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2024

Bat Survey Report for a Proposed Housing Development



**Craddockstown,
Naas,
Co.Kildare**



ASH Ecology & Environmental

Bat Survey & Report for a Proposed Housing Development - Craddockstown, Naas, Co. Kildare

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1. INTRODUCTION

1.1 Purpose of the Report

Ash Ecology and Environmental Ltd (AEE) was commissioned to carry out a Bat Survey with Report on behalf of Verdé Environmental Consultants for their client Kildare County Council (KCC) for the construction of 28 social housing units and associated site works at Craddockstown, Naas, Co. Kildare as shown in Figures 1 and 2.

The site does not contain any buildings that require demolition; however, the proposed development will impact mature treelines with hedgerows. To thoroughly assess the ecological value of the site and ensure compliance with best practice guidelines, two separate bat activity surveys were conducted in June and July 2024. Additionally, the trees and hedgerows identified for removal or felling to accommodate the development footprint were evaluated for their potential to support bat roosts. This evaluation was carried out to determine if pre-felling bat surveys would be necessary to minimise any potential impacts on roosting bats. The proposed development layout is shown as Figure 3.

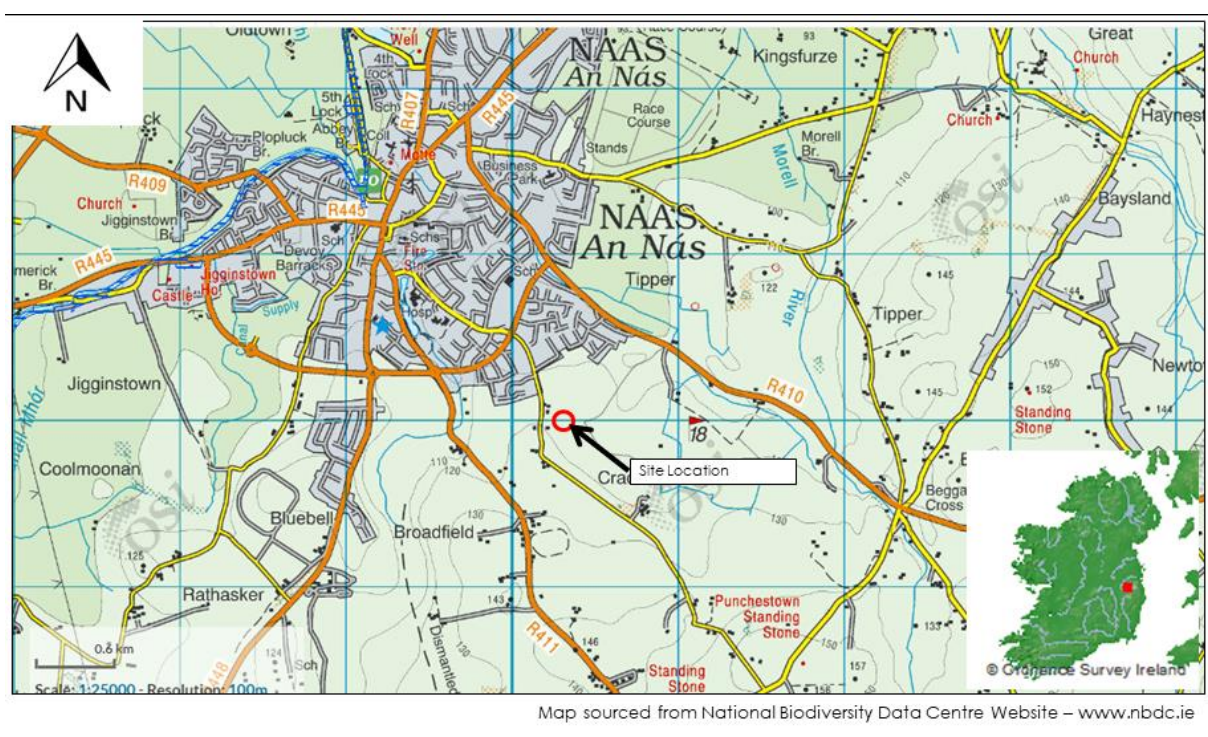


Figure 1 Site Location Map



Figure 2 Aerial Photo of Site showing existing layout and surrounding landscape



Figure 3 Proposed Site Layout

1.2 Competency of Assessor

This report has been prepared by Ash Ecology & Environmental Ltd (AEE) whose managing director and leading ecologist is Aisling Walsh who is a full member of the Chartered Institute of Ecological & Environmental Management (CIEEM) while the company, AEE, is a Registered Practice by the CIEEM.

Aisling's qualifications include M.Sc. (Dist) in Biodiversity and Conservation (TCD) and B.Sc. (Hons) Zoology (NUIG), a Diploma in Applied Aquatic Science (GMIT) and a Certificate in Applied Biology (GMIT).

Aisling is a licenced bat ecologist (example of recent: DER/BAT 2020 – 46 EUROPEAN, DER/BAT 2020 – 48 EUROPEAN, DER/BAT 2021 – 89 EUROPEAN, DER/BAT 2022 – 12 EUROPEAN, DER/BAT 2023 – 23 EUROPEAN, DER/BAT 2023 – 106 EUROPEAN, DER/BAT 2023 – 135 EUROPEAN, DER/BAT 2024 - 25 EUROPEAN, DER/BAT 2024 - 130 EUROPEAN) and a member of Bat Conservation Ireland and associate member of the Institute of Lighting Professionals (ILP). In addition she has completed several bat courses to continue her training and CPD e.g. a Lantra-accredited course, developed by the Bat Conservation Trust and supported by the Arboricultural Association to access bat tree roost features and a course in 'Understanding Obtrusive Light' accredited by the Institute of Lighting Professionals. Over the past 17 years Aisling has completed 100s of bat surveys providing her with more than adequate experience in the profession.

1.3 Bat Legislation

All bat species are protected under the Wildlife Act 1976 to 2021 which make it an offence to wilfully interfere with or destroy the breeding or resting place of these species; however, the Acts permit limited exemptions for certain kinds of situations.

Section 23 of the Wildlife Act 1976 to 2021 contains several exemptions to the protection given to the species listed for protection on Schedule 5 (e.g. for agriculture or construction). In 2005 a further amendment through the European Communities (Natural Habitats) (Amendment) Regulations 2005 (S.I. No. 378 of 2005) removed all of the exemptions provided in Section 23(7) of the Wildlife Act 1976 to 2021 insofar as they relate to Annex IV species, including all species of bats. Those 2005 Regulations were revoked in 2011 except for Regulation 2 which brings about this strengthened protection for bats (and other Annex IV species). All species of bats in Ireland are listed on Schedule 5 of the 1976 Act, and are therefore subject to the provisions of Section 23, which make it an offence to:

- Intentionally kill, injure or take a bat;
- Wilfully interfere with the breeding or resting place of a bat

The Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora ("the Habitats Directive") seeks to protect rare and vulnerable species, including all species of bats, and their habitats and requires that appropriate monitoring of populations be undertaken. All species of bat found in Ireland are listed on Annex IV of the Directive. Member States are required to put in place a system of strict protection (as outlined in Article 12) for species listed on Annex IV ('European protected species'). The lesser horseshoe bat is further protected under

Annex II. This Annex relates to the designation of Special Areas of Conservation (SACs). The Habitats Directive is transposed into Irish law by the European Communities (Birds & Natural Habitats Regulations) 2011 (S.I. No. 477 of 2011) ("the Habitats Regulations"). Under the Habitats Regulations (2011), all bat species are listed on the First Schedule and Regulation 51 makes it an offence to:

- Deliberately capture or kill a bat;
- Deliberately disturb a bat particularly during the period of breeding, hibernating or migrating;
- Damage or destroy a breeding site or resting place of a bat;
- Keep, sell, transport, exchange, offer for sale or offer for exchange any bat taken in the wild.

Across Europe, bats are further protected under the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention 1982), which, in relation to bats, exists to conserve all species and their habitats. The Convention on the Conservation of Migratory Species of Wild Animals (CMS, Bonn Convention 1979) was instigated to protect migrant species across all European boundaries. EUROBATS (a daughter Agreement under CMS) is of particular relevance in relation to cooperation across international borders for the conservation of bats, many of which are known to migrate long distances. The Irish government has ratified both of these conventions as well as the EUROBATS Agreement.

1.4 Derogation licences

It is an offence, under Regulation 51 of the European Communities (Birds and Natural Habitats) Regulations, 2011 ('the 2011 Regulations') to:

- a) Deliberately capture or kill a bat in the wild;
- b) Deliberately disturb a bat particularly during the period of breeding, rearing, hibernation and migration;
- c) Damage or destroy a bat's breeding site or resting place, or;
- d) Keep, transport, sell, exchange, offer for sale or offer for exchange any bat taken in the wild, other than those taken legally before the Habitats Directive before the Habitats Directive was implemented.

A person may apply to the Minister under Regulation 54 of the 2011 Regulations for a derogation licence to carry out one or more of these prohibited activities. But, the Minister may only grant such a derogation licence if three criteria are met.

Firstly the Minister may only grant a derogation licence if it is for one of the following specified reasons listed in Regulation 54:

- a) In the interests of protecting wild fauna and flora and conserving natural habitats;
- b) To prevent serious damage, in particular to crops, livestock, forests, fisheries and water and other types of property;
- c) In the interests of public health and public safety, or for other imperative reasons of overriding public interest, including those of a social or economic

- nature and the beneficial consequences of primary importance for the environment;
- d) For the purpose of research and education, of repopulating and introducing these species and for the breeding operations necessary for these purposes, including the artificial propagation of plants, or;
 - e) To allow, under strictly supervised conditions, on a selective basis and to a limited extent, the taking or keeping of bats.

Secondly, the Minister may only issue a derogation if there is no alternative to carrying out the prohibited activity. The first aim of the developer, whether from a private company or a public authority, working with professional advice, should be to entirely avoid any potential impact of a proposed development on bats and their breeding and resting places. Alternatives may involve redesigning a development so that bat roosts, and associated commuting routes and feeding areas are kept intact and that bats are not disturbed, for example by inappropriate lighting. It should be noted that the European Commission has a specific understanding of satisfactory alternative solution. "An alternative solution cannot be deemed unsatisfactory merely because it would cause greater inconvenience or compel a change in behaviour" (European Commission, 2021, page 13)¹. Decisions about what solution is satisfactory must be science-based and should solve the problem of how to strictly protect the bats in light of the development.

Thirdly the Minister may only grant a derogation if it is not detrimental to the maintenance of the populations of bats at a favourable conservation status (FCS) in their natural range. There is case law from the Court of Justice of the European Union (CJEU) to back this up. One example is the Finnish Wolf Case C-674/17. The ruling establishes that the Member State must "clearly and precisely" identify in the derogation what the objectives of the derogation are. It must also establish that the derogation is capable of achieving those objectives and demonstrate that there is no satisfactory alternative. Cumulative effects of derogations must be taken into account when issuing derogations. The maximum number of all derogations must not be detrimental to the maintenance or restoration of the population at FCS. Consideration must be given to other human causes of mortality. Any risk to FCS must be ruled out by detailed conditions based on the level of population, its conservation status and its biological characteristics. The conditions must be precisely defined and they must be monitored to ensure they are implemented.

If any of these three criteria are not satisfied, the Minister cannot issue a derogation licence. It must never be assumed that a derogation licence will automatically be granted.

In summary, it is clear that a developer must first look to avoid all impacts on bats. This may mean looking at alternative solutions and redesigning the project accordingly. If this is not possible, the developer needs to check whether there are grounds to apply for a derogation licence, based on the reasons given in Regulation 54 of the Habitats Regulations. When applying for a derogation licence the developer must clearly state the reason and describe in detail all alternative solutions which were given serious

¹ <https://op.europa.eu/en/publication-detail/-/publication/bbc7ace0-27e2-11ec-bd8e-01aa75ed71a1/language-en>

consideration. Any mitigation intended to ensure that there is no impact or minimal impact on the bats must be clearly described in detail, giving examples of how it worked in other places.

If a derogation licence has been refused by the Minister, any aspect of the development for which the derogation licence was sought, must not go ahead, no matter what other permissions are in place.

A derogation licence is required when on the basis of survey information and specialist knowledge, it appears that:

- The site in question is a breeding site or resting place for bats and/or;
- The proposed activity could impact on a breeding site or resting place of a bat.

No licence is required if the proposed activity is unlikely to result in an offence. The advice given in this document (and see also Mullen et al. 2021)² should assist the proponent, or those acting on their behalf, in arriving at a decision on this matter, though it must be recognised that determining whether a particular site is used as a breeding or resting place can be problematic for such mobile animals as bats.

Determining whether an activity undertaken near to a roost might impact on that roost (e.g. by removing important flight lines or foraging areas) will also require specialist assessment. Note that if the proposed activity can be timed, organised and carried out so as to avoid committing an offence then no licence is required.

Examples of works that are likely to need a licence because they may result in the destruction of a breeding or resting place and/or disturbance of bats include:

- Demolition of buildings known to be used by bats;
- Conversion of barns or other buildings known to be used by bats;
- Restoration of ruined or derelict buildings;
- Maintenance and preservation of heritage buildings;
- Introduction of artificial lighting inside a roost or near a roost entrance;
- Change of use of buildings resulting in increased ongoing disturbance;
- Removal of trees known to be used by bats;
- Significant alterations to roof voids known to be used by bats.

Examples of works that, if carefully planned, may not need a licence include:

- Works near to or at roosts (e.g. re-roofing) if carried out while bats are not present and the access points and roosting area are not affected;
- Remedial timber treatment, carried out with the correct (non-toxic to bats) chemicals while bats are not present.

² Mullen, E., Marnell, F & Nelson, B. (2021) Strict protection of animal species. Guidance for public authorities on the application of Articles 12 and 16 of the EU Habitats Directive to development/works undertaken by or on behalf of a public authority. Unpublished Report, National Parks and Wildlife Service. Department of Housing, Local Government and Heritage, Dublin. <https://npws.ie/sites/default/files/files/article-12-guidance-final.pdf>

2. METHODOLOGY

2.1 Information Sources

A desk-based review of information sources was completed. Information contained on the websites of the National Parks and Wildlife Service (NPWS)³ and the National Biodiversity Data Centre (NBDC)⁴ was reviewed. The following publications and websites were also reviewed and consulted:

Bat Guidance

- Bat Conservation Trust (2023) Bat Surveys for Professional Ecologists: Good Practice Guidelines 4th edition
- Reason, P.F. and Wray, S. (2023). UK Bat Mitigation Guidelines: a guide to impact assessment, mitigation and compensation for developments affecting bats. Chartered Institute of Ecology and Environmental Management (CIEEM), Ampfield.
- Marnell, F., Kelleher, C. & Mullen, E. (2022) Bat mitigation guidelines for Ireland v2. Irish Wildlife Manuals, No. 134. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland.
- Mullen, E., Marnell, F & Nelson, B. (2021) Strict protection of animal species. Guidance for public authorities on the application of Articles 12 and 16 of the EU Habitats Directive to development/works undertaken by or on behalf of a public authority. Unpublished Report, National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Dublin.
<https://npws.ie/sites/default/files/files/article-12-guidance-final.pdf>
- Bat Conservation Ireland <https://www.batconservationireland.org/>
- Bat Roosts in Trees: A Guide to Identification and Assessment for Tree-Care and Ecology Professionals (2018)
- Bat Conservation Trust (2018) Bats and artificial lighting in the UK Bats and the Built Environment series⁵
- Mitchell-Jones, A.J, & McLeish, A.P. (eds). 2004., 3rd Edition Bat Workers' Manual, JNCC, Peterborough, ISBN 1 86107 558 8
- Bat Conservation Ireland (2012) Bats and Appropriate Assessment Guidelines, Version 1, December 2012. Bat Conservation Ireland, www.batconservationireland.org⁶
- Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes (National Roads Authority, 2005).
- Guidelines for the Treatment of Bats during the Construction of National Road Schemes (National Roads Authority, 2005).
- McAney, K & Hanniffy, R (2015) The Vincent Wildlife Trust's Irish bat box schemes
- Bat Conservation Ireland <https://www.batconservationireland.org/>
- Andrews H & Gardener M (2016) Bat Tree Habitat Key – Database Report 2016. AEcol, Bridgwater.

³ The National Parks and Wildlife Services map viewer <http://webgis.npws.ie/npwsviewer/>

⁴ The National Biodiversity Data Centre www.NBDC.ie

⁵ <https://www.theilp.org.uk/documents/guidance-note-8-bats-and-artificial-lighting/>

⁶ https://www.batconservationireland.org/wp-content/uploads/2013/09/BCIreland-AA-Guidelines_Version1.pdf

- Aughney, T., Kelleher, C. & Mullen, D. (2008) Bat Survey Guidelines: Traditional Farm Buildings Scheme. The Heritage Council, Áras na hOidhreachta, Church Lane, Kilkenny.
- IPL and BCT (2023) Guidance Note GN08/23 Bats and Artificial Lighting At Night

2.2 Desk Study

2.2.1 Species Background

Ireland had ten known bat species until February 2013, when a single live greater horseshoe bat (*Rhinolophus ferrumequinum*) was found roosting in Co. Wexford⁷. On 8th June 2020, a single audio recording was confirmed in the Glendaough area, Co. Wicklow. It was found on two more occasions in the same area in early July 2020 (Bat Conservation Ireland, July 2020).

The ten species (excluding the greater horseshoe) are briefly described overleaf. For a more comprehensive overview see McAney, 2006.⁸

The dependence of Irish bat species on insect prey has left them vulnerable to habitat destruction, land drainage, agricultural intensification and increase use of pesticides. Also, their reliance on buildings as roosting sites has made them particularly vulnerable to renovation works and the use of timber chemical treatment. Buildings are highly important as roosting sites for bats and all Irish bat species use buildings for all roost types. Most significant in terms of roosts in houses are maternity roosts, but cellars and even attics may serve as hibernation sites for bats. Roosts within buildings can far exceed the numbers encountered in trees, bridges, caves or cliffs and roosts of over 1,000 bats have been recorded in buildings.⁹

2.2.1.1 Family Vespertilionidae:

Common pipistrelle *Pipistrellus pipistrellus*

This species was only recently separated from its sibling, the soprano or brown pipistrelle *P. pygmaeus*¹⁰, which is detailed below. The common pipistrelle's echolocation calls peak at 45 kHz. The species forages along linear landscape features such as hedgerows and treelines as well as within woodland.

Soprano pipistrelle *Pipistrellus pygmaeus*

The soprano pipistrelle's echolocation calls peak at 55 kHz, which distinguishes it readily from the common pipistrelle on detector. The pipistrelles are the smallest and most often seen of our bats, flying at head height and taking small prey such as midges and small moths. Summer roost sites are usually in buildings, but tree holes and heavy ivy are also used. Roost numbers can exceed 1,500 animals in mid-summer.

⁷ National Biodiversity Data Centre <http://www.biodiversityireland.ie/new-bat-species-found-in-ireland/>

⁸ McAney, K. (2006) *A Conservation Plan for Irish Vesper Bats*. Irish Wildlife Manual No.20. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government.

⁹ NRA (2005) Guidelines for the Treatment of Bats Prior to the Construction of National Road Schemes. National Roads Authority, Dublin

¹⁰ Barratt, E. M., Deauville, R., Burland, T. M., Bruford, M. W., Jones, G., Racey, P. A., & Wayne, R. K. (1997) *DNA Answers the Call of Pipistrelle Bat Species*. *Nature* 387: 138 - 139.

Nathusius' pipistrelle *Pipistrellus nathusii*

Nathusius' pipistrelle is a recent addition to the Irish fauna and has mainly been recorded from the north-east of the island in Counties Antrim and Down¹¹ and also in Fermanagh, Longford and Cavan. It has also recently been recorded in Counties Cork and Kerry.¹² However, the known resident population is enhanced in the autumn months by an influx of animals from Scandinavian countries. The status of the species has not yet been determined.

Leisler's bat *Nyctalus leisleri*

This species is Ireland's largest bat, with a wingspan of up to 320mm; it is also the third most common bat, preferring to roost in buildings, although it is sometimes found in trees and bat boxes. It is the earliest bat to emerge in the evening, flying fast and high with occasional steep dives to ground level, feeding on moths, caddisflies and beetles. The echolocation calls are sometimes audible to the human ear being around 15 kHz at their lowest. The audible chatter from their roost on hot summer days is sometimes an aid to location. This species is uncommon in Europe and as Ireland holds the largest national population the species is considered as Near Threatened here.

Brown long-eared bat *Plecotus auritus*

This species of bat is a 'gleaner', hunting amongst the foliage of trees and shrubs, and hovering briefly to pick a moth or spider off a leaf, which it then takes to a sheltered perch to consume. They often land on the ground to capture their prey. Using its nose to emit its echolocation, the long-eared bat 'whispers' its calls so that the insects, upon which it preys, cannot hear its approach (and hence, it needs oversize ears to hear the returning echoes). As this is a whispering species, it is extremely difficult to monitor in the field as it is seldom heard on a bat detector. Furthermore, keeping within the foliage, as it does, it is easily overlooked. It prefers to roost in old buildings.

Natterer's bat *Myotis nattereri*

This species has a slow to medium flight, usually over trees but sometimes over water. It usually follows hedges and treelines to its feeding sites, consuming flies, moths, caddisflies and spiders. Known roosts are usually in old stone buildings but they have been found in trees and bat boxes. The Natterer's bat is one of our least studied species and further work is required to establish its status in Ireland.

Daubenton's bat *Myotis daubentonii*

This bat species feeds close to the surface of water, either over rivers, canals, ponds, lakes or reservoirs but it can also be found foraging in woodlands. Flying at 15 kilometres per hour, it gaffs insects with its over-sized feet as they emerge from the surface of the water - feeding on caddis flies, moths, mosquitoes, midges etc. It is often found roosting beneath bridges or in tunnels and also makes use of hollows in trees.

Whiskered bat *Myotis mystacinus*

This species, although widely distributed, has been rarely recorded in Ireland. It is often found in woodland, frequently near water. Flying high, near the canopy, it maintains

¹¹ Richardson, P. (2000) *Distribution Atlas of Bats in Britain and Ireland 1980 - 1999*. The Bat Conservation Trust, London, England.

¹² Kelleher, C. (2005) *International Bat Fieldcraft Workshop, Killarney, Co. Kerry*. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government.

a steady beat and sometimes glides as it hunts. It also gleans spiders from the foliage of trees. Whiskered bats prefer to roost in buildings, under slates, lead flashing or exposed beneath the ridge beam within attics. However, they also use cracks and holes in trees and sometimes bat boxes. The whiskered bat is one of our least studied species and further work is required to establish its status in Ireland.

Brandt's bat *Myotis brandtii*

This species is known from five specimens found in Counties Wicklow (Mullen, 2007), Cavan, and Clare in 2003, a specimen in Kerry in 2005¹³ and another in Tipperary in 2006.¹⁴ No maternity roosts have yet been found. It is very similar to the whiskered bat and cannot be separated by the use of detectors. Its habits are similar to its sibling.

2.2.1.2 Family Rhinolophidae:

Lesser horseshoe bat *Rhinolophus hipposideros*

This species is the only representative of the Rhinolophidae or horseshoe bat family in Ireland. It differs from our other species in both habits and looks, having a unique nose leaf with which it projects its echolocation calls. It is also quite small and, at rest, wraps its wings around its body. Lesser horseshoe bats feed close to the ground, gleaning their prey from branches and stones. It often carries its prey to a perch to consume, leaving the remains beneath as an indication of its presence.

The echolocation call of this species is of constant frequency and, on a heterodyne bat detector, sounds like a melodious warble. The species is confined to six counties along the Atlantic seaboard: Mayo, Galway, Clare, Limerick, Kerry and Cork. The current Irish national population is estimated at 12,500 animals. This species is listed on Annex II of the EC Habitats Directive and 41 Special Areas of Conservation have been designated in Ireland for its protection. Where it occurs, it is often found roosting within farm buildings.

¹³ Kelleher, C. 2006a Nathusius pipistrelle *Pipistrellus nathusii* and Brandt's Bat *Myotis brandtii* - New Bat Species to Co. Kerry – Irish Naturalists' Journal 28: 258.

¹⁴ Kelleher, C. 2006b Brandt's Bat *Myotis brandtii*, New Bat Species to Co. Tipperary. Irish Naturalists' Journal 28: 345.

2.2.2 Previous Records & Landscape Suitability

The National Biodiversity Data Centre (NBDC) maps landscape suitability bats based on Lundy *et al.* (2011). The maps are a visualisation of the results of the analyses based on a 'habitat suitability' index. The index ranges from 0 to 100 with 0 being least favourable and 100 most favourable for bats. On average, for all bat species, the highest range is between 36.44 - 58.56. The overall assessment of bat habitats for the current study area is 31.22 – High (author's interpretation of NBDC scoring)¹⁵. Table 1 gives the suitability of the study area for the bat species found in the study area (based on NBDC) along with their Irish Red List Status (from Marnell *et al.*, 2019).¹⁶

Four species of bat have previously been recorded in the 10km² grid square N91 (data accessed 14/06/2024):

- Brown Long-eared Bat (*Plecotus auritus*)
- Daubenton's Bat (*Myotis daubentonii*)
- Leisler's Noctule (*Nyctalus leisleri*)
- Pipistrelle (*Pipistrellus pipistrellus sensu lato*)
- Soprano Pipistrelle (*Pipistrellus pygmaeus*)
- Whiskered Bat (*Myotis mystacinus*)

Table 1 Suitability of the study area for the bat species found in the Naas area (based on the NBDC data) with Irish Red list status indicated

Common name	Scientific name	Suitability index	Irish red list status
All bats	-	31.22	Least Concern
Soprano pipistrelle	<i>Pipistrellus pygmaeus</i>	41	Least Concern
Brown long-eared bat	<i>Plecotus auritus</i>	42	Least Concern
Common pipistrelle	<i>Pipistrellus pipistrellus</i>	50	Least Concern
Lesser-horseshoe bat	<i>Rhinolophus hipposideros</i>	0	Least Concern
Leisler's bat	<i>Nyctalus leisleri</i>	47	Least Concern
Whiskered bat	<i>Myotis mystacinus</i>	19	Least Concern
Daubenton's bat	<i>Myotis daubentonii</i>	30	Least Concern
Nathusius' pipistrelle	<i>Pipistrellus nathusii</i>	19	Least Concern
Natterer's bat	<i>Myotis nattereri</i>	33	Least Concern

2.2.3 Bat Roosts

Bats were originally cave and tree dwelling animals but many now find buildings just as suitable for their needs. Bats are social animals and most species congregate in large colonies during summer. These colonies consist mostly of females of every reproductive class, with some juvenile males from the previous year. Male bats

¹⁵ 0.00 - 13.0 – Very Low
13.0 - 21.3 - Low
21.3 - 28.1 – Moderate
28.1 - 36.4 – High
36.4 - 58.5 – Very High

¹⁶ Marnell, F., Looney, D. & Lawton, C. (2019) Ireland Red List No. 12: Terrestrial Mammals. National Parks and Wildlife Service, Department of the Culture, Heritage and the Gaeltacht, Dublin, Ireland.

normally roost individually or in small groups meeting up with the females in the late autumn-early winter, when it is time to mate. In summer, bats seek warm dry buildings in which they can give birth and suckle their young. In winter, they seek out places with a constant low temperature and high humidity where they can become torpid and hibernate during adverse weather conditions. However, bats do not hibernate continuously during winter and will awake and hunt during mild nights when there are insects available, and it is energetically advantageous to forage.

2.2.3.1 Maternity Roosts

Maternity roosts are the most significant roosts and they are predominantly all-female aggregations that are formed from late May onwards and remain as a relatively cohesive unit until mid to late August. Not all female bats give birth annually. These females that do bear young in a given year avail of a suitable building, tree and sometimes cave (or equivalent). The young are flightless for several weeks and hence are vulnerable to dangers such as tree felling and restoration, reinforcement or demolition of structures such as buildings and bridges.

2.2.3.2 Mating Roosts

Most bat species mate in autumn but pregnancy does not occur until the following spring. During this time males will take possession of a cavity in a building, tree, bridge, cave or mine and attract females to these sites to establish a harem. Male bats call both from a perch and in flight in much the same manner that male birds sing.

2.2.3.3 Hibernation Roosts

Bats have a high metabolic rate and in temperate countries, such as Ireland, flying insects are not available in sufficient numbers during winter to sustain bats. Therefore, bats hibernate during winter. In hibernation sites, bats are often completely inactive for several days and are extremely vulnerable to disturbance by human activities due to the time taken for them to become sufficiently active to allow escape. Hibernation may extend from November to the end of March, during which time bat activity will take place sporadically.

2.2.3.4 Night Roosts

These are roosts which are used as resting places for bats between foraging bouts. They also provide retreats for bats from predators or during inclement weather conditions. They also function as feeding perches and may be important for socialising.

2.3 Bat Activity Survey Methodology

A total of two bat activity surveys were completed June 12th and July 6th 2024 which is within acceptable guidelines for general activity surveys typically recommended between April-October as per BCT Guidelines 2023, see Table 2. The surveys followed the BCT Guidelines 2023 and involved monitoring the area by walking the site and detecting activity and noting if affected trees have bat roost potential.

Weather conditions were optimal during both surveys (June 12-14°C, July 13-15°C, both during calm, dry conditions,). Surveys in 2024 were completed by two trained bat surveyors, commencing a half hour before sunset to detect early flying bats such as Leisler's Bat, and were completed 1.5 hours after sunset. Sunset for both surveys was 21.54. Surveys were therefore between 21.24 and 23.24.

General Site photos and photos of trees with Moderate-High Bat roost assessment are contained in Appendix A.

The equipment used for the bat activity surveys included 2 x Elekon Bat Logger M detectors. Visual observations were taken with the aid of a powerful L.E.D. torch (AP Pros-Series 220 Lumens High Performance Spotlight) and Celestron 12x56 Prism Binoculars. Bat activity was plotted on a map using GPS coordinates. The surveyors were located in opposite sides of the site and had with results combined for the activity maps. Limitations included access to the trunks of the trees due to thick areas of scrub in the foreground and therefore the tree assessment for bat roost potential was undertaken using authors experience with a visual assessment. Tree climbing was not completed, and due to the number of trees present, bat emergence from trees with bat potential may be missed. Bat activity, along with the visual assessment for bat roost features is therefore used as a proxy for roost likelihood which informs the recommendations, see Section 4. Higher levels of activity can also indicate tree roosts along with early emergence/detection times.

The 2023 BCT guidelines were followed for the assessment rating¹⁷ and classification which is shown as Table 3.

¹⁷ Bat Surveys for Professional Ecologists, Good Practice Guidelines (2016)

Table 2 Recommended Survey Times for Survey Types described in Table 2.2. of the BCT 2023 Guidelines.

Survey type	Month											
	J	F	M	A	M	J	J	A	S	O	N	D
Daytime Bat Walkover (DBW)												
PRA – structures												
Emergence survey for maternity or summer roosts ^b												
Emergence survey for transitional/occasional roosts ^b												
Re-entry surveys ^c												
Emergence survey for mating roosts ^b												
Hibernation survey – structures ^a												
GLTA ^d												
PRF inspection survey – trees												
Ground-level bat activity survey – night-time walkover surveys and automated/static												
Pre-, during and post-hibernation – automated/static bat activity survey												
Swarming survey ^e												
Back-tracking survey												
Trapping and radio-tagging survey ^f												

= optimal period
 = sub-optimal period
 = weather or location dependent (i.e. may not be suitable due to spring and autumn conditions in any one year or in more northerly latitudes). Note that October emergence surveys are not acceptable in Scotland.
 = it is not acceptable to trap bats when they are heavily pregnant and have dependent pups. Mothers need to optimise foraging due to the physiological demands of pregnancy and lactation, and pups need to be regularly fed. Interrupting these activities could potentially have an impact on breeding success in the year in question. The timing of birth can vary between years – it may be as early as the end of May or as late as the start of August, therefore caution should be exercised and local information gained on birth dates before trapping activities are carried out during the summer months. Any information gained and decisions made should be kept as a record.

a Not including trees.
b Please see Chapter 7 for recommended timings for surveys to give confidence in a negative result. For sites assessed as having low suitability, a survey should be carried out between May and August. For sites with moderate and high suitability, a proportion of the surveys should be carried out between May and August (to detect maternity roosts if present) but some of the surveys may be carried out later in the year in order to detect transitional and mating roosts. The survey season for presence/likely absence surveys is defined as May to September. Roost characterisation surveys may be appropriate in April and/or October depending on the need to characterise transitional/occasional roosts at these times.
c The time that bats return to their roosts is very variable and therefore re-entry surveys are no longer recommended as a standard approach. If they are carried out the constraints should be recognised.
d GLTAs can be sub-optimal in the spring, summer and autumn due to foliage obscuring parts of the tree. If all parts of the tree are visible then the survey can be carried out at any time. If parts of the tree are obscured by foliage then it is not possible to carry out a thorough survey and this limitation should be recognised and the impact on the results acknowledged. Please refer to Chapter 6 for more information.
e Different species show a peak in swarming activity at different times, e.g. Daubenton's bat activity tends to peak in August whilst Natterer's bat activity tends to peak in September (Tomlinson, 2020) and therefore surveying across the swarming season is likely to be important.
f Trapping and tagging in cooler conditions can make release of bats difficult, which should be a consideration if trapping is carried out in spring and autumn. Tagging of bats in April and sometimes early May should be avoided following a poor spring, if bats are in poor condition. Tagging of newly volant pups should be avoided. Tagging of bats should be avoided in October due to the risk that bats will enter hibernation with the tag still attached (bats will groom less often as they enter torpor more frequently). If a tag falls off during hibernation this could leave a bald patch if the fur has been clipped, which could have negative impacts for the hibernating bat. Please refer to Chapter 9 for more information.

Table 3 Guidelines for assessing the potential suitability of proposed development sites for bats, based on the presence of roost features within the landscape, to be applied using professional judgement (BCT Guidelines, 2023)

Potential suitability	Description	
	Roosting habitats in structures	Potential flight-paths and foraging habitats
None	No habitat features on site likely to be used by any roosting bats at any time of the year (i.e. a complete absence of crevices/suitable shelter at all ground/underground levels).	No habitat features on site likely to be used by any commuting or foraging bats at any time of the year (i.e. no habitats that provide continuous lines of shade/protection for flight-lines, or generate/shelter insect populations available to foraging bats).
Negligible ^a	No obvious habitat features on site likely to be used by roosting bats; however, a small element of uncertainty remains as bats can use small and apparently unsuitable features on occasion.	No obvious habitat features on site likely to be used as flight-paths or by foraging bats; however, a small element of uncertainty remains in order to account for non-standard bat behavior.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically at any time of the year. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions ^b and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e. unlikely to be suitable for maternity and not a classic cool/stable hibernation site, but could be used by individual hibernating bats ^c).	Habitat that could be used by small numbers of bats as flight-paths such as a gappy hedgerow or unvegetated stream, but isolated, i.e. not very well connected to the surrounding landscape by other habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
Moderate	A structure with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions ^b and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only, such as maternity and hibernation – the categorisation described in this table is made irrespective of species conservation status, which is established after presence is confirmed).	Continuous habitat connected to the wider landscape that could be used by bats for flight-paths such as lines of trees and scrub or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water.

High	A structure 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 ^b and surrounding habitat. These structures have the potential to support high conservation status roosts, e.g. maternity or classic cool/stable hibernation site.	<p>Continuous, high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by bats for flight-paths such as river valleys, streams, hedgerows, lines of trees and woodland edge.</p> <p>High-quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats such as broadleaved woodland, tree-lined watercourses and grazed parkland.</p> <p>Site is close to and connected to known roosts.</p>
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a Negligible is defined as 'so small or unimportant as to be not worth considering, insignificant'. This category may be used where there are places that a bat could roost or forage (due to one attribute) but it is unlikely that they actually would (due to another attribute).

b For example, in terms of temperature, humidity, height above ground level, light levels or levels of disturbance.

c Evidence from the Netherlands shows mass swarming events of common pipistrelle bats in the autumn followed by mass hibernation in a diverse range of building types in urban environments (Korsten *et al.*, 2016 and Jansen *et al.*, 2022). Common pipistrelle swarming has been observed in the UK (Bell, 2022 and Tomlinson, 2020) and winter hibernation of numbers of this species has been detected at Seaton Delaval Hall in Northumberland (National Trust, 2018). This phenomenon requires some research in the UK, but ecologists should be aware of the potential for larger numbers of this species to be present during the autumn and winter in prominent buildings in the landscape, urban or otherwise.

2.4 Bat Roost Potential Tree Assessment

The trees and hedgerows along the west boundary will be removed for site entrance. The trees and hedgerows along the southwest and southeast boundaries potentially be affected by felling or significant trimming. Some dead trees are present within the treelines to the southwest and southeast and are likely recommended for removal.

Plates of trees with Moderate-High Bat Roost potential along the site boundaries are contained in Appendix A. Trees that may provide a roosting space for bats were classified using the Bat Tree Habitat Key (BTHK, 2018) and the classification system adapted from BCT Guidance (2023). The Potential Roost Features (PRFs) listed in BTHK (2018) were used to determine the PBR value of trees, see Table 3 and 4. Consideration was also given to the classification of trees according to the British Standard BS8956 - Surveying for bats in trees and woodland, see Table 5.

During the survey, the features listed below on the affected trees were sought as they may provide suitable roost sites for bats:

- Natural holes (e.g. knot holes) arising from naturally shed branches or branches previously pruned back to a branch collar.
- Man-made holes (e.g. cavities that have developed from flush cuts or cavities created by branches tearing out from parent stems).
- Cracks/splits in stems or braches (horizontal and vertical).
- Partially detached, loose or bark plates.

- Cankers (caused by localised bark death) in which cavities have developed.
- Other hollows or cavities, including butt rots.
- Compression of forks with included bark, forming potential cavities.
- Crossing stems or branches with suitable roosting space between.
- Ivy stems with diameters in excess of 50mm with suitable roosting space behind (or where roosting space can be seen where a mat of thinner stems has left a gap between the mat and the trunk).
- Bat or bird boxes.
- Other suitable places of rest or shelter.

Certain factors such as orientation of the feature, height from the ground, the direct surroundings and its location in respect to other features may enhance or reduce the potential value.

Table 4 Classification and Survey Requirements for Bats in Trees¹⁸

Classification of Tree	Description of Category and Associated Features (based on Potential Roosting Features listed above)	Likely Further Survey Work / Actions
Confirmed Roost	Evidence of roosting bats in the form of live / dead bats, droppings, urine staining, mammalian fur oil staining, etc.	<p>A National Parks and Wildlife (NPWS) derogation licence application will be required if the tree or roost site is affected by the development or proposed arboricultural works. This will require a combination of aerial assessment by roped access bat workers (where possible, health and safety constraints allowing) and nocturnal survey during appropriate periods (e.g. nocturnal survey - May to August) to inform on the licence.</p> <p>Works to tree undertaken under supervision in accordance with the approved good practice method statement provided within the licence.</p> <p>However, where confirmed roost site(s) are not affected by works, work under a precautionary good practice method statement may be possible.</p>
High Potential Category 1	A tree with one or more Potential Roosting Features that	Aerial assessment by roped access bat workers (if appropriate) and / or nocturnal

¹⁸ Bat Surveys for Professional Ecologists: Good Practice Guidelines (J., Collins (Bat Conservation Trust), 2023).

Classification of Tree	Description of Category and Associated Features (based on Potential Roosting Features listed above)	Likely Further Survey Work / Actions
	<p>are obviously suitable for larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter protection, conditions (height above ground level, light levels, etc) and surrounding habitat. Examples include (but are not limited to); woodpecker holes, larger cavities, hollow trunks, hazard beams, etc.</p>	<p>survey during appropriate period (May to August).</p> <p>Following additional assessments, tree may be upgraded or downgraded based on findings.</p> <p>If roost sites are confirmed and the tree or roost is to be affected by proposals a licence from the NPWS will be required.</p> <p>After completion of survey work (and the presence of a bat roost is discounted), a precautionary working method statement may still be appropriate.</p>
Moderate Potential – Category 2	<p>A tree with Potential Roosting Features which could support one or more potential roost sites due to their size, shelter protection, conditions (height above ground level, light levels, etc) and surrounding habitat but unlikely to support a roost of high conservation status (i.e. larger roost, irrespective of wider conservation status). Examples include (but are not limited to); woodpecker holes, rot cavities, branch socket cavities, etc.</p>	<p>A combination of aerial assessment by roped access bat workers and / or nocturnal survey during appropriate period (May to August).</p> <p>Following additional assessments, tree may be upgraded or downgraded based on findings.</p> <p>After completion of survey work (and the presence of a bat roost is discounted), a precautionary working method statement may still be appropriate.</p> <p>If a roost site/s is confirmed a licence from the NPWS will be required.</p>
Low Potential Category 3	<p>A tree of sufficient size and age to contain Potential Roosting Features but with none seen from ground or features seen only very limited potential. Examples include (but are not</p>	<p>No further survey required but a precautionary working method statement may be appropriate.</p>

Classification of Tree	Description of Category and Associated Features (based on Potential Roosting Features listed above)	Likely Further Survey Work / Actions
	limited to); loose/lifted bark, shallow splits exposed to elements or upward facing holes.	
Negligible/No potential – Category 4	Negligible/no habitat features likely to be used by roosting bats	None.

Table 5 Classification of Trees for Risk of Bat Roost Presence

Tree category and description (following scoping survey)	Secondary (non-specialist) survey recommendations	Secondary (specialist) survey recommendations
Known or confirmed roost	Initially consider if work to tree(s) can be avoided. If not, a specialist bat roost assessment should be undertaken to establish bat species, numbers and the nature of the roost.	
High/medium risk Trees with a suitable potential roost feature, or with several features with some bat roost potential.	<ul style="list-style-type: none"> Secondary (non-specialist) assessment to examine potential roost features previously identified. If roosts cannot reasonably be ruled out a bat specialist should be consulted. Following this assessment the tree could be up-graded or down-graded (see column 1 categories). 	<ul style="list-style-type: none"> Specialist bat roost assessment should be undertaken if work to a tree cannot be avoided. Assessment to include techniques such as endoscope use and dusk/pre-dawn surveys should be undertaken. Following this assessment the tree could be up-graded or down-graded.
Low risk Trees of sufficient size and age to contain bat roosts but with no obvious potential roost features seen during the scoping survey, or features seen with limited roosting potential only, e.g. small amounts of ivy.	No further assessment is required unless sufficient new evidence is found to upgrade the category.	None
Negligible/no risk Trees with apparently no potential to support bats.		
<i>NOTE Risk equates to the likelihood of bat roost presence.</i>		

2.5 Landscape Evaluation

Ecological survey results were evaluated to determine the significance of identified features located in the study area on an importance scale ranging from international-national-county-local (from NRA, 2009) The local scale is approximately equivalent to one 10km square but can be operationally defined to reflect the character of the area of interest. Because most sites will fall within the local scale, this is sub-divided into two categories: local importance (higher value) and local importance (lower value).

3. RESULTS

3.1 Activity Surveys

A comprehensive bat activity survey was conducted on June 12th and July 6th within the study area. The survey aimed to evaluate the overall bat activity levels on the site.

During the two surveys, the site exhibited moderate levels of bat activity, which can be attributed to the optimal weather conditions on the survey nights and the presence of mature treelines and hedgerow along the west, southwest and southeast

boundaries. The surrounding landscape, characterised by woodland pockets, hedgerows, and mature trees, further contributes to the site's suitability for bats, as reflected in the 'High' landscape suitability rating for the area.

The surveyors employed a robust methodology, using two Elekon Bat Logger M detectors to record bat echolocation calls and capture GPS coordinates of each bat pass. The raw dataset was then processed (see Appendix B).

The surveys of June 12th and July 6th 2024 had 2 bat surveyors with 2 bat detectors, and results were combined. The combined results are not deemed as duplicates as the surveyors were sufficiently spaced. The surveys revealed High levels of bat activity across the site, with three species recorded: Common Pipistrelle, Soprano Pipistrelle, and Leisler's Bat. The results are summarised in Table 6, and site photos are available in Appendix A. The activity maps for each survey are shown as Figures 4 and 5 with them combined as Figure 6. The GPS data from these three dusk surveys are attached as Appendix B.

The processed dataset revealed the presence of three bat species: Common Pipistrelle (*Pipistrellus pipistrellus*), Leisler's Bat (*Nyctalus leisleri*), and Soprano Pipistrelle (*Pipistrellus pygmaeus*). Common Pipistrelle and Soprano Pipistrelle were the most frequently recorded species, with passes distributed across multiple unique locations and throughout the survey periods. Leisler's Bat passes were recorded at several distinct locations and times, indicating the presence of more than one individual.

Table 6 presents a summary of the bat passes using the dataset from the two 2024 surveys. The more detailed survey data, including GPS points, can be found in Appendix B.

There are affected trees in the locations of high bat activity (see Figures 4, 5, and Combined Figure 6). It is possible that some bats recorded were roosting in the trees onsite, so further pre-felling bat surveys will be required, as discussed in Section 4.

Table 6 Bat Activity Results (June 12th and July 6th 2024)

Species Name – Common	Species Name – Latin	Number of Passes	Peak Frequency (kHz)
June 12th 2024			
Common Pipistrelle	<i>Pipistrellus pipistrellus</i>	24	46.0
Soprano Pipistrelle	<i>Pipistrellus pygmaeus</i>	22	56.0
Leisler's Bat	<i>Nyctalus leisleri</i>	6	24.0
July 6th 2024			
Common Pipistrelle	<i>Pipistrellus pipistrellus</i>	28	46.0
Soprano Pipistrelle	<i>Pipistrellus pygmaeus</i>	19	56.0
Leisler's Bat	<i>Nyctalus leisleri</i>	8	24.0

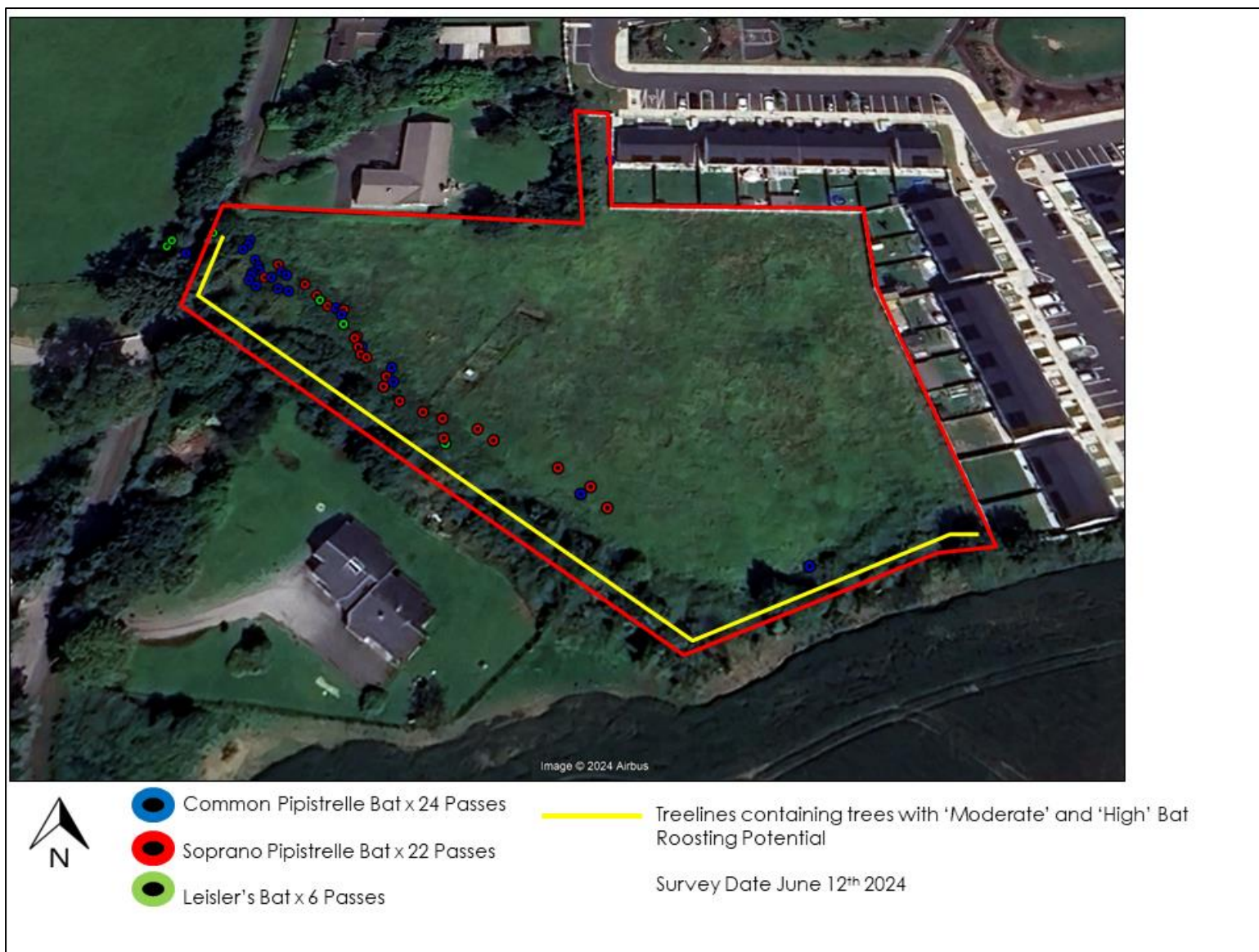


Figure 4 Bat Activity Results – June 12th 2024



Figure 5 Bat Activity Results –July 6th 2024



Figure 6 Bat Activity Results Combined –June and July 2024

3.2 Bat Roost Potential Tree Assessment

Treelines for removal were graded as per Tables 4 and 5. The results are shown in Table 7 below. See Appendix A – ‘Plates’ for photos of trees assessed for bat roost potential. Figures 4, 5 and 6 gives the location of the Treelines containing trees with Moderate-High Bat Roost Potential.

The presence of bat roost features on the treelines to the western boundary (affected) and southwest/southeast boundary (potentially affected) deems the site having significant value for roosting bats. This is further ? by the bat activity maps showing the majority of activity along these mature treelines. The initial times of bat detection for Leisler’s bat and Soprano Pipistrelle on June 12th were 4 to 7 mins after sunset which are early and may suggest emergence from trees onsite, especially for soprano pipistrelle which is usually detected approx. 15-20 after sunset in the author’s experience.

These overall findings highlight the importance of the site for local bat populations and underscore the need for appropriate mitigation measures to minimise the impact of any proposed development activities on the identified bat roost features. The presence of moderate to high bat roost potential necessitates further surveys prior to felling, and a carefully considered mitigation strategy, which will be discussed in Section 4.

Table 7 Assessment of Boundaries for Bat Roost Potential

Boundary Location	Bat Potential Tree Assessment (Table 4)	Roost Category (Table 5)	Mitigation Required
West (entrance)	Contains trees with “Moderate” and “High” bat roost potential	1-2 Medium to High Risk	Yes.
Southwest and Southeast	Both contain trees with “Moderate” and “High” bat roost potential	1-2 Medium to High Risk	Yes, if removal or other management required. Lighting to be considered if retained.
East	Wall, no bat roost potential.	4 – No Risk	None Required.
North (western section)	Garden Hedge of Adjacent dwelling with some mature trees. Hedges and trees with no obvious bat roost potential.	4 – No Risk	None Required, to be retained as privately owned.
North (eastern section)	Wall of adjoining Housing Development, no bat roost potential.	4 – No Risk	None Required.

3.3 Landscape Evaluation

The broader landscape surrounding the site is considered of local importance for bats, with a 31.22 average landscape suitability score (Table 1). The site is located close to a residential area, providing moderate habitat suitability for bats.

The site itself, consisting primarily agricultural grassland, offers low potential as bat habitat, however the mature treelines and hedgerows around part of the site provide the main features of interest for bats and may harbour bat roosts.

These treelines and hedgerows along the site boundaries provide valuable commuting and foraging corridors for the recorded bat species, particularly Common Pipistrelle, Soprano Pipistrelle and Leisler's Bat.

4. RECOMMENDATIONS

The following recommendations are provided to further minimise any potential disturbance and enhance the site's value for bats:

4.1 Dark Corridor and Buffer Zone at Treelines

A 5m dark buffer zone should be implemented along the retained treelines and hedgerows on the west, southwest, and southeast boundaries. This recommendation is based on recent guidance for bat conservation in urban settings.¹⁹ The justification for this buffer is:

- Bat activity: These treelines and hedgerows serve as important commuting and foraging routes for bats, particularly Common Pipistrelle, Soprano Pipistrelle, and Leisler's Bat.
- Potential roost features: Trees with 'Moderate' and 'High' bat roost potential were identified in these areas.
- Wider ecological value: These linear features likely support other wildlife, including nesting birds and small mammals.

This buffer zone should be delineated with hoarding during the construction phase and maintained as a dark corridor (maximum 0.5 lux at ground level) in the operational phase.²⁰

4.2 Root Protection Zone (RPZ)

Within the 5m buffer, a Root Protection Zone (RPZ) should be established. The exact extent of the RPZ should be calculated by an arborist following the guidance in BS 5837:2012.²¹ This is particularly important for trees identified as having moderate or high bat roost potential along the west, southwest, and southeast boundaries.

¹⁹ Devon County Council (2022). Maintaining dark corridors through the landscape for bats

²⁰ Stone, E.L. (2013). Bats and lighting: Overview of current evidence and mitigation guidance

²¹ British Standards Institution (2012). BS 5837:2012 Trees in relation to design, demolition and construction

4.3 Construction Environmental Management Plan (CEMP)

A detailed CEMP should be developed and include:

1. Delineation of the 5m buffer zone and RPZ with appropriate fencing or hoarding.
2. Protocols for tree and hedgerow removal, including:
 - a. Timing of removal outside the bird nesting season (1st March to 31st August as per Irish Wildlife Acts)
 - b. Soft-felling techniques for trees with moderate or high bat roost potential
 - c. Presence of an ecologist during removal to check for wildlife and advise accordingly
3. Measures to protect retained treelines/hedgerows from construction impacts and during the operational phase. No clearance of the base of treelines/hedgerows should take place for landscaping, and should be left 'as is' and undisturbed for existing wildlife to continue to use.
4. Protocols to prevent the introduction of invasive species during construction

4.4 Lighting Design

Artificial light at night (ALAN) can have significant negative impacts on Ireland's bat species, all of which are nocturnal. Bats are adapted to low light conditions, and exposure to artificial light can disrupt their natural behaviours, including roosting, commuting, and foraging.^{22, 23} The bat species recorded during the surveys have varying degrees of sensitivity to light, as shown in Table 8. Species in bold font were recorded onsite.

Table 8 Potential light sensitivity of the Irish Bat Species

Species: Common Name	Rydell Category	Sensitivity
Daubenton's bat <i>Myotis daubentonii</i>	Category 4	Light sensitive
Whiskered bat <i>Myotis mystacinus</i>	Category 4	Light sensitive
Natterer's bat <i>Myotis nattereri</i>	Category 4	Light sensitive
Leisler's bat <i>Nyctalus leisleri</i>	Category 2	Light tolerant
Nathusius' pipistrelle <i>Pipistrellus nathusii</i>	Category 3	Semi-tolerant
Common pipistrelle <i>Pipistrellus pipistrellus</i>	Category 3	Semi-tolerant
Soprano pipistrelle <i>Pipistrellus pygmaeus</i>	Category 3	Semi-tolerant
Brown long-eared bat <i>Plecotus auritus</i>	Category 4	Light sensitive
Lesser horseshoe bat <i>Rhinolophus hipposideros</i>	Category 4	Light sensitive

To mitigate the potential impacts of artificial lighting on bats and other nocturnal wildlife, it is essential to implement a smart lighting strategy that adheres to best practice guidelines.²⁴ The current lighting design should be revised to ensure:

²² Stone, E.L. (2013). Bats and lighting: Overview of current evidence and mitigation guidance

²³ Schofield, H. (2008). The Lesser Horseshoe Bat Conservation Handbook

²⁴ Institution of Professional Lighting and Bat Conservation Trust (2023). Bats and Artificial Lighting in the UK

Illuminance levels:

- Light levels within the 5m buffer zone do not exceed 0.5 lux at ground level.²⁵
- Illuminance remains below 1 lux in newly planted areas and retained tree/hedgerow areas outside the buffer zone.
- Light trespass onto surrounding areas used by bats for foraging and commuting is minimised.
- Light characteristics:
 - Use warm white (2700K or lower) LEDs with no UV and peak wavelength above 550nm to minimise impacts on bats and other nocturnal wildlife.
 - Minimise upward light ratio, glare, and spill through appropriate luminaire design.
- Lighting control:
 - Utilise motion sensors and short timer settings to limit lighting duration where feasible.
 - Implement a central management system for flexible control of lighting times.
 - Consider part-night lighting in areas where continuous illumination is not necessary for safety.
- Luminaire design and placement:
 - Use directional lighting to minimise light spill onto vegetated areas and the dark buffer zone.
 - Consider accessories like baffles or louvres to further reduce light spill.
 - Avoid any unnecessary lighting toward retained treelines or new tree planting.

Safety considerations:

- Ensure that the lighting design meets required public safety standards while implementing these bat-friendly measures.

Post-installation assessment:

- A bat ecologist should inspect the site during the operational phase to ensure the implemented lighting design matches the proposed plan and effectively maintains the dark corridor for bats.

Examples of Bat friendly lighting shown as Appendix C.

²⁵ Stone, E.L. (2013). Bats and lighting: Overview of current evidence and mitigation guidance

4.5 Habitat Enhancement

Landscaping:

Incorporate native tree and shrub species into the landscaping scheme, particularly along the site boundaries, to enhance the site's value for foraging and commuting bats. Species such as hawthorn, blackthorn, and elder provide valuable food sources for insects, which in turn support the local bat population.

Bat boxes:

Install at least 5 x bat boxes on suitable trees within the site to provide additional roosting opportunities for bats. Bat boxes should be positioned at least 4m above the ground, facing south or southeast, and away from artificial light sources (see Appendix C for examples). An ecologist should revisit the site to ensure these are in place.

4.6 Pre-Construction Surveys

- Tree and Hedgerow retention: Retain and protect mature trees and hedgerow where the project allows them to be kept during construction works, as they provide valuable commuting and foraging corridors for bats. Ensure that no trees or hedging to be retained is damaged during the development process. Adhere to a strict/delineated tree protection/root zone around retained trees.
- Pre-felling surveys: For trees with 'Moderate' or 'High' bat roost potential that need to be felled, e.g. those within the west, southwest and southeast boundaries as indicated in Figures 4, 5 and 6. Pre-felling bat surveys of these affected trees should be conducted the night before they are removed/felled by an experienced Bat Ecologist. These surveys should be carried out during October-November, in favourable weather, to avoid bat hibernation and maternity periods. The number of surveys may be required to be determined by the Bat Ecologist depending on tree number affected when project finalised.
- If the pre-felling survey reveals bats roosting in any Moderate or High Potential Bat treelines during these surveys then a bat derogation licence will be required. Any positively identified tree roost, and adjacent trees/hedging (which may serve as a corridor) should be retained until the licence is secured.
- If no bats are found during the pre-felling survey, all trees (including those with Low or Negligible bat roost potential) should be soft-felled and left to lie for 24 hours before mulching. This precautionary measure allows any potentially undetected bats or other wildlife to escape.

4.7 Additional Ecological Considerations

While the focus of this report is on bats, the following additional ecological recommendations should be considered:

- **Mammals:** The presence of well-worn tracks and trails suggests active use by mammals such as rabbits, foxes, and potentially passing badgers. A specialist badger survey was conducted by Brian Keeley Wildlife Surveys Ireland (November 2024). While no badgers were found the report did state *"There were no signs of badgers in November 2024 but given the adjoining agricultural lands, it is probable that badgers travel through the neighbouring lands and may occasionally enter the site"*.
- The badger Report also reported that there was Rabbit and Fox onsite. In the authors opinion it is likely that hedgehog and Irish Hare (protected) may also use the site. In that regard appropriate measures should be implemented to minimise impact on these species, in compliance with the Animal Health and Welfare Act 2013. A mitigation plan for same is outlined in Appendix D. This should form part of the CEMP.
- **Nesting birds:** No vegetation clearance should occur during the bird nesting season (1st March to 31st August).
- **Invertebrates:** The mature treelines and hedgerows likely support a diverse invertebrate community. Retention and enhancement of these habitats where possible will benefit the wider ecosystem.
- **New boundary walls:** The impact of the proposed 2m boundary wall on wildlife movement should be carefully considered. If feasible, incorporating periodic gaps at the base of the wall could facilitate wildlife passage, particularly near retained treelines/hedgerows.

By implementing these recommendations, the proposed development can minimise its impact on local bat populations and other wildlife while enhancing the site's overall ecological value. It's important to note that these are recommendations based on the ecological assessment, and their implementation may be subject to further planning and design considerations.

5. CONCLUSION

Two bat activity surveys conducted at the proposed housing development site in Craddockstown, Naas, Co. Kildare, during June and July 2024 revealed moderate to high levels of bat activity. Three species were identified: Common Pipistrelle, Soprano Pipistrelle, and Leisler's Bat. The mature treelines and hedgerows along the west, southwest, and southeast site boundaries provide valuable commuting, foraging, and potential roosting habitats for these bat species.

The bat roost potential assessment identified several trees and hedgerows with 'moderate' and 'high' bat roost potential, particularly along the west, southwest, and southeast boundaries. To minimize the impact on bats, it is essential to implement the following key recommendations:

- Establish a 5m dark buffer zone along retained treelines and hedgerows, maintaining light levels below 0.5 lux at ground level.
- Conduct pre-felling surveys of trees with moderate or high bat roost potential during October-November, outside sensitive maternity and hibernation periods.
- Implement a carefully designed lighting strategy that adheres to best practice guidelines for bat conservation.
- Enhance habitats through native species planting and installation of bat boxes.
- Develop a detailed Construction Environmental Management Plan (CEMP) to protect retained vegetation and wildlife during construction.

If bat roosts are confirmed during pre-felling surveys, the development may need to be adjusted, and a bat derogation license will be required before proceeding with any works affecting the roosts. All tree felling and hedgerow removal should employ soft felling techniques, with felled trees left to lie for 24 hours before mulching, allowing any undetected bats or wildlife to escape.

The development can proceed without significant adverse effects on the local bat population, provided that the recommendations outlined in Section 4 are followed. If bats are discovered at any stage during the proposed works, all activities should cease immediately, and a licensed bat ecologist should be consulted for further advice.

An operational phase monitoring visit by a Bat Ecologist will ensure the effective implementation of the mitigation measures, verifying that the lighting plan prevents light spill outside the site boundary, a dark buffer corridor is in place along commuting routes, and that bat boxes are placed in appropriate locations.

Mitigation for other mammals, protected or unprotected e.g. rabbit, fox, Irish hare, hedgehog should also form part of any CEMP to adhere with the Animal Welfare Act 2013 and Wildlife Acts (for hedgehog and hare).

In conclusion, while the proposed development has the potential to impact the local bat population, implementing a comprehensive mitigation strategy can effectively minimise these impacts on the local bat population.

APPENDICES

APPENDIX A



Plate 1 Treeline/Hedgerow (WL2/WL1) for removal to the front of site.



Plate 2 Treeline/Hedgerow (WL2/WL1) for removal to the front of site with existing entrance to the right.



Plate 3 Treeline/Hedgerow (WL2/WL1) for removal to the front of site with existing entrance in centre. Looking east.



Plate 4 Treeline/Hedgerow (WL2/WL1) on boundaries shown with Improved Agricultural Grassland (GA1) the main habitat affected. Recently mown. Adjacent housing development also shown east of site. Looking southeast.



Plate 5 Extensive areas of Scrub (WS1) to the base/front of the mature Treeline/Hedgerow (WL2/WL2) on boundaries. Will be affected for works. Mammals tracks and trials noted, see arrow for example. Any removal works will need to take out place outside of the bird nesting season.



Plate 6 Wall (BL3) on east and part of north boundaries. Also shown is Improved Agricultural Grassland (GA1) - the main habitat affected. Recently mown with taller areas on edges. Adjacent housing development also shown east and northeast of site. Looking north.



Plate 7 Treeline/Hedgerow (WL2/WL1) on boundaries shown in distance with Improved Agricultural Grassland (GA1) the main habitat affected. Recently mown but with an area fenced off in centre. Looking southwest.



Plate 8 Garden Hedgerow (WL1) on part of north boundary, see arrow with adjacent private dwelling (BL3 - Buildings and Artificial Surfaces). Improved grassland (GA1) also shown, the main habitat affected for proposal.



Plate 9 Examples of numerous rabbit burrows onsite.



Plates 10 Examples of trees with Moderate and High Bat Roost potential located on the site boundaries to the west, southwest and southeast which are affected, or partially affected, by works. Will require pre-felling bat surveys.

APPENDIX B

Survey Data 1 – June 12th 2024

12/06/2024	Species Text	Calls [#]	Mean Peak Frequency [kHz]	Mean Max Frequency [kHz]	Mean Min Frequency [kHz]	Mean Call Length [ms]	Mean Call Distance [ms]	Temp [°C]	Latitude [WGS84]	Longitude [WGS84]
21:58:55	Leisler's Bat	10	24	26.7	22.8	12	433	14	53.20528	-6.65131
21:59:03	Leisler's Bat	6	22.7	23.7	21.9	11.6	509	14	53.20529	-6.6513
22:00:28	Leisler's Bat	16	23.9	27.2	22.8	11	230	14	53.20531	-6.65119
22:01:26	Soprano Pipistrelle	11	52.3	57.8	52	3	84	14	53.20515	-6.65083
22:10:28	Leisler's Bat	1	22.6	27.1	21	2	0	14	53.20489	-6.65049
22:23:14	Leisler's Bat	1	21.4	22	20.7	10.5	0	14	53.20511	-6.65078
22:23:33	Leisler's Bat	1	21.7	22.3	21	15.1	0	14	53.20516	-6.65086
22:26:14	Common Pipistrelle	33	45.9	62.7	45.1	4	93	13	53.20527	-6.65109
22:26:39	Common Pipistrelle	3	45.5	51.9	44.9	3	172	13	53.20525	-6.65105
22:26:47	Common Pipistrelle	2	46.5	54	45.8	3.6	71	13	53.20521	-6.65106
22:26:56	Common Pipistrelle	1	46.4	51.9	45.8	3.3	0	13	53.20522	-6.65106
22:27:04	Common Pipistrelle	3	45.9	50.2	45.4	3	128	13	53.2052	-6.65106
22:28:37	Common Pipistrelle	43	46.9	65.1	46.4	5	90	13	53.20514	-6.65081
22:29:26	Soprano Pipistrelle	7	54.7	65.2	54.1	3	97	13	53.20501	-6.65065
22:29:42	Common Pipistrelle	31	46.9	70.5	46.2	3	86	13	53.205	-6.65063
22:30:08	Common Pipistrelle	10	48.2	55.8	47.5	6	90	13	53.20468	-6.64962
22:30:51	Soprano Pipistrelle	29	53.7	74.8	53	3	80	12	53.20524	-6.65099
22:31:11	Common Pipistrelle	15	48.9	60.7	47.8	3	80	12	53.20529	-6.65108
22:31:35	Soprano Pipistrelle	34	54.2	69.3	53.2	6	80	12	53.20519	-6.6509
22:31:47	Soprano Pipistrelle	11	53.9	60.8	53	3	150	12	53.20514	-6.65079
22:31:57	Soprano Pipistrelle	6	53.5	59.3	52.8	4	126	12	53.20508	-6.65075
22:32:05	Soprano Pipistrelle	45	52.8	74.4	52.1	4	70	12	53.20504	-6.65071
22:33:18	Soprano Pipistrelle	34	54.5	71.3	53.8	5	80	12	53.20478	-6.65009
22:35:00	Soprano Pipistrelle	25	53.1	69.4	52.2	3	75	12	53.20481	-6.65013
22:35:09	Soprano Pipistrelle	76	53.4	71.3	52.5	3	70	12	53.20484	-6.65021
22:35:25	Soprano Pipistrelle	1	54	59.8	53.4	3.3	0	12	53.20489	-6.65037
22:35:29	Soprano Pipistrelle	3	53.1	59.4	52.6	3	151	12	53.20491	-6.65041
22:36:00	Common Pipistrelle	51	47.3	64.8	46.6	3	94	12	53.20502	-6.65064
22:36:12	Common Pipistrelle	30	45.5	67.2	44.7	5	85	12	53.20507	-6.65073
22:37:43	Soprano Pipistrelle	3	54.1	57.4	53.4	2.8	165	12	53.20517	-6.65087
22:37:53	Common Pipistrelle	35	47	65.9	46.2	5	90	12	53.20513	-6.65079

12/06/2024	Species Text	Calls [#]	Mean Peak Frequency [kHz]	Mean Max Frequency [kHz]	Mean Min Frequency [kHz]	Mean Call Length [ms]	Mean Call Distance [ms]	Temp [°C]	Latitude [WGS84]	Longitude [WGS84]
22:38:08	Soprano Pipistrelle	24	53.3	67.2	52.5	3	70	12	53.20506	-6.65074
22:38:14	Soprano Pipistrelle	19	52.3	67.7	51.6	4	86	12	53.20505	-6.65073
22:38:42	Soprano Pipistrelle	43	52.3	68.4	51.6	5	90	12	53.20499	-6.65066
22:38:57	Soprano Pipistrelle	54	53	76.1	52	4	65	12	53.20496	-6.65061
22:39:05	Soprano Pipistrelle	20	52.5	68.8	51.7	3	70	12	53.20494	-6.65055
22:39:11	Soprano Pipistrelle	89	52.2	67.5	51.3	5	85	12	53.20493	-6.6505
22:39:57	Common Pipistrelle	27	47.3	66.4	46.5	5	90	12	53.2048	-6.65015
22:40:05	Common Pipistrelle	5	47.9	52.3	46.7	5	279	12	53.20548	-6.65007
22:40:35	Soprano Pipistrelle	48	53.1	70.7	52.2	3	70	12	53.20489	-6.65049
22:42:02	Common Pipistrelle	27	46.8	66.1	46	4	95	12	53.20522	-6.65097
22:42:08	Common Pipistrelle	29	46	61.3	45.4	5	90	12	53.20521	-6.65096
22:42:41	Common Pipistrelle	18	46.3	59.3	45.4	5	90	12	53.20521	-6.651
22:43:41	Soprano Pipistrelle	27	53.7	75.1	52.8	3	70	12	53.20509	-6.65074
22:45:17	Soprano Pipistrelle	16	51.9	62.5	51.2	4	75	12	53.20521	-6.65102
22:47:14	Common Pipistrelle	2	47.3	50.8	46.8	2.9	397	12	53.20518	-6.65095
22:47:17	Common Pipistrelle	37	46.9	62.2	46.4	5	90	12	53.20518	-6.65098
22:48:05	Common Pipistrelle	3	46.8	47.9	46.1	6.1	343	12	53.20519	-6.65104
22:48:50	Common Pipistrelle	1	46.4	50.3	45.8	3.3	0	12	53.20522	-6.65104
22:48:51	Common Pipistrelle	22	46.9	54.1	46	3	85	12	53.20523	-6.65104
22:49:07	Common Pipistrelle	1	46.7	54.3	46.1	3.3	0	12	53.20528	-6.65108
22:52:14	Common Pipistrelle	2	46.2	53.2	45.8	7.9	286	12	53.20526	-6.65125

Survey Data 2 – July 6th 2024

06/07/2024	Species Text	Calls [#]	Mean Peak Frequency [kHz]	Mean Max Frequency [kHz]	Mean Min Frequency [kHz]	Mean Call Length [ms]	Mean Call Distance [ms]	Temp [°C]	Latitude [WGS84]	Longitude [WGS84]
22:03:14	Leisler's Bat	9	23.9	26.3	22.8	10	290	15	53.20526	-6.65125
22:19:39	Common Pipistrelle	13	43.9	55.3	43.5	4	80	15	53.20481	-6.64944
22:19:59	Common Pipistrelle	51	44.7	67.4	43.5	5	90	15	53.20475	-6.64955
22:22:40	Common Pipistrelle	23	42.2	52.3	41.4	5	95	15	53.20528	-6.65049
22:23:52	Leisler's Bat	1	21.7	25.3	16.2	5.2	0	15	53.20501	-6.65061
22:27:25	Soprano Pipistrelle	58	53	77	51.9	4	70	15	53.20494	-6.65053
22:27:32	Leisler's Bat	3	22.3	24.9	20.3	2.6	751	15	53.20468	-6.64976
22:27:51	Soprano Pipistrelle	11	53.8	64	53.1	3	70	15	53.20486	-6.65035
22:32:08	Soprano Pipistrelle	7	53.3	59.6	52.7	3	70	15	53.20507	-6.65072
22:33:09	Soprano Pipistrelle	13	53.1	61	52.3	5	100	15	53.20468	-6.64962
22:33:42	Soprano Pipistrelle	12	52.4	62.8	51.6	5	80	15	53.20478	-6.64962
22:34:09	Common Pipistrelle	1	48.8	49.7	47.3	2	0	15	53.20522	-6.651
22:34:22	Soprano Pipistrelle	8	53	60.5	51.6	6	260	15	53.20476	-6.64961
22:35:15	Leisler's Bat	1	23.2	30.2	14.9	2	0	15	53.20523	-6.65107
22:36:26	Soprano Pipistrelle	41	54.3	73.4	53.2	3	70	15	53.20488	-6.65025
22:37:49	Common Pipistrelle	18	45.2	59.6	44.6	5	86	15	53.20516	-6.65079
22:39:55	Leisler's Bat	1	22	26.2	18.6	2	0	15	53.20467	-6.64986
22:40:00	Common Pipistrelle	2	47	51.2	46.1	2.6	722	15	53.20521	-6.65106
22:43:15	Common Pipistrelle	1	42.4	48.5	41.2	5.2	0	15	53.20548	-6.65007
22:43:52	Soprano Pipistrelle	18	56.5	64.9	54.9	5	80	15	53.20482	-6.64963
22:44:16	Soprano Pipistrelle	9	52	59.6	51.2	5	80	15	53.20476	-6.64961
22:45:21	Common Pipistrelle	15	47.7	67.9	47	3	65	15	53.2052	-6.65095
22:45:42	Soprano Pipistrelle	28	52.5	68.6	51.7	5	80	15	53.20476	-6.6498
22:46:17	Common Pipistrelle	25	46.9	67.6	46.2	4	93	15	53.20523	-6.65092
22:46:20	Soprano Pipistrelle	30	56.7	73.5	55.9	5	83	14	53.2048	-6.65015
22:46:24	Common Pipistrelle	30	46.2	63.3	45.5	5	90	14	53.20522	-6.65091
22:47:20	Soprano Pipistrelle	25	53.2	71.7	51.8	4	65	14	53.20499	-6.65065
22:47:23	Soprano Pipistrelle	24	55	81.7	54.3	5	80	14	53.20503	-6.65065
22:47:55	Soprano Pipistrelle	17	53.4	76.1	52.5	3	80	14	53.20485	-6.65034
22:48:28	Common Pipistrelle	6	48.6	54.9	47.7	2	118	14	53.20522	-6.65097
22:49:08	Common Pipistrelle	23	47	68.5	46.2	4	100	14	53.20519	-6.651

06/07/2024	Species Text	Calls [#]	Mean Peak Frequency [kHz]	Mean Max Frequency [kHz]	Mean Min Frequency [kHz]	Mean Call Length [ms]	Mean Call Distance [ms]	Temp [°C]	Latitude [WGS84]	Longitude [WGS84]
22:49:28	Common Pipistrelle	23	47.8	58.8	47	4	70	14	53.20478	-6.64951
22:49:32	Soprano Pipistrelle	46	52.7	75.2	51.9	4	70	14	53.20509	-6.65074
22:49:34	Common Pipistrelle	14	45	50.7	44.4	4	80	14	53.20481	-6.64946
22:49:38	Soprano Pipistrelle	1	54	57.6	53.4	2.6	0	14	53.20524	-6.6509
22:50:11	Common Pipistrelle	16	46.4	52.6	45.2	6	120	14	53.20527	-6.65084
22:50:11	Common Pipistrelle	2	47.6	57	47	7.2	157	14	53.20474	-6.64965
22:50:39	Common Pipistrelle	37	46.9	68	46	4	90	14	53.20468	-6.64981
22:51:07	Common Pipistrelle	1	45.8	50.6	45.1	3.3	0	14	53.2053	-6.65081
22:51:46	Leisler's Bat	1	22.6	22.9	14.9	4.6	0	14	53.20488	-6.65036
22:51:53	Common Pipistrelle	3	45.5	50.1	44.9	3.5	124	14	53.20529	-6.65033
22:52:19	Common Pipistrelle	62	44.1	63.3	43.2	4	90	14	53.20534	-6.65011
22:52:32	Common Pipistrelle	2	43.5	46.7	42.2	9.8	92	14	53.20538	-6.65012
22:53:05	Common Pipistrelle	4	47.2	51.8	46.5	7	241	14	53.20546	-6.65008
22:53:06	Common Pipistrelle	14	46.6	53.5	46	3	80	14	53.20519	-6.65099
22:53:39	Common Pipistrelle	2	47.6	48.8	46.8	4.9	246	14	53.20548	-6.65006
22:54:43	Soprano Pipistrelle	7	55.4	58.6	54.1	5	200	13	53.20537	-6.6503
22:56:31	Common Pipistrelle	12	47.6	70.4	46.7	4	65	13	53.20519	-6.65087
22:56:40	Leisler's Bat	9	23.3	27.9	21.7	12	306	13	53.20517	-6.65084
22:56:57	Common Pipistrelle	10	46.8	54.7	46.2	3	85	13	53.20511	-6.65072
22:57:06	Soprano Pipistrelle	27	53	76.3	52.2	4	70	13	53.20505	-6.65066
22:59:22	Common Pipistrelle	9	45.1	52.3	44.6	3	90	13	53.20476	-6.64957
23:02:08	Leisler's Bat	1	22	25.3	14.9	2	0	13	53.20497	-6.65056
23:04:29	Common Pipistrelle	14	44.1	62	43.5	5	86	13	53.2048	-6.65015
23:14:14	Soprano Pipistrelle	30	52.5	73.7	51.8	4	80	13	53.20475	-6.65006

APPENDIX C



**2F Schwegler Bat Box
(General Purpose)**



**PRO UK Build-in
WoodStone Bat Box**



Maternity Bat Box



**4m Pole Mounted Large
Colony Bat Box**

Available on link below with fitting instructions on website

<https://www.nhbs.com/search?q=bat+boxes>



Bat Slates -

<https://beddoesproducts.com/products/bat-access-slate>





1. Use warm white LED lights (2700K or lower) to reduce impact on bats.
2. Install downward-facing, shielded fixtures on walls and low-level bollards (max 1m height) for pathways.
3. Set timers to switch off lights between 11pm and 5am when bats are most active.
4. Maintain a 5m wide dark corridor along property boundaries and near vegetation.
5. Implement motion sensors with short duration settings (1-2 minutes) for essential lighting.

For more detailed guidance, refer to: Bat Conservation Trust and Institution of Lighting Professionals. (2023). Guidance Note 8/23 Bats and Artificial Lighting.

APPENDIX D



Mammal Protection Protocol - for Hedgehog, Hare, Rabbit and Fox

In accordance with the Animal Health and Welfare Act 2013 and best practice ecological guidance, the following measures should be implemented to protect all mammals during construction works, including those without formal protected status. This protocol should be included in the Construction Environmental Management Plan (CEMP).

Pre-Construction Phase

A comprehensive pre-construction survey should be undertaken to establish baseline mammal activity across the site. This should include deployment of trail cameras at key locations such as burrow entrances, well-worn trails, and site boundaries for a minimum of 2 weeks prior to works commencing. These cameras should help document species presence, movement patterns, and timing of activity.

Within 48 hours of works commencing, an detailed burrow mapping survey should be conducted. This should involve GPS location of all burrows (active and inactive), mapping of main mammal trails, and photographic documentation. This information should inform the positioning of protective measures and working methodologies during construction.

Construction Phase

Protection Measures and Working Methods

Construction activities should progress in a consistent direction to allow mammals to naturally relocate away from working areas. The direction of work should move away from known active burrows and main wildlife corridors, with 24-hour gaps maintained between phases to allow animal dispersal.

For active burrows that cannot be avoided, a careful protocol should be followed involving installation of one-way exclusion fencing, monitoring via trail camera for 5 days, and careful hand excavation under ECoW supervision once confirmed inactive. Any discovered animals should be safely relocated to suitable nearby habitat by the ECoW.

Solid hoarding should be installed around construction zones, extending 300mm below ground to prevent burrowing, with mammal gates provided every 50m along lengthy sections. All excavations should be either covered overnight or provided with escape ramps (maximum 45° slope). Regular inspections of both hoarding and excavations should be undertaken before work commences each day by the ECoW.

Vegetation clearance should be conducted directionally towards areas of retained habitat, undertaken progressively in stages over multiple days to allow animal dispersal. The ECoW should hand search areas of dense vegetation before any clearance.



Species-Specific Considerations

Different mammals require tailored approaches based on their behaviour and habitat preferences:

For rabbits, all warren systems should be mapped and a program of progressive exclusion from active working areas implemented, while maintaining alternative burrowing areas if possible.

Fox dens should be identified and mapped, with crossing points maintained through the site. Night working restrictions should apply near known dens, and careful food waste management should be implemented to avoid attracting animals to the construction area.

For hedgehogs and European Hare, particular attention should be paid during hibernation season (November-March) with careful hand searching of dense vegetation and leaf litter. Dark corridors should be maintained through the site, and log pile refuges created in retained habitat areas.

Monitoring and Documentation

The ECoW should maintain detailed records including a daily log of mammal observations, photographic records of protection measures, trail camera footage archive, and incident reports if required. A summary reports should be produced documenting the effectiveness of protection measures and any required modifications to procedures.

This protocol should be reviewed by the ECoW and updated based on monitoring results and changing site conditions. All site personnel should receive training on these procedures through toolbox talks, with particular emphasis on identification of common mammals, protocol if animals are encountered, and reporting procedures.