is still used by bats;

Minimise upward spill of light with the use of down lighting, hoods and cowls to direct light where it is needed and prevent light being directed above and around the feature requiring lighting; and

Consider the timings of lighting required, where possible avoiding lighting in the hours immediately after dusk and before dawn when bats are most active

Proposed Mitigation Measure 2

A sensitive lighting strategy should be implemented for both the construction and operational phases of the proposed development. Where night time lighting during construction or operation of the development is necessary, lighting schemes must be designed to avoid excessive light spill.

Opportunities for biodiversity enhancement

Pursuant to the National Planning Policy Framework (NPPF, see Appendix 1), all planning decisions should aim to maintain and enhance, restore or add to biodiversity and geological conservation interests.

There are numerous ecological enhancements detailed in the proposed plan. The loss of arable land in the centre of the Site will be compensated by the planting of high value grassland, woodland and native shrubs. The proposed site plan also involves the creation of several new ponds. These new habitats will be of value to foraging bats and should improve the suitability of the Site for bats.

Proposed Enhancement Measure 1

The planting of species-rich grassland, woodland and native shrubs, enhancing invertebrate populations and therefore a greater foraging resource for bats. The creation of ponds/ wetland areas.

Bats utilise the Site for foraging, yet few roosting opportunities are currently available. The provision of roosting opportunities for bats would significantly enhance the area for these species. It is therefore recommended that bat boxes are incorporated within the design scheme to enhance the roosting opportunities for bats post development. Bat boxes can be integrated within, and mounted onto, the external walls of any new buildings or existing trees. It is recommended that bat boxes are installed in close proximity to the proposed new habitat and to existing stream/hedgerow features which have been identified as important for bats (see Appendix 2 for recommendations).

Proposed Enhancement Measure 2

A minimum of 20 bat boxes should be installed at the Site.

Summary of recommendations

Table 8 below summarises the recommendations made within this report, and specifies the stage of the development at which action is required. Colour coding of cells within the table is as follows:

Key:

No action required for this species group at this stage

Action required (see notes for details)

Level of action required will be determined following the further survey work

Table 8: Summary of further work required

Species	Pre-planning action required?	Pre-construction action required?	Construction phase mitigation required?	Enhancements proposed?
Habitats	Retain hedgerows.	No	Protection of stream and hedgerow during development	Enhance hedgerows.
Lighting	Develop sensitive lighting strategy with no light spill to stream/ hedgerows	No	No night time lighting during the construction period.	No
Enhancements	Develop bat box scheme with	No	Install bat boxes	Integrated/wall mounted bat boxes.

Species	Pre-planning action required?	Pre-construction action required?	Construction phase mitigation required?	Enhancements proposed?
	integrated/wall mounted boxes			Creation of species-rich grassland, native planting and ponds.

6. CONCLUSIONS

MKA Ecology Ltd were commissioned to undertake an assessment of the bat activity at The Land off Hogshaw Road, Granborough in 2023. Between May and September 2023, transect surveys and automatic bat detector surveys were conducted to identify the bat species present, assess how they utilise the Site and identify potential impacts of development.

At least four species of bat, with one identifiable only to genus (*Myotis*), were recorded during the surveys. The majority of activity during all survey types was from common pipistrelle, with soprano pipistrelle and the larger bat species noctule and also present at low levels. *Myotis* (unidentified species) were present, but with only very occasional passes.

Total bat activity showed a trend of activity along the stream which forms the west and north perimeter site boundaries, as well as along a hedgerow running through the centre of the Site. The proposed development will involve the removal of a small section of hedgerow to allow for a crushed stone access track. This may have a very minor negative impact on commuting bats through reduced connectivity of habitats, however extensive tree and woodland planting across the Site will compensate for any minor habitat loss.

The proposed development includes measures to minimise negative effects upon bat species and to provide opportunities for ecological enhancement. The proposed plan involves the planting of high value grassland, woodland and native shrubs, as well as the creation of several new ponds. These new habitats will be of value to foraging bats and should improve the suitability of the Site for bats. A sensitive lighting scheme should be created to protect sensitive areas of the site and maintain connectivity to the wider landscape. There are currently few roosting opportunities and it is recommended that a bat box scheme is developed to include integrated bat boxes.

7. REFERENCES

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8. APPENDICES

Appendix 1: Relevant wildlife legislation and planning policy

Please note that the following is not an exhaustive list, and is solely intended to cover the most relevant legislation pertaining to species commonly associated with development sites.

Subject	Legislation (England)	Relevant criminal offences
Bats (all species)	The Conservation of Habitats and Species Regulations 2017 (as amended) All bat species are listed on Schedule 2, which designates them as European Protected Species. European Protected Species are subject to the provisions of Part 3, Regulation 41 (Protection of certain wild animals).	Deliberate capture, injury or killing of a bat; Deliberate disturbance of a bat; Damage or destruction of a bat roost; To possess, control, transport, sell or exchange, or to offer for sale or exchange, any live or dead bat or part of a bat, or anything derived from a bat or any part of a bat. **Notes** In this interpretation, a bat roost is "*a breeding site or resting place of a bat*". Because bats tend to reuse the same roosts, bat roosts are considered to be protected whether or not the bats are present at the time. In this interpretation, disturbance of animals includes *in particular* any disturbance which is likely – (a) to impair their ability: to survive, to breed or reproduce, or to rear or nurture their young, or in the case of animals of a hibernating or migratory species, to hibernate or migrate; or

Subject	Legislation (England)	Relevant criminal offences
		(b) to affect significantly the local distribution or abundance of the species to which they belong.
	Wildlife and Countryside Act 1981 (as amended) All bat species are listed on Schedule 5 and are therefore subject to parts of the provisions of Section 9 (Sections 9(4)(b) and (c) and Section 9(5)).	Intentional or reckless disturbance of a bat while it is occupying a roost; Intentional or reckless obstruction of access to a roost; To sell, expose for sale, possess or transport for the purpose of sale, any live or dead bat or any part of, or anything derived from a bat; or Publishing or causing to be published any advertisement likely to be understood as conveying that an individual buys or sells, or has an intention to buy or sell bats. In this interpretation, a bat roost is "*any structure or place which any wild [bat]...uses for shelter or protection*". Because bats tend to reuse the same roosts, bat roosts are considered to be protected whether or not the bats are present at the time.

The Wildlife & Countryside Act 1981 (as amended)

Full legislation text available at: http://www.legislation.gov.uk/ukpga/1981/69

Conservation of Habitats and Species Regulations 2017 (as amended)

Full legislation text available at: http://www.legislation.gov.uk/uksi/2017/1012/contents/made

Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006

Full legislation text available at: http://www.legislation.gov.uk/ukpga/2006/16/contents

Several bat species are listed as Species of Principal Importance for the purpose of conserving biodiversity under Section 41 of the NERC Act 2006.

The NERC Act 2006 places a legal obligation on public bodies, including those considering planning applications, to maintain, and where possible enhance, the conservation status of any Section 41 species found on a site. Species included on Section 41 were also included on the UK Biodiversity Action Plan (BAP) and remain an integral part of the Post-2010 Biodiversity Framework.

These species are:

Barbastelle *Barbastella barbastellus*;
Bechstein's bat *Myotis bechsteinii*;
Brown long-eared bat *Plecotus auritus*;
Greater horseshoe bat *Rhinolophus ferrumequinum*;
Lesser horseshoe bat *Rhinolophus hipposideros*;
Noctule *Nyctalus noctula*; and
Soprano pipistrelle *Pipistrellus pygmaeus*.

National Planning Policy Framework (NPPF)

Full text is available at: https://www.gov.uk/guidance/national-planning-policy-framework

A revised NPPF was published on 05 September 2023 setting out the Government's planning policies for England and the process by which these should be applied. The policies within the NPPF are a material consideration in the planning process. The key principle of the NPPF is a presumption in favour of sustainable development, with sustainable development defined as a balance between economic, social and environmental needs.

Policies 174 to 188 of the NPPF address conserving and enhancing the natural environment, stating that the planning system should:

Contribute to and enhance the natural and local environment by protecting and enhancing valued landscapes;
Recognise the wider benefits of ecosystem services; and
Minimise impacts on biodiversity and provide net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity.

Furthermore, there is a focus on re-use of existing brownfield sites or sites of low environmental value as a priority, and discouraging development in National Parks, Sites of Specific Scientific Interest, the Broads or Areas of Outstanding Natural Beauty other than in exceptional circumstances.

Where possible, planning policies should also

"promote the conservation, restoration and enhancement of priority habitats, ecological networks and the protection and recovery of priority species; and identify and pursue opportunities for securing measurable net gains for biodiversity".

8.1. Appendix 2: Bat box recommendations

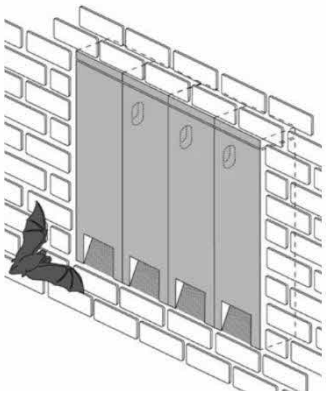
Bat box recommendations

A wide range of bat boxes are available to suit a variety of species and design requirements. Bat boxes can be mounted externally on buildings, built directly into the wall structure or mounted on trees (dependent on box design).

Boxes are more likely to be inhabited if they are located where bats feed and it may help to place the box close to features such as tree lines or hedgerows, which bats are known to use for navigation and can provide immediate cover for bats leaving the roost. Boxes should be placed in areas sheltered from strong winds and are exposed to the sun for part of the day. Access to any bat roosting features should not be lit and should also be at a reasonable height to avoid predation (at least 2m if possible, preferably 4-5m).

Example	Description	Picture
Schwegler General Purpose Bat Box 2F	www.schwegler-nature.com Height: 33 cm Weight: approx. 3.8 kg External diameter: 16 cm Installation: Hanging A general purpose box, suitable for all species.	
Schwegler General Purpose Bat Box 2F with Double Front Panel	www.schwegler-nature.com Height 33 cm Weight: approx. 4.1 kg External diameter: 16 cm Installation: Hanging This box is suitable for crevice dwellers, such as Nathusius´ pipistrelle, Daubenton`s bat and common pipistrelle.	

Example	Description	Picture
Schwegler 1FF	www.schwegler-nature.com Dimensions: 14(d) x 27(w) x 43(h) cm Weight: 9.9 kg Installation: Hanging This box is suitable for crevice dwellers, such as Nathusius´ pipistrelle, Daubenton`s bat and common pipistrelle. This box minimises temperature fluctuations in spring and autumn and is self-cleaning.	
Schwegler 1FQ	www.schwegler-nature.com Dimensions: 60(h) x 35(w) x 9(d) cm Weight: 15.8kg Installation: Attached to most external brick, timber or concrete walls at least 3m high. Can also be placed inside roof space This box is ideal for all types of bats that inhabit buildings. The box is weather-resistant and is also temperature controlled and self-cleaning. The front panel of the box can also be painted during manufacture, to match an existing colour.	
Brick Box Type 27	www.schwegler-nature.com Dimensions: 26.5(h) x 18(w) x 24(d) cm Weight: 9.5kg Installation: Can be flush with outside wall and rendered or covered so only the entrance hole is visible. This box is ideal for all types of bats that inhabit buildings.	

Example	Description	Picture
2FR Schwegler Bat Tube	www.schwegler-nature.com Dimensions: 47(h) x 20(w) x 12.5(d) Weight: 9.8kg Installation: Can be installed on external walls – either flush or beneath a rendered surface in concrete and, during renovation work, under wooden panelling or in building cavities. Several tubes should be installed together (recommended three). This box is ideal for all types of bats that inhabit buildings. By installing boxes side by side a colony roosts can be created with any size requirement. This box has three different environmental partitions inside, attracting different species. The box is self-cleaning.	 
1WI Schwegler Summer and Winter Bat Box	www.schwegler-nature.com Dimensions: 55(h) x 35(w) x 9.5(d) cm Weight: 15kg Installation: Attached to most types of external brick, timber or concrete walls. It can be installed flush-mounted and rendered over or simply against the wall. It should be installed at a height of at least 3m. This box typically attracts building-inhabiting bat species like pipistrelles or serotine bat. This box is weather-resistant and designed for both winter hibernation and larger colonies in summer, including nursery roosts.	

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