

2025

Bat Survey: Cornacassa, Monaghan  
Town, Co. Monaghan



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NPWS licence C17/2023 (Licence to handle bats, expires 23<sup>rd</sup> January 2026);

NPWS licence 017/2025 (Licence to photograph/film bats, expires 31<sup>st</sup> December 2025);

NPWS licence DER/BAT 2025-171 (Survey licence, expires 31<sup>st</sup> December 2025).

**Statement of Authority:** Dr Aughney has worked as a Bat Specialist since 2000 and has undertaken extensive survey work for all Irish bat species including large scale development projects, road schemes, residential developments, wind farm developments and smaller projects in relation to building renovation or habitat enhancement. She was a monitoring co-ordinator and trainer for Bat Conservation Ireland for 20 years. She is a co-author of the 2014 publication *Irish Bats in the 21<sup>st</sup> Century*. This book received the 2015 CIEEM award for Information Sharing. Dr Aughney is a contributing author for the Atlas of Mammals in Ireland 2010-2015. She is a trained bat handler, bat ringer and radio-telemetry project manager. She is a member of the Nathusius' Pipistrelle Working Group and the Cavan Bat Group.

All analysis and reporting is completed by Dr Tina Aughney. Data collected and surveying is completed with the assistance of trained field assistants. Mr. Shaun Boyle (Field Assistant) NPWS licence DER/BAT 2025-172 (Survey licence, expires 31<sup>st</sup> December 2025). Ms. Eva Boyle (Field Assistant) NPWS licence DER/BAT 2025-173 (Survey licence, expires 31<sup>st</sup> December 2025). Both field assistants have received in-house training to undertake all elements of bat surveying according to Collins (2023).

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**Project Name & Location:** Cornacassa, Monaghan Town, Co. Monaghan

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30 <sup>th</sup> September 2025	Draft 1	Traynor Environmental & Monaghan Co. Co. (by email)
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**Purpose**

This document has been prepared as a Report for Monaghan Co. Co. Only the most up to-date report should be consulted. All previous drafts/reports are deemed redundant in relation to the named site. Bat Eco Service accepts no responsibility or liability for any use that is made of this document other than by the client for the purposes for which it was originally commissioned and prepared.

**Carbon Footprint Policy**

It is the policy of Bat Eco Services to provide documentation digitally to reduce carbon footprint. Printing of reports etc. is avoided, where possible.

**Record Submission Policy**

It is the policy of Bat Eco Services to submit all bat records to the NBDC database one-year post-surveying. This is to ensure that a high-level bat and mammal databases are available for future desktop reviews. This action will be automatically undertaken unless otherwise requested, where there is genuine justification.

**Citation: Bat Eco Services (2025) Bat Survey of Cornacassa, Monaghan Town, Co. Monaghan. Unpublished report prepared for Monaghan Co. Co.**

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## 1. Introduction

Bat Eco Services was commissioned by Traynor Environmental to undertake a bat survey of lands at Cornacassa, Monaghan Town, Co. Monaghan. This is to provide information on potential bat usage of the proposed development area.

### 1.1 Relevant Legislation & Bat Species Status

All Irish bat species are protected under the Wildlife Act (1976) and Wildlife Amendment Acts (2000 and 2010). Also, the EC Directive on The Conservation of Natural habitats and of Wild Fauna and Flora (Habitats Directive 1992), seeks to protect rare species, including bats, and their habitats and requires that appropriate monitoring of populations be undertaken. All Irish bats are listed in Annex IV of the Habitats Directive and the lesser horseshoe bat *Rhinolophus hipposideros* is further listed under Annex II. Across Europe, they 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 (Bonn Convention 1979, enacted 1983) was instigated to protect migrant species across all European boundaries. The Irish government has ratified both these conventions.

Also, under existing legislation, the destruction, alteration or evacuation of a known bat roost is an offence. The most recent guidance document is “Guidance document on the strict protection of animal species of Community interest un the Habitats Directive (Brussels, 12.10.2021 C(2021) 7391 final”.

Regulation 51(2) of the 2011 Regulations provides –

“(2) Notwithstanding any consent, statutory or otherwise, given to a person by a public authority or held by a person, except in accordance with a licence granted by the Minister under *Regulation 54*, a person who in respect of the species referred to in *Part 1* of the *First Schedule*—

(a) deliberately captures or kills any specimen of these species in the wild, (b) deliberately disturbs these species particularly during the period of breeding, rearing, hibernation and migration, (c) deliberately takes or destroys eggs of those species from the wild, (d) damages or destroys a breeding site or resting place of such an animal, or (e) keeps, transports, sells, exchanges, offers for sale or offers for exchange any specimen of these species taken in the wild, other than those taken legally as referred to in Article 12(2) of the Habitats Directive, shall be guilty of an offence.”

The grant of planning permission does not permit the commission of any of the above acts or render the requirement for a derogation licence unnecessary in respect of any of those acts.

Any works interfering with bats and especially their roosts, may only be carried out under a derogation licence granted by National Parks and Wildlife Service (NPWS) pursuant to Regulation 54 of the European Communities (Birds and Natural Habitats) Regulations 2011 (which transposed the EU Habitats Directive into Irish law).

There are eleven recorded bat species in Ireland, nine of which are considered resident on the island. Eight resident bat species and one of the vagrant bat species are vesper bats and all vespertilionid bats have a tragus (cartilaginous structure inside the pinna of the ear). Vesper bats are distributed throughout the island. Nathusius’ pipistrelle *Pipistrellus nathusii* is a recent addition while the Brandt’s bat has only been recorded once to-date (Only record confirmed by DNA testing, all other records has not been genetically confirmed). The ninth resident species is the lesser horseshoe bat

*Rhinolophus hipposideros*, which belongs to the Rhinolophidea and has a complex nose leaf structure on the face, distinguishing it from the vesper bats. This species' current distribution is confined to the western seaboard counties of Mayo, Galway, Clare, Limerick, Kerry and Cork. The eleventh bat species, the greater horseshoe bat, was only recorded for the first time in February 2013 in County Wexford and is therefore considered to be a vagrant species. A total of 41 SACs have been designated for the Annex II species lesser horseshoe bat (1303), of which nine have also been selected for the Annex I habitat 'Caves not open to the public' (8310).

The following species list (Table 1) identifies the range of bat species (resident and vagrant) whose presence has been confirmed in Ireland along with their current status. According to the Bat Conservation Ireland databases, all nine resident bat species have been recorded in Co. Limerick.

**Table 1a: Status of the Irish bat fauna (Marnell *et al.*, 2019 & NPWS, 2022).**

Species: Common Name	Irish Status	European Status	Global Status
<b>Resident Bat Species ^</b>			
<b>Daubenton's bat <i>Myotis daubentonii</i></b>	Least Concern	Least Concern	Least Concern
<b>Whiskered bat <i>Myotis mystacinus</i></b>	Least Concern	Least Concern	Least Concern
<b>Natterer's bat <i>Myotis nattereri</i></b>	Least Concern	Least Concern	Least Concern
<b>Leisler's bat <i>Nyctalus leisleri</i></b>	Least Concern	Least Concern	Least Concern
<b>Nathusius' pipistrelle <i>Pipistrellus nathusii</i></b>	Least Concern	Least Concern	Least Concern
<b>Common pipistrelle <i>Pipistrellus pipistrellus</i></b>	Least Concern	Least Concern	Least Concern
<b>Soprano pipistrelle <i>Pipistrellus pygmaeus</i></b>	Least Concern	Least Concern	Least Concern
<b>Brown long-eared bat <i>Plecotus auritus</i></b>	Least Concern	Least Concern	Least Concern
<b>Lesser horseshoe bat <i>Rhinolophus hipposideros</i></b>	Inadequate	Least Concern	Least Concern
<b>Possible Vagrants ^</b>			
<b>Brandt's bat <i>Myotis brandtii</i></b>	Data deficient	Least Concern	Least Concern
<b>Greater horseshoe bat <i>Rhinolophus ferrumequinum</i></b>	Data deficient	Near threatened	Near threatened

^ Roche *et al.*, 2014

### 1.1.1 NPWS Article 17 Reporting

NPWS (2019) provides details on the conservation status for each of Ireland's bat species along with distribution maps (See appendices for such maps). The following table summarises the conclusions of Article 17 assessment of conservation status at the end of the most recent reporting period. Additional information for each of the bat species provides some clarifying notes in relation to the conservation status conclusions. Such information, where appropriate to the current project, will be drawn on in the project assessment section.

**Table 1b: NPWS Article 17 Conservation Status of Irish Bat Species (Adapted from NPWS, 2022).**

	Range	Population	Habitat	Future Prospects	Conservation Status Assessment	Conservation Status Trend
<b>Lesser horseshoe bat</b>	Inadequate	Favourable	Inadequate	Inadequate	Inadequate	Deteriorating
<b>Common pipistrelle</b>	Favourable	Favourable	Favourable	Favourable	Favourable	Improving
<b>Soprano pipistrelle</b>	Favourable	Favourable	Favourable	Favourable	Favourable	Improving
<b>Nathusius' pipistrelle</b>	Unknown	Unknown	Favourable	Unknown	Unknown	Not applicable
<b>Natterer's bat</b>	Favourable	Favourable	Favourable	Favourable	Favourable	Stable
<b>Daubenton's bat</b>	Favourable	Favourable	Favourable	Favourable	Favourable	Improving
<b>Whiskered bat</b>	Favourable	Favourable	Favourable	Favourable	Favourable	Improving
<b>Brown long-eared bat</b>	Favourable	Favourable	Favourable	Favourable	Favourable	Improving
<b>Leisler's bat</b>	Favourable	Favourable	Favourable	Favourable	Favourable	Improving

### 1.1.2 Irish Bat Monitoring Programme – Population Trends

The Irish Bat Monitoring Programme provides information on monitoring schemes managed by Bat Conservation Ireland:

- Car-Based Bat Monitoring (All Ireland) – monitors common pipistrelle, soprano pipistrelle, Leisler's bats with limited information for Nathusius' pipistrelle and *Myotis* species.
- All Ireland Daubenton's Bat Waterway Monitoring
- Brown Long-eared Bat Roost Monitoring
- Lesser Horseshoe Bat Monitoring

This provides population trend data for seven bat species: common pipistrelle, soprano pipistrelle, Leisler's bat, Nathusius' pipistrelle, Daubenton's bat, brown long-eared bat and lesser horseshoe bat (some limited data for *Myotis* species). There is currently no systematic monitoring surveys for Natterer's bat and whiskered bat. Annual reporting is undertaken and the most recent report (Aughney *et al.*, 2023) is referenced for this report. In summary, the population trends for each bat species are as follows:

- Trends of the three common bat species (common pipistrelle, soprano pipistrelle and Leisler's bat) continued to increase in 2022, although the yearly estimates of common pipistrelle levelled out a little. Confidence intervals of these three bat species were all above their baseline indices indicating they each show a significantly increasing trend.

- Nathusius' pipistrelle trends are still unclear due to low encounter rates but decreased a little in 2022 compared to previous years.
- The yearly estimate for the *Myotis* spp. group steadied out a little but overall the smoothed trend for this group is still well below the baseline.
- Daubenton's bat numbers trend line appears to be fairly steady from year to year with error bars consistently encompassing the baseline.
- Brown long-eared bat shows a fluctuating trend around the baseline and is considered to be currently stable.
- Lesser horseshoe bat continue to increase in 2022 for the summer counts while low winter counts caused a slight downward trend in 2022. But overall, this species has increased over the last 20 years of monitoring.

### 1.1.3 Bat Mitigation Measures

#### 1.1.3.1 Bats & Lighting

All European bat species, including Irish bat species, are nocturnal. Light levels as low as typical full moon levels, i.e. around 0.1 LUX, can alter the flight activity of bats (Voigt *et al.* 2018). Any level of artificial light above that of moonlight can mask the natural rhythms of lunar sky brightness and, thus, can disrupt patterns of foraging and mating and might, for instance, interfere with entrainment of the circadian system.

Artificial light pollution is an increasing global problem (Rich and Longcore, 2006) and Artificial light at night (ALAN) is considered a major threat to biodiversity, especially to nocturnal species. As urbanisation expands into the landscape, the degree of street lighting also expands. Its ecological impacts can have a profound affect the behaviour of nocturnal animals including impacts on reproductive behaviours, orientation, predator-prey interaction and competition among others, depending on the taxon and ecosystem in question (Longcore and Rich 2004). It is considered by Hölker *et al.* (2010) to be a key biodiversity threat to biodiversity conservation. In relation to bats, the potential impacts of artificial night lighting can result in habitat fragmentation (Hanski, 1998), delay in roost emergence (Downs *et al.*, 2003) and a reduction in prey items.

In the context of behavioural ecology, lights can work to attract or repel certain animals. Many groups of insects, including moths, lacewings, beetles, bugs, caddisflies, crane flies, midges, hoverflies and wasps, can be attracted to artificial light (Eisenbeis and Hassel 2000; Frank 1988; Kolligs 2000). Attraction depends on the spectrum of light. In the context of street lights, white (mercury vapour) lamps emit a white light that includes ultraviolet. High pressure sodium lights (yellow) emit some ultraviolet, while low pressure sodium lamps (orange) emit no ultraviolet light (e.g. Rydell 2006). As a result of the attractiveness of lights to aerial invertebrates, swarms of insects often occur in and around street lights and, particular bat species such as aerial insect predators, can exploit the swarming insects to their advantage. Such attraction can also take prey items away from dark zones where light sensitive species are foraging, thus reducing their likelihood of feeding effectively.

Rydell (2006) divides bats into four categories in terms of their characteristic behaviours at street lamps. The four categories are based on bat size, wing morphology and echolocation call characteristics which were highlighted by Norberg and Rayner (1987) to determine flight speed, manoeuvrability, and prey detection capabilities of bats. Rydell (2006) stated that the large, fast flying bats, which are confined to open airspace, fly high over lit areas and are rarely observed near ground level. None of these, typically large free-tailed bats (e.g. large species of the family Molossidae), are found in Ireland. The second category are the medium-sized fast flying species, including the *Nyctalus* species, which patrol the street well above the lights and can be seen occasionally as they

dive for prey into the light cone. This group includes the Leisler's bat, which is found in Ireland. Rydell's third category describes the small but fast flying bats that are manoeuvrable enough to forage around light posts or under the lights, and includes the small *Pipistrellus* species of the old world, three of which are found in Ireland. The fourth category includes broad-winged slow flyers, most of which are seldom or never observed at lights. Slow flying bat species may be more vulnerable to predation by diurnal birds of prey and this may restrict their exploitation of insects around artificially illuminated areas (e.g. Speakman 1991). There are also the concerns that some bat species are more light sensitive and therefore actively avoid lit up areas. This is particularly relevant for lesser horseshoe bats. Therefore from this, we can categorise the suite of Irish bats species as follows (please note that the sensitivity category is the author's description):

**Table 2a: Potential light sensitivity of the Irish bat fauna using categories described by Rydell, 2006.**

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

The ability of different bat species to exploit insects gathered around street lights varies greatly. Gleaning species such as *Myotis* bats rarely forage around street lights (Rydell and Racey, 1995). The ecological effects of illuminating aquatic habitats are also poorly known. Moore *et al.* (2006) found that light levels in an urban lake, subject simply to sky glow and not direct illumination from lights, reached the same order of magnitude as full moonlight.

All European bat species, including Irish bat species, are nocturnal. As a consequence, the scientific literature provides evidence that artificial lighting does impacts on bats. The degree of impact depends on the light sensitivity of the bat species and the type of luminaire. Lesser horseshoe bats are light sensitive and therefore adversely effected by the presence of lighting in all aspects of their life strategies (e.g. foraging, commuting, drinking and roosting).

The potential impacts of street lighting can be summarised as follows:

- Attracting Prey Items

Lights can work to attract or repel certain animals. Many groups of insects can be attracted to artificial light and this attraction depends on the spectrum of light. As a result of the attractiveness of lights to aerial invertebrates, swarms of insects often occur in and around street lights. Such attraction can

also take prey items away from dark zones where light sensitive species, such as lesser horseshoe bats, are foraging, thus reducing their likelihood of feeding effectively.

- Reducing Foraging Habitat

The research documents that there is less bat species diversity foraging in habitats lit up by artificial lighting. Only bat species considered to be light tolerant are generally able to exploit habitats with lighting present, but overall, all bat species activity tends to be less in lit up habitats compared to non-lit up habitats.

- Fragmenting The Landscape

Scientific evidence shows that lighting is a barrier to the movement of light sensitive bat species, such as lesser horseshoe bats. Light sensitive bat species will actively seek dark corridors to commute along and therefore the presence of lighting in commuting habitats will restrict their movement of such species in the landscape.

- Reducing Drinking Sites

There is increasing evidence that drinking sites for bats is an essential component for local bat population survival and that the presence of artificial lighting at waterbodies prevents bats from availing of this resource.

Lighting, including street lights come in an array of different types but for street lights they typically include High Pressure Sodium, Low Pressure Sodium, Mercury Vapour and the more modern Light Emitting Diodes (LED). An array of field-based research has been undertaken to document the potential impact of lighting on bat flight activity. LED lighting is predicted to constitute 70% of the outdoor and residential lighting markets by 2020. While the use of LEDs promotes energy and cost savings relative to traditional lighting technologies, little is known about the effects these broad-spectrum “white” lights will have on wildlife, human health, animal welfare, and disease transmission. As a consequence, a large array of research has been undertaken recently on the potential impact of LED on bats.

Stone *et al.* (2012) undertook research in relation to “Cool” LED street lights on an array of local bat species in England. Overall the presence of LED street lights had a significant negative impact on lesser horseshoe bats and *Myotis* spp. for all light treatments investigated while there was no sign impact of light treatment type on *Pipistrellus pygmaeus* (soprano pipistrelle – a common Irish bat species) or *Nyctalus* (Leisler’s bats is part of this bat family and is a common Irish bat species)/*Eptesicus* species. This research paper also documented behavioural changes for the different bat species. Lesser horseshoe bats and *Myotis* spp. did not avoid lights by flying along the other side of the hedge but altered their commuting behaviour altogether. It was concluded that LEDs can fragment commuting routes causing bats to alter their behaviour with potentially negative conservation consequences. Lesser horseshoe bat activity was significantly lower during high intensity treatment than medium, but at all treatment levels (even as low as 3.6 LUX), activity was significantly lower than unlit control (LUX level measurements were taken at 1.7m at the hedge below the light).

Russo *et al.* (2017) investigated the impact of LED lighting on drinking areas for bats in Italy. Drinking sites are considered to be important components for the survival of local bat populations. Drinking sites were illuminated with a portable LED outdoor light emitting (48 high-power LEDs generated a light intensity of 6480 lm (4000–4500 K) at 25°C, two peaks of relative luminous flux at 450 and 590 nm). *Plecotus auritus* (brown long-eared bat – resident in Ireland), *Pipistrellus pygmaeus* (soprano

pipistrelle – resident in Ireland) and *Rhinolophus hipposideros* (lesser horseshoe bat – resident in Ireland) did not drink when troughs were illuminated.

Rowse *et al.* (2018) researched the impacts of LED lights (portable lights, 97W 4250K LED on 10m high poles) in England on local bat populations. Treatments were either 100% light intensity; dimmed (using pulse width modulation) at 50% or 25% light intensity; and unlit. Sites were in suburban areas along busy roads but with vegetation and tree lines adjacent. High light levels (50% & 100% light treatments) increased activity of opportunistic *Pipistrellus pipistrellus* (common pipistrelle – resident in Ireland) but reduced activity of *Myotis* species group. Conversely 25% and unlit sites had no difference from each other. The research paper conclude that dimming could be an effective strategy to mitigate ecological impacts of street lights.

Wakefield *et al.* (2017) stated that an important factor to be aware of in relation to LED is the direction of the light projected. Therefore it is recommended that highly focused/shielded LEDs designed to filter out short wavelengths of light may should be used as they attract relatively fewer insects. Less insects attracted to street lights means less insects leaving dark zones where light sensitive bat species primarily feed.

Martin *et al.* (2021) showed that LED street lights lead to a reduction in the total number of insects captured with light traps in a wide range of families. Coleoptera and Lepidoptera orders were the most sensitive groups to ecological light pollution in the study area. The paper suggested that LED was the least attractive light system for most of the affected groups both because of its very little emitted short-wavelength light and because of its lower light intensity. They also concluded that reduction in insect attraction to LED could be even larger with current LED technologies emitting warmer lights, since other research showed that LED emitting “warmer white” colour light (3000 K) involves significantly lower attraction for insects than “colder white” LED (6000 K).

Wilson *et al.* (2021) investigate the impact of LED on biting insects and concluded because LED is highly malleable with regard to spectral composition, they can be tailored to decrease or increase insect catches, depending on situation. Therefore this design control of LED could greatly assist in reducing impact of street lighting on local bat populations.

Stone *et al.* (2015) reviewed the impacts of ALAN on bat roosts and flight paths in order to provide recommendations in relation to street lighting. The principal recommendations were to avoid lighting places where bats are present and to ensure that there are interconnected light exclusion zones and variable light regimes with reduced intensity of light in specific areas (e.g. important foraging and commuting habitats) as responses to street lighting may vary between species. It recommends that there should be a 'light threshold'.

#### *1.1.3.1.1 Lighting Guidelines – Effective Mitigation Measures*

As a consequence of this extensive amount of research there are two principal guideline documents available for best practice for effective mitigation relating to outdoor lighting.

EUROBATS (Voigt *et al.*, 2018) guidelines recommends the following:

- ALAN should be strictly avoided, and artificial lighting should be installed only where and when necessary coupled with the following:
  - o Dynamic lighting schemes, where possible.
  - o Use a minimal number of lighting points and luminaires on low positions in relation to the ground for minimising light trespass to adjacent bat habitats or into the sky.

- Use focused light, e.g. by using LED or shielded luminaires which limit the light flux only to the required areas and prevent light trespass into adjacent bat habitats.
- Create screens, either by erecting walls or by planting hedgerows or trees, to prevent light trespass, e.g. from illuminated roads, to surrounding bat habitats.
- Exits of bat roosts and a buffer zone around them should be protected from direct or indirect lighting to preserve the natural circadian rhythm of bats.

This BCT (2018) guidelines provided a list of recommendations in relation to luminaire design, which was based on the extensive research completed at the time on the potential impact of lighting on bats, and therefore provides best practice mitigation measures. These recommendations have been updated with the new BCT (2023) guidelines:

- All luminaires should lack UV elements when manufactured. Metal halide, compact fluorescent sources should not be used.
- LED luminaires should be used where possible due to their sharp-cut-off, lower intensity, good colour rendition and dimming capability,
- A warm white light source (2700 Kelvin or lower) should be adopted to reduce blue light component.
- Light sources should feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats.

***DEFINITION: Red Light refers to the light sources in the red spectrum and mainly consist of long wavelength light above 600nm with an RA value of 60 (for good colour recognition). This wavelength of light is considered to have the least impact on bats.***

- Internal luminaires can be recessed (as opposed to using a pendant fitting) where installed in proximity to windows to reduce glare and light spill.
- Waymarking inground markers (low output with cowls or similar to minimised upward light spill) to delineate path edges.
- Column heights should be carefully considered to minimise light spill and glare visibility. This should be balanced with the potential for increased numbers of columns and upward light reflectance as with bollards.
- Only luminaires with a negligible or zero Upward Light Ratio, and with good optical control, should be considered.
- Luminaires should always be mounted horizontally, with no light output above 90° and/or no upward tilt.
- Where appropriate, external security light should be set on motion sensors and set to as short a possible a timer as the risk assessment will allow (e.g. 1-2 minute timer).
- Use of a Central Management System (CMS) with additional web-enabled devices to light on demand.
- Use of motion sensors for the local authority street lighting may not be feasible unless the authority has the potential for smart metering through a CMS.
- The use of bollard or low-level downward-directional luminaires is strongly discouraged.
- Only if all other options have been explored, accessories such as baffles, hoods or louvres can be used to reduce light spill and direct it only to where it is needed.

Due to the large array of research undertaken on the potential impact of ALAN on bats, the new guidelines from the BCT (2023) has provided an updated table on the potential impact of ALAN on UK bat species. Extracting data from this table, the following is a summary of the effect of LAN on Irish Bat species. Please note that this information is drawn from European studies and as does not have information for all Irish bat species for each of the various topics listed, it is indicative only.

**Table 2b: Potential light sensitivity of the Irish bat fauna using categories described by Rydell, 2006.**

**YELLOW:** Positive effect **GREY:** No effect **BLUE:** Negative effect **NA:** No data available

Species	Roost	Flight Corridor	Foraging Area	Drinking Site	Migration	Landscape Level	Habitat Type
Lesser horseshoe bat	BLUE	BLUE	NA	NA	NA	BLUE	Clutter
Brown long-eared bat	BLUE	BLUE	BLUE	BLUE	NA	BLUE	Clutter
Natterer's bat	BLUE	NA	NA	BLUE	NA	NA	Clutter
Daubenton's bat	NA	GREY	BLUE	NA	NA	BLUE	Edge
Whiskered bat	NA	NA	NA	NA	NA	NA	Edge
Common pipistrelle	NA	GREY	GREY	BLUE	NA	GREEN	Edge
Soprano pipistrelle	BLUE	GREY	GREY	NA	BLUE	GREY	Edge
Nathusius' pipistrelle	NA	NA	NA	NA	BLUE	GREEN	Edge
Leisler's bat	NA	NA	NA	GREY	NA	YELLOW	Open

BCT (2023) also state key messages in this document, some of which are presented below:

**Key Message 1.18**

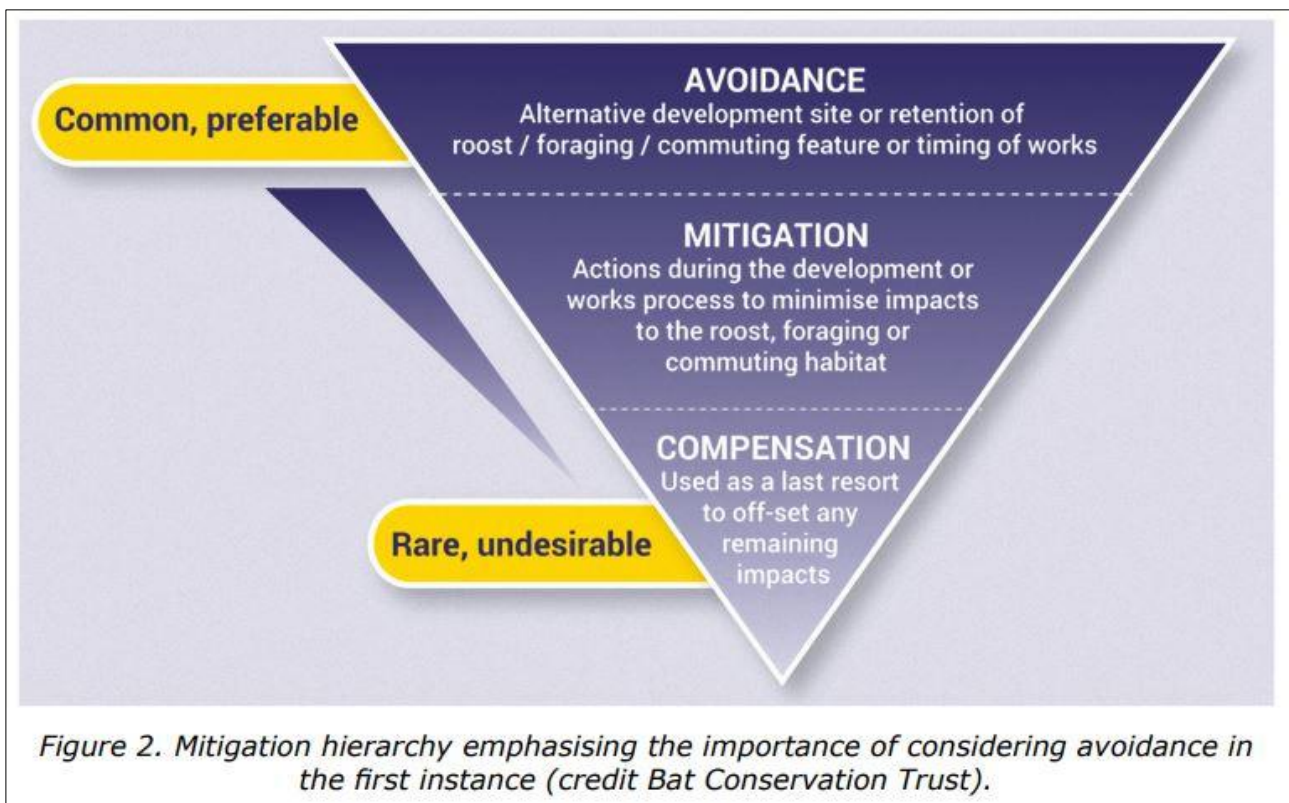
“It is important to minimised ALAN close to vegetation, particularly for slower-flying species, and the need to increase dense vegetation in urban landscape to provide, not just roosting opportunities, but also protection against ALAN for open-space foraging bats in city landscapes”.

**Key Message 1.20**

“When considering how bats move through the landscape, ALAN has been shown to be particularly harmful along river corridors, near woodland edges and hedgerows”.

**Key Message 1.39**

“This research highlights the importance of integrating avoidance measures (as per the first step of the mitigation hierarchy see Figure 2) into the development design, by retaining ecologically functional ‘dark corridors’ within scheme where feasible, and in preference to seeking lighting mitigation strategies”.



**Figure 1e:** Taken from BCT (2023) – Mitigation Hierarchy.

### Key Message 3.13

“There are no lux level thresholds available for individual species to negate the need for site specific advice. Every site is different ... The key in the first instance is to maintain or reduce existing light levels, and reduce blue content to protect the bat species present ... Ideally light levels should always be designed to minimise potential environmental impacts and to maximise the potential of habitat and species enhancement work ...”

#### 1.1.3.2 Landscaping For Bats

Bats depend on the landscape for foraging, roosting and commuting. Different bat species will travel different distances, to and from their principal roosting sites, depending on their morphology, life stage and preferred foraging areas. Bats in Ireland are insect eating mammals and feed on an array of insects, whose populations are ultimately supported by vegetation. Areas of rich vegetation habitat tend to support higher abundances of insect populations and therefore a higher abundance of bats. In addition, many bat species rely on continuous linear habitats (e.g. treelines and hedgerows) to commute along. As a consequence landscaping as part of a proposed development project is an important element to the goal of retaining local bat populations.

The Bat Conservation Trust publication “Landscape and Urban Design for bats and biodiversity” (Gunnell *et al.*, 2012) is a resource for planning landscape design in our urban areas. This resource encourages measures to enhance existing bat foraging habitat, create water features such as ponds (drinking sites for bats and as a source of emerging insects), manage species rich grassland and planting of tall vegetation to ensure that existing treelines and hedgerows are linked. It also recommends that use of landscaping as a means to creating dark zones or dark corridors for this mammal group to fly along in our lit urban areas. This is also support by the BCT Lighting Guidelines (BCT, 2018) where landscape design can be utilised to buffer potential light spillage from developments.

## 1.2 Project Location

The proposed development is located on lands north of the Clones Road, Monaghan Town, Co. Monaghan. Currently there is a large agricultural field with treeline and hedgerow boundaries. Adjacent to the field is a residential access to existing bungalow along with associated buildings. There are a number of agricultural sheds to the rear of the bungalow.



Figure 2a: Red line boundary of proposed development Cornacassa, Monaghan Town.

### 1.3 Proposed Development Details

The development shall consist of the following:

1. Demolition of a derelict bungalow (H18 R681), boundary walls, associated outbuildings and agricultural sheds.
2. Erection of 70no. housing units comprising of:
  - 1no. 5 bed semi-detached part one storey, part two storey unit
  - 19no. 2 bed semi-detached/ terraced two storey units
  - 32no. 3 bed semi-detached/ terraced two storey units
  - 2no. 4 bed semi-detached two storey units
  - 15no. 2 bed semi-detached/ terraced bungalows
  - 1no. 5 bed detached bungalow
3. Proposed new access road from the public road, car parking and bicycle parking provision, boundary fencing, hard and soft site landscaping works, new playground, public lighting, new pumping station, connection to public sewer, watermain and surface water and all associated site works.



Figure 2b: Layout of proposed development Comacassa, Monaghan Town.

## 2. Survey Methodology

### 2.1 Guidance Document

This report will draw on guidelines already available in Europe and will use the following documents:

- Collins, J. (Editor) (2023) *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (4<sup>th</sup> edition). Bat Conservation Trust, London
- 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 (Version 1: Kelleher & Marnell, 2006).

Collins (2023) was the principal document used to provide guidance in relation to bat survey effort required. Marnell *et al.* (2022) is referred to for guidance in relation to survey guidance (timing and survey design), derogation licences and mitigation measures.

### 2.2 Desktop Review

#### 2.2.1 *Bat Conservation Ireland Database*

Bat Conservation Ireland acts as the central depository for bat records for the Republic of Ireland. Its' bat database is comprised of >100,000 bat records. The database primarily contains bat records from the following datasets:

- Irish Bat Monitoring Programme
- BATLAS 2020 & 2010
- Ad Hoc Bat Records submitted by ecologist bat groups etc.

The Bat Conservation Ireland database was accessed on 25<sup>th</sup> September 2025 to collated bat records for a 1km radius of the proposed development site (H6581633298).

An important caveat to note is that the BCIreland dataset is dependent on bat records being regularly submitted to BCIreland and/or NBDC. Therefore, the absence of information does not necessarily imply that there are no bats or bat roosts present in the search area.

#### 2.2.2 *Bat Conservation Landscape Favourability*

Bat Conservation Ireland (BCIreland) produced a landscape conservation guide for Irish bat species using their database of species records collated during the 2000 – 2009 survey seasons. An analysis of the habitat and landscape associations of all bat species deemed resident in Ireland was undertaken and reported in Lundy *et al.* (2011). This model was queried on 25<sup>th</sup> September 2025.

The geographical area suitable for individual species was used to identify the core favourable areas of each species. This was produced as a GIS layer for local authorities and planners in order to provide a guide for the consideration of bat conservation. The island is divided into 5km squares and the landscape favourability (expressed as a percentage, the higher the value, the greater the favourability) of each 5km square for each species of bat was modelled. A caveat is attached to the model: the model is based on records held on the Bat Conservation Ireland database, while core areas have been identified, areas outside the core area should not be discounted as unimportant as bats are a landscape species and can travel many kilometres between roosts and foraging areas nightly and seasonally. This model was used as part of the desktop study for this report.

## 2.3 Daytime Inspection

### 2.3.1 Trees

The mature trees were inspected during the daytime on 15<sup>th</sup> September 2025. 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 Collins (2016 & 2023). The Potential Roost Features (PRFs) listed in BTHK (2018) were used to determine the PBR value of trees. A ground-level search to look for Potential Roost Features (PRFs) was undertaken.

Trees identified as PBRs were inspected during the daytime, where possible, for evidence of bat usage. Evidence of bat usage is in the form of actual bats (visible or audible), bat droppings, urine staining, grease marks (oily secretions from glands present) and claw marks. In addition, the presence of bat fly pupae (bat parasite) also indicated that bat usage of a crevice, for example, has occurred in the past. Inspections were undertaken visually with the aid of a strong torch beam (LED Lenser P14.2) during the daytime searching for PRFs, if visible.

**Table 3a: Tree Bat Roost Category Classification System (adapted from Collins, 2016 & 2023).**

<b>Tree Category</b>	<b>Description</b>
1 High	Trees with multiple, highly suitable features (Potential Roosting Features = PRFs) capable of supporting larger roosts (Collins (2023) = PRF-I)
2 Moderate	Trees with definite bat potential but supporting features (PRFs) suitable for use by individual bats (Collins (2023) = PRF-M)
3 Low	Trees have no obvious potential although the tree is of a size and age that elevated surveys may result in cracks or crevices being found or the tree supports some features (PRFs) which may have limited potential to support bats;
4 Negligible	Trees have no potential.

## 2.4 Night-time Surveys

The following handheld bat detectors were used:

- Surveyor 1: Anabat Walkabout Full Spectrum Bat Detector
- Surveyor 2: BatLogger M3 Full Spectrum Bat Detector
- Surveyor 3: Anabat Scout Full Spectrum Bat Detector

A Night Vision Aids (NVA) was used to support dusk surveys. The following NVA was used:

- A Guide TrackIR Pro25 thermal imagery scope
- FLIR Scion OTM255 thermal imaging camera
- HikMicro thermal imaging scope

### 2.4.1 Dusk Bat Survey & Walking Transect

Dusk surveys of the buildings were completed on the 25<sup>th</sup> and 28<sup>th</sup> August 2025. Surveys of buildings were undertaken to record if there are any roosts located within the survey area. Post dusk survey on 28<sup>th</sup> August 2025, a walking transect of grounds proposed to be developed (Figure 3).

The survey started 15 minutes prior to sunset and was undertaken for 2 hours of surveying. Survey was completed during mild and dry weather conditions. Preparation for dusk survey started approximately 60 minutes prior to sunset and the following actions were undertaken:

- Re-inspection of building to be surveyed to determine surveyor and filming locations (external and internal (where possible) inspections).
- Internal inspection of building (applicable only to derelict structures and agricultural buildings) to document any visible bats or audible noises (bats are more audible prior to dusk activity).
- Positioning of filming equipment and surveyor.
- Completion of dusk survey.
- Post surveys, a repeat internal inspection of the surveyed building was undertaken (only applicable only to derelict structures and agricultural buildings) to document any visible bats within the structure.

All audio files recorded by full spectrum bat detectors were analysed using Wildlife Acoustics Kaleidoscope Pro and validation of bat records was completed by the principal bat surveyor prior to mapping. This data was then entered onto an Excel file for mapping. All filming was watched post surveys and any emerging bats were noted and compared to audio recordings also recorded by surveyors.

#### 2.4.2 *Static Surveillance*

Static bat surveys involved leaving a static bat detector unit (with ultrasonic microphone) in a specific location, set to record for a specified period of time (i.e. a bat detector is left in the field, there is no observer present and bats which pass near enough to the monitoring unit are recorded and their calls are stored for analysis post surveying). The bat detector was effectively used as a bat activity data logger. This results in a far greater sampling effort over a shorter period of time and increases the opportunity to record less common bat species as the units are set to continuously record ultrasonic noise, when triggered, from 30 minutes for sunset to 30 minutes after sunrise. Bat detectors with ultrasonic microphones were used as the ultrasonic calls produced by bats cannot be heard by human hearing.

The microphone of the unit was positioned horizontally to reduce potential damage from rain. The static units deployed use Real Time recording as a technique to record bat echolocation calls and using specific software, the recorded calls are identified. It is these sonograms (2-d sound pictures) that are digitally stored on the SD card (or micro SD cards depending on the model) and downloaded for analysis. These results are depicted on a graph showing the number of bat passes per species per night. Each bat pass does not correlate to an individual bat but is representative of bat activity levels. Some species such as the pipistrelles will continuously fly around a habitat and therefore it is likely that a series of bat passes within a similar time frame is one individual bat. On the other hand, Leisler's bats tend to travel through an area quickly and therefore an individual sequence or bat pass is more likely to be indicative of individual bats.

Recordings were analysed using Wildlife Acoustics Kaleidoscope Pro. Manual validation was undertaken by the principal bat specialist and the following rules were followed:

- Validation that the auto-id function was checked for at least 20% of *Pipistrellus* spp. and Leisler's bat calls apart from Nathusius' pipistrelle calls.
- All Nathusius' pipistrelles calls were manually verified. The reasoning for this is due to frequently misidentification of low 40kHz calls, by auto-id tools, as this species, which may in fact be low frequency common pipistrelle calls.

- All brown long-eared bat calls were manually verified. The reasoning for this due to frequently misidentification of social calls of *Pipistrellus* spp. frequently identified as this bat species.
- Manual verification of *Myotis* spp., where possible, to species level in order to increase the accuracy of the dataset. Where such calls cannot be identified to species level, they are reported as *Myotis* spp.
- Manual validation was undertaken for all “Unidentified” calls and for approximately 20% proportion of “Noise” calls.

Each audio file was noted as a bat pass to indicate level of bat activity for each species recorded. This was expressed as the average number of bat passes per survey night (no. of nights was the total number successful nights of deployment).

The following static unit model were deployed during this static bat detector survey:

**Table 3b: Static Bat Detectors deployed during Static Bat Detector Surveys.**

Static Unit Code	Bat Detector Type	Recording Function	Microphone
SM Mini Bat 1 Units	Wildlife Acoustics SongMeter Mini Bat 2 FS	Passive Full Spectrum	SMM-U2

Static surveillance consisted of seven static units within the proposed development area as presented on Figure 3, three units in buildings and four units on trees along linear habitats.

- o 25<sup>th</sup> to 30<sup>th</sup> August 2025 (3 units, 5 nights) & 8<sup>th</sup> to 14<sup>th</sup> September 2025 (4 units, 6 nights)



Figure 3: Locations of static units deployed in 2025 and walking transect route.

### 3. Bat Survey Results

#### 3.1 Desktop Review

##### 3.1.1 Bat Conservation Ireland Database

A total of two geo-referenced bat records were available for the 1km search area. The number of records for each of the bat species is listed in the table below and this includes two bat detector records.

**Table 4a: Bat Records (Source: Bat Conservation Ireland).**

Bat species	No. of records		Bat species	No. of records	
	Roost	Detector		Roost	Detector
Common pipistrelle	0	0	Soprano pipistrelle	0	1
Nathusius' pipistrelle	0	0	Leisler's bat	0	0
Daubenton's bat	0	1	Whiskered bat	0	0
Brown long-eared bat	0	0	Natterer's bat	0	0
Pipistrelle spp	0	0	Myotis spp	0	0

##### 3.1.2 Bat Conservation Landscape Favourability

The BC Ireland Landscape Favourability Model (Lundy *et al.*, 2011) was investigated as part of this desktop review. The island of Ireland is divided into 5km squares and the darker the shading of the square, the higher favourability of the 5km square for bats. The favourability of the square is represented by a percentage for each bat species, with higher values representing higher level of favourability. Each 5km square is labelled numerically and the exact percentage favourability of each of the two squares for all species of bats recorded is presented in the table below.

**Table 4b: Percentage Landscape Favourability for each 5km for Irish bat species (Lundy *et al.*, 2011).**

Square No.	All bat spp.	SP	CP	Nath Pip	Leis	BLE	Daub	Natt	Whis
1	36%	53%	54%	25%	53%	42%	47%	30%	18%

Note: SP = soprano pipistrelle, CP = common pipistrelle, Nath Pip = Nathusius' pipistrelle, Leis = Leisler's bat, BLE = brown long-eared bat, Daub = Daubenton's bat, Natt = Natterer's bat, Whis = whiskered bat.

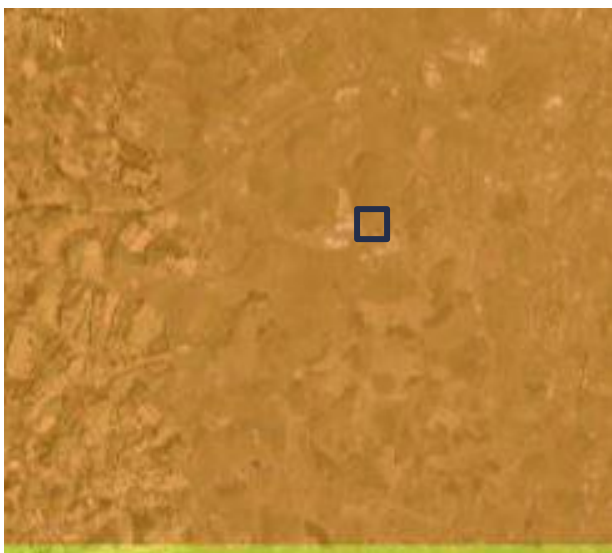


Figure 4a: Bat Conservation Ireland Landscape Favourability Model for 5km squares where the proposed development site is located in County Monaghan (Source: Bat Conservation Ireland Landscape Model). Proposed development site is marked in Dark Blue Square.

### 3.2 Daytime Inspection

#### 3.2.1 Buildings

The proposed development site was inspected to determine the roost potential of buildings located within the proposed development area. Two of the buildings have a low potential while the glass house have no potential to provide roosting for bats.

**Table 4c: Potential Bat Roost (PBR) trees.**

Building No.	Description	Proposed Works	Bat Value
<b>Bungalow (1)</b>	Modern building with tiled roof.	To be demolished	Moderate value – loft space. Bat droppings present.
<b>Garage (2)</b>	shed constructed from concrete block and corrugated iron sheets.	To be demolished	Low – large space with loft (felt with chicken wire). No evidence of bat usage.
<b>Shed A (3)</b>	Large shed constructed from concrete block and corrugated iron sheets. Boards on sections of the roof. Timber partition walls.	To be demolished	Low – large open space, open at either end of the structure (a lot of light egress), boards on sections of the roof may provide roosting space. No evidence of bat usage.
<b>Shed B (4)</b>	Concrete block shed with iron corrugate roof. Boards on sections of the roof, roof felt and chicken wire.	To be demolished	Low – boards on sections of the roof may provide roosting space. No evidence of bat usage.
<b>Shed C (5)</b>	Series of sheds in poor condition, partial collapse of roofs	To be demolished	Negligible



Figure 4b: Location of buildings surveyed, Cornacassa, Monaghan Town, Co. Monaghan.



Plate 1: Bungalow (Building 1), Cornacassa, Monaghan Town, Co. Monaghan.



Plate 2a, b: External and internal photographs of Garage (Building 2), Cornacassa, Monaghan Town, Co. Monaghan.



Plate 3: Internal photograph of Shed A (Building 3), Cornacassa, Monaghan Town, Co. Monaghan.



Plate 4: External photograph of Shed C (Building 5), Cornacassa, Monaghan Town, Co. Monaghan.



Plate 5a, b: Internal photographs of Shed B (Building 4), Cornacassa, Monaghan Town, Co. Monaghan.

### 3.2.2 Trees

The trees were assessed from the ground to determine their Potential Bat Roost (PBR) value with reference to the tree survey report. A list of trees is recommended to be felled by the arborist. These trees are list below along with the Potential Roost Features (PRFs) noted and their PBR value.

**Table 4d: Ground assessment of trees within St. Louis Convent grounds.**

Tree Tag No.	Tree Species	PRFs	PBR Value
No. 5	Ash	Mature tree with dead wood and tree holes	Category 2
No. 12	Ash	Mature tree with dead wood and tree holes	Category 2
No. 15	Beech	Mature tree with dead wood and tree holes	Category 2
No. 17	Ash	Mature tree with dead wood and tree holes	Category 2
No. 18	Beech	Mature tree with dead wood and tree holes	Category 2
No. 20	Beech	Mature tree with dead wood and tree holes	Category 2
No. 21	Beech	Mature tree with dead wood and tree holes	Category 2
No. 24	Beech	Dead stump, isolated	Category 3
No. 25	Beech	Mature tree with dead wood and tree holes	Category 2

### 3.3 Night-time Survey

The following are the results of the array of bat surveys undertaken. All of the results are combined to produce distribution maps for each of the bat species recorded.

#### 3.3.1 Dusk Survey

##### 3.3.1.1 Night 1 – 25<sup>th</sup> August 2025

Two surveyors and two NVAs were set up within the two large sheds (Shed A and Shed B) to determine if these buildings were bat roosts. Surveyor 1, located in Shed B, recorded a single brown long-eared bat roosting behind the boards. This bat emerged at 20:55 (Red circle) and 20:56 hrs (Red X), flew around the internal space of the building and while one individual returned to roost behind the board at 21:05 hrs. This was confirmed by the thermal imagery filming.

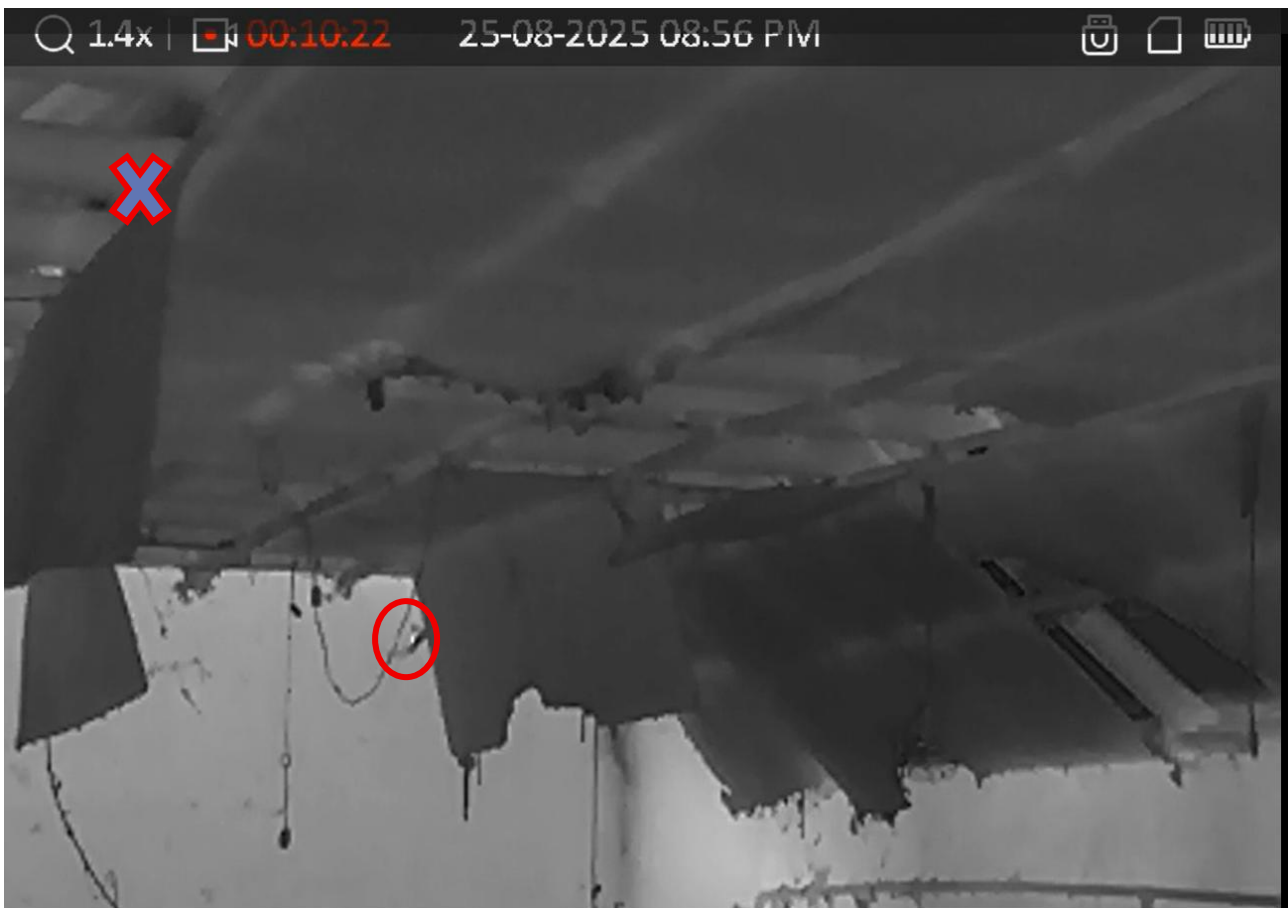


Figure 5a: Screenshot of thermal imagery footage recording emerging bat from boards (Shed B).

Surveyor 2, located in Shed A, recorded common pipistrelles (2 individuals, 20:49 hrs and 20:53 hrs) and a soprano pipistrelle (at 20:52 hrs) emerging from boards on the roof on the left hand-side of the building. These bats flew inside the building for approximately 10 minutes before exiting through the open gable.

### 3.3.1.2 Night 2 – 28<sup>th</sup> August 2025

Surveying was concentrated on the bungalow and garage building during this survey. The first brown long-eared bat emerged at 21:12 hrs and a total of 17 individuals were recorded emerging during the survey. This was captured on thermal imagery filming. The number of bats indicates that this is likely to be a maternity roost.



Figure 5b: Screenshot of thermal imagery footage on Night 2 (25mm) – brown long-eared bat exit point at apex of roof (gable of bungalow).



Plate 6: Exit point for brown long-eared bats from roof space of bungalow (Red circle).

The static unit located in the attic space also confirmed that there was roosting brown long-eared bats. Bat passes for this bat species were recorded at dusk and at dawn indicating emerging and returning bats, respectively. For example, on 25<sup>th</sup> August 2025, brown long-eared bat activity was recorded from 20:19 hrs to 21:16 hrs (period of preparation for emergence, 28 bat passes). Some activity was recorded again from 00:43 hrs to 00:46 hrs and may indicate a single bat returning to the roosts as there were only 4 bat passes during this time period. Then around dawn, the bats started to return from 05:16 hrs with a total of 147 bats passes recorded from this time till 06:40 hrs. Typically this species of bat will fly around the roof space prior to settling down for the day and

therefore this accounts for the large number of bat passes (i.e. bat passes are an indication of bat activity and does not correspond to number of actual bats present).

No bats were recorded exiting from the garage (Building 2) during the dusk survey and this was confirmed by the thermal imagery filming. The static unit located in this building also confirmed that there were no bats roosting in the building.

### 3.3.2 Walking Transect

Four species of bat was recorded during the walking transect completed on 28<sup>th</sup> August 2025: soprano pipistrelle, Leisler's bat. Daubenton's bat and common pipistrelle.

### 3.3.3 Static Surveillance

Two static surveillance periods were undertake. The first period refers to Static 1, 2 and 3 which were located inside buildings and presented in text to support the dusk survey results. The second period, which will be presented in this section, refers to statics located along linear habitats. This was undertaken to guide the potential location of a bat house to replace the brown long-eared roost in the bungalow (Static 4, 5, 6 and 7).

The static surveillance provided evidence of the importance of the deciduous linear boundary habitat as a commuting route for local bat populations. Brown long-eared bats were recorded on all static units, with the higher level of activity at Static 5, which is the proposed location for a replacement bat house. This bat house will also have rooting provision for all bat species recorded during this survey.

A total of seven bat species were recorded. Soprano pipistrelle was the most frequently recorded bat species with common pipistrelle, the second most recorded bat species. Both bat species are Ireland's commonest bats. While brown long-eared bat appears to have a much lower activity level, the echolocation call produced by this bat is very quiet compared to *Pipistrellus* species and therefore, the level of activity recorded is indicative that there is a local roost as recorded in the bungalow within the proposed development area. All other bat species were recorded at a low level of activity.

**Table 4e: Static Surveillance results – total number of bat passes recorded on units.**

Static No.	Common pipistrelle	Soprano pipistrelle	Leisler's bat	Nathusius' pipistrelle	Daubenton's bat	Natterer's bat	Brown long-eared bat	No. of Nights
Static 4	67	203	30	2	2	2	18	6
Static 5	37	182	26	1	5	0	45	6
Static 6	26	124	13	0	9	0	3	6
Static 7	89	97	16	0	0	0	18	6

### 3.3.4 Bat Distribution Maps

The follow maps present all of the bat survey data and the distribution of such data for each bat species recorded.

- Soprano pipistrelles and common pipistrelles were the most frequently recorded bat species and also recorded throughout the survey area. Both species have a similar distribution.
- Brown long-eared bat was only recorded during the static surveillance. This is a quiet echolocating bat species and therefore difficult to pick up during walking transects. However, static surveillance is an ideal method to record its presence and it was recorded in association with the treeline boundary of the proposed development site.
- Leisler's bats were infrequently recorded, primarily on static units deployed.
- Nathusius' pipistrelle was only recorded during the static surveillance at two locations. This bat species is new to the Irish list and tends to be found in areas with large lakes or area with numerous lakes. The Nathusius' Pipistrelle Working Group and Cavan Bat Group (the author is a member of both groups) have undertaken research on the distribution of this bat species in the County Cavan and as result County Cavan is proving to be a stronghold county for Nathusius' pipistrelle in the Republic of Ireland (Aughney *et al.*, 2023). Since there is a similar spread of large waterbodies in County Monaghan, it is likely that this county is also favourable for this species of bat.
- Daubenton's bat recorded at was recorded on three static unit locations and one additional geo-referenced location during the walking transect. In relation to Natterer's bat, this species was only recorded on the static unit located outside the proposed development area but adjacent to deciduous woodland to the west. These are less frequent bat species and therefore they are difficult to pick up during walking transects. However, static surveillance is an ideal method to recorded its presence.



Figure 6a: Soprano pipistrelle bat encounters within survey area.



Figure 6b: Common pipistrelle bat encounters within survey area.



Figure 6c: Leisler's bat and Nathusius' pipistrelle encounters within survey area.



Figure 6d: Brown long-eared bat encounters within survey area.



Figure 6e: Daubenton's bat and Natterer's bat encounters within survey area.

## 4. Site Evaluation

The BC Ireland landscape favourability model indicates that the survey area has a Moderate importance for local bat populations.

The survey site was surveyed according to Collins (2023). The night-time bat surveys completed recorded a total of seven bat species: Daubenton's bat, brown long-eared bat, Leisler's bat, common pipistrelle, Nathusius' pipistrelle and soprano pipistrelle.

A brown long-eared bat maternity roost was recorded in the bungalow, while day roosts were recorded in Shed A (brown long-eared bat) and Shed B (common pipistrelle and soprano pipistrelle).

The following are the main summary points of the distribution of each bat species:

- Soprano pipistrelles and common pipistrelles were the most frequently recorded bat species and also recorded throughout the survey area.
- Brown long-eared bat was recorded in association with the treeline boundary of the proposed development site.
- Leisler's bats was infrequently recorded, primarily on static units deployed.
- Nathusius' pipistrelle was only recorded during the static surveillance at two locations.
- Daubenton's bat recorded at was recorded on three static unit locations and one additional geo-referenced location during the walking transect. In relation to Natterer's bat, this species was only recorded on the static unit located outside the proposed development area but adjacent to deciduous woodland to the west.

As a consequence, this site is of high local importance for local bat populations.

### Leisler's bat

- o Leisler's bat is an Annex IV bat species under the EU Habitats Directive. The status of this bat species is listed as Least Concern. The national Leisler's bat population is considered to be significantly increasing (Aughney *et al.*, 2021).
- o The modelled Core Area for Leisler's bats is a relatively large area that covers much of the island of Ireland (52,820km<sup>2</sup>). The Bat Conservation Ireland Irish Landscape Model indicated that the Leisler's bat habitat preference has been difficult to define in Ireland. Habitat modelling for Ireland shows an association with riparian habitats and woodlands (Roche *et al.*, 2014). The landscape model emphasised that this is a species that cannot be defined by habitats preference at a local scale compared to other Irish bat species but that it is a landscape species and has a habitat preference at a scale of 20.5km.
- o The population estimates (2023 figures) indicates that population is between 112,800 and 202,300 individuals and this represents a 49.92% increase compared to 2012 population estimates (Roche & Langton, 2024).

The overall trend for the national population of Leisler's bat in Article 17 reporting (NPWS, 2019) is as follows:

- Range = Favourable
- Population = Favourable
- Habitat for species = Favourable
- Overall Assessment of Conservation Status = Favourable
- Overall trend in Conservation Status = Improving

### **Common pipistrelle**

- Common pipistrelle is an Annex IV bat species under the EU Habitats Directive. The status of this bat species is listed as Least Concern. The national common pipistrelle population is considered to be significantly increasing (Aughney *et al.*, 2021).
- The modelled Core Area for common pipistrelle is a relatively large area that covers much of the island of Ireland (56,485km<sup>2</sup>). The Bat Conservation Ireland Irish Landscape Model indicated that the common pipistrelle selects areas with broadleaf woodland, riparian habitats and low density urbanization (<30%) (Roche *et al.*, 2014).
- The population estimates (2023 figures) indicates that population is between 1,074,000 and 2,416,500 individuals and this represents a 75.4% increase compared to 2012 population estimates (Roche & Langton, 2024).

The overall trend for the national population of common pipistrelle in Article 17 reporting (NPWS, 2019) is as follows:

- Range = Favourable
- Population = Favourable
- Habitat for species = Favourable
- Overall Assessment of Conservation Status = Favourable
- Overall trend in Conservation Status = Improving

### **Soprano pipistrelle**

- Soprano pipistrelle is an Annex IV bat species under the EU Habitats Directive. The status of this bat species is listed as Least Concern. The national soprano pipistrelle population is considered to be significantly increasing (Aughney *et al.*, 2021).
- The modelled Core Area for soprano pipistrelle is a relatively large area that covers much of the island of Ireland (62,020km<sup>2</sup>). The Bat Conservation Ireland Irish Landscape Model indicated that the soprano pipistrelle selects areas with broadleaf woodland, riparian habitats and low density urbanisation (Roche *et al.*, 2014).
- The population estimates (2023 figures) indicates that population is between 1,204,800 and 2,709,600 individuals and this represents a 140.2% increase compared to 2012 population estimates (Roche & Langton, 2024).

The overall trend for the national population of soprano pipistrelle in Article 17 reporting (NPWS, 2019) is as follows:

- Range = Favourable
- Population = Favourable
- Habitat for species = Favourable
- Overall Assessment of Conservation Status = Favourable
- Overall trend in Conservation Status = Improving

### **Daubenton's Bat**

- Daubenton's bat is an Annex IV bat species under the EU Habitats Directive. The status of this bat species is listed as Least Concern. The national Daubenton's bat population is considered to be stable (Aughney *et al.*, 2021).
- The modelled Core Area for Daubenton's bat is (41,285 km<sup>2</sup>) reflecting the distribution of sizeable river catchments. The Irish Landscape Model indicated that the Daubenton's bat habitat preference is for areas with broadleaf woodland, riparian habitats and low density urbanisation (Roche *et al.*, 2014).

- The population estimates (2023 figures) indicates that population is between 56,500 and 76,500 individuals and this this represents a 1.24% decrease compared to 2012 population estimates (Roche & Langton, 2024).

The overall trend for the national population of Daubenton's bat in Article 17 reporting (NPWS, 2019) is as follows:

- Range = Favourable
- Population = Favourable
- Habitat for species = Favourable
- Overall Assessment of Conservation Status = Favourable
- Overall trend in Conservation Status = Stable

### **Nathusius' pipistrelle**

- Nathusius' pipistrelle is an Annex IV bat species under the EU Habitats Directive. The status of this bat species is listed as Least Concern. The national Nathusius' pipistrelle population is unknown due to a paucity of information (Aughney *et al.*, 2021).
- The modelled Core Area for Nathusius' pipistrelle is a relatively restricted area (13,543km<sup>2</sup>) and these areas are primarily associated with large water bodies such as Lough Neagh and the Lough Erne complex. The Bat Conservation Ireland Irish Landscape Model indicated that the Nathusius' pipistrelle habitat preference is large waterbodies (Roche *et al.*, 2014). But due to the paucity of information on this species, the knowledge of this species preference in Ireland is limited, any records recorded for this species is important.

### **Brown long-eared bat**

- Brown long-eared bat is an Annex IV bat species under the EU Habitats Directive. The status of this bat species is listed as Least Concern. The national brown long-eared bat population is considered to be stable (Aughney *et al.*, 2021).
- The modelled Core Area for brown long-eared bat is a relatively large area that covers much of the island of Ireland (49,929 km<sup>2</sup>). The Bat Conservation Ireland Irish Landscape Model indicated that the brown long-eared bat habitat preference is for areas with broadleaf woodland and riparian habitats on a small scale of 0.5km emphasising the importance of local landscape features for this species (Roche *et al.*, 2014).
- The population estimates (2023 figures) indicates that population is between 65,200 and 102,000 individuals and this this represents a 5.18% increase compared to 2012 population estimates (Roche & Langton, 2024).

The overall trend for the national population of brown long-eared bat in Article 17 reporting (NPWS, 2019) is as follows:

- Range = Favourable
- Population = Favourable
- Habitat for species = Favourable
- Overall Assessment of Conservation Status = Favourable
- Overall trend in Conservation Status = Stable

### **Natterer's bat**

- Natterer's bat is an Annex IV bat species under the EU Habitats Directive. The status of this bat species is listed as Least Concern.
- The modelled Core Area for Natterer's bat is a relatively large area that covers much of the island of Ireland (52,864km<sup>2</sup>). The Bat Conservation Ireland Irish Landscape Model indicated that the Natterer's bat selects areas with broadleaf woodland, riparian habitats and areas with larger scale provision of mixed forest (Roche *et al.*, 2014).

The overall trend for the national population of Natterer's bat in Article 17 reporting (NPWS, 2019) is as follows:

- Range = Favourable
- Population = Favourable
- Habitat for species = Favourable
- Overall Assessment of Conservation Status = Favourable
- Overall trend in Conservation Status = Stable

The results of the survey documents that the proposed development area is a roosting site for three species of bat and is also used as a commuting and foraging resource for local bat populations comprised of seven bat species. The bat species recorded are all in favourable conservation status.

## 5. Potential Impacts

The potential impacts of the proposed development on local bat populations within the project area are considered across each phase in terms of the following aspects, where relevant :

### Construction Phase

- Loss of a maternity roost and three day roost due to the demolition of existing buildings,
- Potential loss of tree roosts in trees proposed to be felled;
- Disturbance due to increased lighting;
- Disturbance due to increased noise;
- Loss of foraging habitat to facilitate construction of proposed development;

### Operation Phase

- Disturbance due to increased lighting;
- Disturbance due to increased noise;

The degree of potential impact varies depending on the bat species and the type of roosts recorded and their location relative to the proposed development.

Brown long-eared bat is a “light-sensitive” less common bat species and this was recorded roosting in two buildings, one of which is a maternity roost. The building that this species of bat was recorded roosting in are proposed to be demolished as part of the development. The potential impacts of the proposed development, during construction, is deemed to be **Negative, Significant** impacts in the **long-term**. The third building was recorded as a day roost for common pipistrelle and soprano pipistrelle, Ireland’s two most common bat species. Therefore, the potential impact for the loss of this building is **Negative, Not Significant** impacts in the **long-term**.

In relation to commuting and foraging bats, a total of seven bat species were recorded within the survey area. While the linear habitats of the proposed development area are to be retained, some mature trees are proposed to be felled and the internal linear habitats adjacent to existing buildings will be removed and the agricultural field will be developed. Therefore the potential impacts of the proposed development will remove commuting and foraging habitat for local bat populations. The impacts, during construction, is deemed to be **Negative, Not Significant** impacts in the **long-term**.

The operation of the proposed development will increase lighting and noise in vicinity and therefore there are potential impacts on local bat populations commuting and foraging within the proposed development. However, there are two Public Greens and one Public Amenity Space proposed. This offers alternative foraging and commuting habitat for local bat populations, particularly the light tolerant bat species (Leisler’s bat) and semi-light tolerant bat species (i.e. common and soprano pipistrelles) which reduces the potential impacts of the proposed development during the operational phase. In addition, as there are large area of woodland adjacent to the proposed development, the potential impacts of the proposed development, during operation, is deemed to be **Negative, Not Significant** impacts in the **Medium-term**.

Bat mitigation measures are required to reduce the potential impacts on local bat populations, particularly in relation to the roost loss.

## 6. Bat Mitigation Measures

Due to the fact that the proposed development requires the demolition of all buildings, a derogation licence is required to permit the loss of the bat roosts recorded:

- Brown long-eared bat maternity roost in the bungalow
- Common pipistrelle and soprano pipistrelle day roost in Shed A
- Brown long-eared bat day roost in Shed B

### 6.1 Mitigation Measures

Mitigation measures are required to be put in place to reduce this potential impact. The result of the summer bat survey will determine the bat mitigation measures required. Provisionally, the following will be required in relation to any outdoor lighting proposed.

#### 6.1.1 NPWS Derogation Licence

Apply for a derogation licence (at least a 4 week procedure).

#### 6.1.2 Alternative Bat Roosts

The provision of alternative bat roosts can be in the form of bat box schemes and/or the construction of species-specific bat houses. Marnell *et al.* (2022) provides guidance in relation to appropriate mitigation for different Irish bat species and the type of roosts recorded, depending on the roost status (e.g. maternity roosts). Bat boxes are acceptable for the provision of alternative roosts for bat species proven to use such while bat houses are increasingly constructed for the replacement of more important roosts (i.e. maternity roosts). Therefore, both type of alternative measures will be applied here. The Bat House is primarily designed to meet the alternative roosting requirements for brown long-eared bat maternity roost. The design was successfully used for common pipistrelles in another project and for whiskered bat and brown long-eared bats in a second separate project and therefore will be suitable for this project. Additional bat tubes will be designed into the fabric of the bat house to provide additional roosting for species such as soprano pipistrelle, Daubenton's bat and Leisler's bat (all bat species recorded by Bat Eco Services Ltd. to roost in bat tubes). This will ensure that the Bat House provides alternative roosting for all bat species recorded roosting in the buildings proposed to be demolished and also cater for the array of roost types recorded. Bat boxes are also recommended to provide additional alternative roosting for all bat species recorded.

##### 6.1.2.1 Bat House

The bat house design presented below is based on successful bat houses designed by Bat Eco Services Ltd. and constructed as mitigation for other projects. The details of Oldstreet Bat House is presented as a case study in Appendix 8.1.

The proposed location of the Bat House is in the northern corner of the proposed development site, adjacent to existing woodland, a location where the highest level of brown long-eared bat activity was recorded (apart from the existing bat roost itself) and where there is a proposed maintenance building for the proposed development (i.e. Pumping House Station). The latter provides additional exclusion from the day-to-day operation of the site with a Public Green acting as a buffer zone (vegetation buffer) from the day-to-day operation of the site.

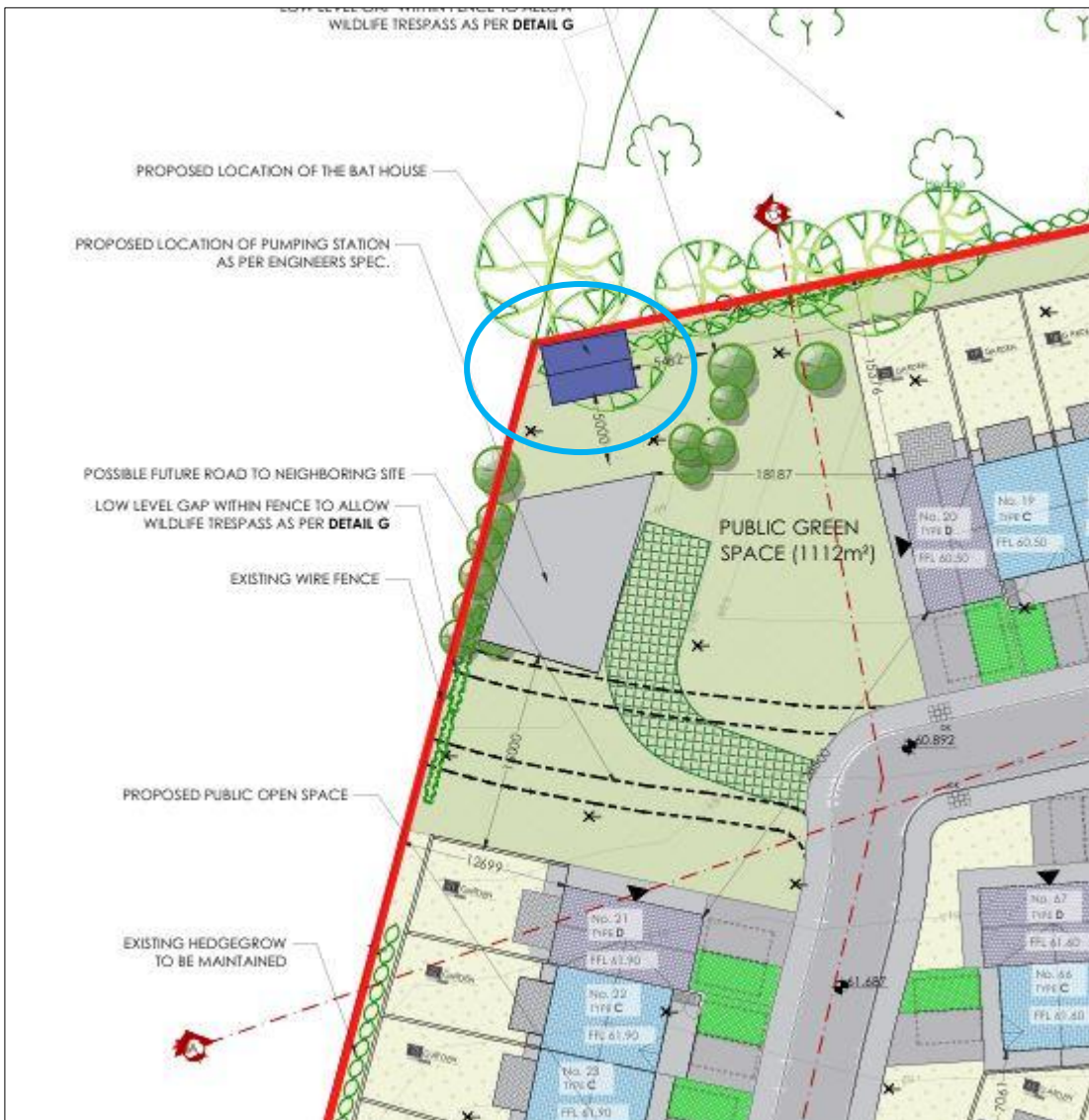


Figure 7: Proposed location of bat house, in Public Green, north of Pumping Hs Station.

The following design has different dimensions because it is to fit in with exiting plans and in order to cater for the ecological roosting requirements of brown long-eared bats:

- 3m x 7m (internal floor space) 1½ storey (internal height of 4.5m from floor level to highest point of roof space) building constructed from concrete block rendered with plastered externally (no plaster required internally).
- A-roof, constructed of natural slate and 1F bitumous felt (no modern breathable felt is to be used in the bat house) on timber joists (9 x 2 inch joists). There is an attic space with loft entrance internally from the ground floor. The timber joists of the loft space is constructed in a traditional manner to ensure that the arrangement of the timbers provide the bats with an uncluttered in which to fly. The modern pre-formed roof trusses are generally unsuitable for bat species as they tend to have more timbers across their giving more obstacles for bats to fly around. A pitched roof creates thermal gradient for bats and should be constructed of local material, preferably natural slate.
- Entrance points along the facia and soffit (small sections of the soffit will be left out to provide gaps for the bats to enter the loft space) and additional access points will be provide by the use of bat slates (2 units) which will be inserted into the roof during constructed (ensuring that the felt is cut to allow bats to crawl through the bat slate and into the roof void).
- The ground floor entrance will be a solid door (locked).

- Facia/Soffit and drain pipes required. Sections of the soffit will be left off to allow bats to enter the loft space (30cm sections in four areas – to be decided in consultation with the bat specialist).
- Four bat slates will be inserted into the roof, 3 on the roof elevation facing the existing deciduous woodland and the 4<sup>th</sup> on the roof elevation facing the Pump house Station. These are designed according to the VWT Bat Slate and will be inserted at the exact positions determined by the bat specialist during supervision of works.
- Six bat tubes will be inserted into the external fabric of the gable walls (i.e. a total of 12 bat tubes). These are inserted side-by-side similar to that undertaken for the Oldstreet Bat House (See Appendix 8.1).

Internally, the following is recommended:

- The floor of the building is to be a layer of crushed stone (2/3 inch down) (minimum use of concrete is recommended in order to reduce the negative impact of this material on the thermal conditions of the building) with a upper layer of 804 Clause (crushed) stone.
- A loft space is to be constructed. A floor is to be constructed dividing the building into a ground floor and loft floor. Timber joists (9x2 inch timber) will be sheathed with marine ply wood (leaving the timber joists exposed at the ground floor level (i.e. under the ply wood sheets) – this will provide additional roosting space for bats).
- In order to achieve a minimum loft space of 24m<sup>3</sup> (Lintott & Mathews, 2018), the height of the loft is a minimum of 2.5m from the internal apex of the roof. However, if at all possible, once access is possible to existing house, an examination of the current loft space may result in small tweaks to this design.
- To allow bats to fly between the loft and ground floor, the trap door opening should remain open.
- Ladder will be provided and remain in the structure to allow human access to loft to undertake monitoring of this section of the bat house.
- The floor of the loft should be insulated (underneath the floor – i.e. ceiling side of the ground floor) to ensure that solar heating of the loft is retained within the loft space.
- Additional bat tubes will be hung inside bat house, within the ground floor space at the highest point tuck up against the ceiling of the loft (See Appendix 8.1 for details).

### 6.1.2.2 Bat Boxes

A bat scheme is recommended both as a conservation measure and to provide alternative roosts, particularly if there are any proposed tree felling of parkland trees. These will be erected prior 6 months to tree felling to allow local bat populations to become aware of it prior to removal of the structure.

- Summer Bat Boxes (1FF Schwegler woodcrete or similar design) – 6 bat boxes will be erected on mature trees within the proposed development site.

Bat boxes will be erected prior to tree felling or tree surgery works. Some general points that will be followed include:

- Straight limb trees (or telegraph pole) with no crowding branches or other obstructions for at least 3 metres above and below position of bat box will be used.
- Diameter of tree will be wide and strong enough to hold the required number of boxes.
- Locate bat boxes in areas where bats are known to forage or adjacent to suitable foraging areas. Locations will be sheltered from prevailing winds.

- Bat boxes will be erected at a height of 4-5 metres to reduce the potential of vandalism and predation of resident bats.
- It is recommended to erect a number of bat boxes on one tree at an array of aspects. South facing boxes will receive the warmth of the sun, which is necessary for maternity colonies. In large bat box scheme it is generally recommended to have three bat boxes arranged at the same height facing North, South-East and South-West. This ensures a range of temperatures are available all day. If the South facing boxes become warm, bats can safely remove to the cooler North facing box.
- Locations for bat boxes will be selected to ensure that the lighting plan for the proposed site does not impact on the bat boxes.

It is important to note that the construction of the bat house is required to be in place prior to any demolition of buildings and a degree of proof that the building is “fit for purpose” is also needed. This will be undertaken as part of monitoring of the bat house through the use of temperature data loggers and static bat detectors to ensure that the internal loft temperature is suitable for roosting bats and that any bat usage is recorded, respectively.

### *6.1.3 Demolition of Buildings*

The proposed development will require that all existing buildings are demolished. As a number of these were recorded as a bat roost, a derogation licence is required and this will be applied for prior planning.

#### **6.1.3.1 Bungalow**

As this building was recorded as a brown long-eared maternity roost, this building can only be demolished outside the maternity season (i.e. not in the months of May to September).

The demolition procedure will require the following elements in relation to the treatment of bats:

- Dusk survey prior to demolition to determine if any bats are present;
- Ridge tiles, tiles, fascia & soffit will removed hand under supervision by the bat specialist;
- The internal space of the attic and roof felt will be inspected for any roosting bats and removed to safety (place in the bat house by the bat specialist).
- The finer details will need to be finalised with the contractor.

#### **6.1.3.2 Agricultural Sheds**

As these buildings were recorded as a brown long-eared bat, common pipistrelle and soprano pipistrelle day roosts, these buildings can only be demolished outside the maternity season (i.e. not in the months of May to September) to reduce the likelihood of encountering pregnant or suckling females.

The demolition procedure will require the following elements in relation to the treatment of bats:

- Dusk survey prior to demolition to determine if any bats are present;
- Roof boards will be removed hand under supervision by the bat specialist;
- The internal space of the buildings will be inspected for any roosting bats and removed to safety (place in the bat house by the bat specialist).
- The finer details will need to be finalised with the contractor.

#### 6.1.4 Outdoor Lighting

Bats are light sensitive bats species, hence their nocturnal activities and where possible, no lighting is the Best Practice to prevent an impact on nocturnal wildlife as lighting is a barrier to movement and therefore impacts on feeding, commuting and potentially roosting.

Where lighting is required, luminaire design is extremely important to achieve an appropriate lighting regime. Luminaires come in a myriad of different styles, applications and specifications which a lighting professional can help to select. The following should be considered when choosing luminaires. This is taken from the most recent BCT Lighting Guidelines (BCT, 2023). It is important that the client checks that any outdoor lighting meets the following guidelines:

- No lighting should be erected in vicinity of the Bat House and the linear boundary habitats for 100m either side of the bat house location.
- Lighting associated with the buildings must meet the guidelines below to reduce the impact on local bat populations.

Where lighting is deemed necessary, the following are required:

- All luminaires should lack UV elements when manufactured. Metal halide, compact fluorescent sources should not be used.
- LED luminaires should be used where possible due to their sharp-cut-off, lower intensity, good colour rendition and dimming capability,
- A warm white light source (2700 Kelvin or lower) should be adopted to reduce blue light component of luminaires. A 2700 Kelvin luminaire appears as a warm yellow due to the reduction in the stark blue light associated with higher Kelvin values (e.g. 4000 Kelvins). The “warmer” the light, the less of an impact on nocturnal wildlife. The progression of LED technology means that the majority of luminaires are available at 2700 Kelvins and lower. Therefore, it is recommended that such luminaires are standard for “biodiversity areas”. The lower the Kelvin level the more Yellow the light appears.
- Light sources should feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats.
- Internal luminaires, in relation to buildings within the proposed development area, can be recessed (as opposed to using a pendant fitting) where installed in proximity to windows to reduce glare and light spill.
- Waymarking inground markers (low output with cowls or similar to minimised upward light spill) to delineate path edges, if required, for pedestrian zones within the proposed development area should be used.
- Column heights should be carefully considered to minimise light spill and glare visibility. This should be balanced with the potential for increased numbers of columns and upward light reflectance as with bollards.
- Only luminaires with a negligible or zero Upward Light Ratio, and with good optical control, should be considered.
- Luminaires should always be mounted horizontally, with no light output above 90° and/or no upward tilt.
- Where appropriate, external security light should be set on motion sensors and set to as short a possible a timer as the risk assessment will allow (e.g. 1-2 minute timer).
- Only if all other options have been explored, accessories such as baffles, hoods or louvres can be used to reduce light spill and direct it only to where it is needed.

Any external lighting for the proposed development should strictly follow the above guidelines and these should be strictly implemented during construction and operation phase of the proposed development.

#### *6.1.5 Vegetation Removal & Tre Felling*

It is recommended that vegetation removal is kept to a minimum and undertaken at the appropriate time of year. It is recommended that large mature trees are retained and protected. If tree surgery works are required for trees listed in Table 4c, further bat survey work is required and consultation with the bat specialist and tree surgeon is recommended. Bat boxes are required to be erected to provide alternative roosts and any tree surgery should only be undertaken outside the bird nesting season.

The procedure to fell the PBR trees is as follows:

- Trees with roosting features (dead wood, tree holes etc.) will be checked prior to felling by physically checking the features (using an endoscope and high power torch) and/or a dusk/dawn surveys will be completed to determine if bats are roosting within. A tree felling plan will be required in consultation with the tree surgeons. A bat box scheme will be erected prior to felling and in consultation with the bat specialist. Any trees showing crevices, hollows, etc., will be removed while a bat specialist is present to deal with any bats found. Such animals should be retained in a box until dusk and released on-site. Large mature trees will be felled carefully, essentially by gradual dismantling of larger limbs by tree surgeons, under supervision of a bat specialist. Care will be taken when removing branches as removal of loads may cause cracks or crevices to close, crushing any animals within.
- Any ivy covered trees which require felling will be left to lie for 24 hours after cutting to allow any bats beneath the cover to escape.

#### *6.1.6 Landscaping*

To increase the success of the bat house, it is important that the landscaping is design to increase tall deciduous vegetation in vicinity of the proposed bat house and connected to the boundary linear habitat features. This is to ensure that there is a dark corridor of vegetation available to the commuting and foraging for light sensitive bat species such a brown long-eared bats. Therefore the following key elements are required for the landscape plan:

- Only deciduous tree and shrubs are used in landscape with a preference for native tree and shrub species.
- The bat house is located adjacent to existing woodland and is surrounded by a newly planted native treeline/hedgerow to prevent lighting spill and to reduce noise from operation of the proposed development. This planting will be at a distance of 5m from the external foot print of the Bat House to allow maintenance and to prevent shading on the bat house to ensure that there is maximum solar heating of the roof.
- The linear habitats that are connected to the bat house are required to be enhanced to ensure that there is a dense tall vegetation treeline/hedgerow to provide commuting and foraging habitat.
- It is recommended that where possible, a great level of individual trees are planted to provide foraging habitat in area such as the Public Greens (x2) and Public Amenity Space. Such planting should include a mix of Oak, Birch, Mountain ash, Crab apple, Hazel and Alder trees, all of which are native plant species.
- New hedgerows should be planted with hawthorn, blackthorn, holly, alder and hazel native plant species.

### *6.1.7 Construction Environmental Management Plan*

A Construction Environmental management Plan (CEMP) is recommended to reduce potential pollution from any proposed work

## 7. Survey Conclusions

The survey site was surveyed according to Collins (2023). The night-time bat surveys completed recorded a total of seven bat species: Daubenton's bat, brown long-eared bat, Leisler's bat, common pipistrelle, Nathusius' pipistrelle and soprano pipistrelle.

A brown long-eared bat maternity roost was recorded in the bungalow, while day roosts were recorded in Shed A (brown long-eared bat) and Shed B (common pipistrelle and soprano pipistrelle). The proposed development will require the demolition of existing buildings which will result in the loss of bat roosts. Therefore, extensive bat mitigation measures will be required in order to reduce the potential impact of the development, and this will require an NPWS Derogation Licence.

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## 9. Appendices

### 9.1 Appendix 1 – Bat Houses

It is proposed that a purposed built bat house is constructed to provide alternative roosting for Soprano pipistrelle roosts recorded. The location of any bat houses should be located at least 25m from the boundary of the proposed road scheme with dense landscape planting between the bat houses perimeter (this perimeter is the landscape planting boundary of the bat house – i.e. a separate landscape boundary is required to be planted around the bat house at a 10m distance from the bat houses). Therefore the nearest boundary of the bat house is to be at least 25m from the road scheme landscape planting.

The following design is based on that recently constructed for Common pipistrelles at Oldstreet Substation, Co. Galway (permission granted by ESB and EirGrid to use the bat design drawing). However, due to the fact that the bat house required for this site needs to fit in an area most suitable for brown long-eared bats (i.e. corner of site adjacent to existing deciduous woodland), the dimensions area changed, but also to ensure that there is sufficient loft volume that is suitable for brown long-eared bats.

This Oldstreet Bat House consisted the following design features:

- 4m x4m (internal floor space) 1½ storey (internal height of 4.5m from floor level to highest point of roof space) building constructed from concrete block rendered with plaster (insulation between the two walls).
- A-roof, constructed of natural slate and 1F bitumous felt (no modern breathable felt is to be used in the bat house) on timber joists (9 x 2 inch joists). There is an attic space with loft entrance internally from the ground floor.
- Entrance points along the fascia and soffit (sections of the soffit will be left out to provide gaps for the bats to enter the loft space). Additional access points will be provide by the use of bat slates (2 units) which will be inserted into the roof during constructed (ensuring that the felt is cut to allow bats to crawl through the bat slate and into the roof void).
- The ground floor entrance will be a solid door (locked).
- Fascia/Soffit and drain pipes required. Sections of the soffit will be left off to allow bats to enter the loft space (30cm sections in four areas – to be decided in consultation with the bat specialist).

Internally, the following is recommended:

- The floor of the building is to be a layer of crushed stone (2/3 inch down) (minimum use of concrete is recommended in order to reduce the negative impact of this material on the thermal conditions of the building) with a upper layer of 804 Clause (crushed) stone.
- A loft space is to be constructed. A floor is to be constructed dividing the building into a ground floor and loft floor. Timber joists (9x2 inch timber) will be sheeted with marine ply wood (leaving the timber joists exposed at the ground floor level (i.e. under the ply wood sheets) – this will provide additional roosting space for bats).
- In order to achieve a loft space of 24m<sup>3</sup> (Lintott & Mathews, 2018), the height of the loft is a minimum of 1.5m from the internal apex of the roof. However, if at all possible, once access is possible to existing house, an examination of the current loft space may result in small tweaks to this design.
- To allow bats to fly between the loft and ground floor, the trap door opening should remain open.





Open trap door and insulated ceiling (ground floor) of Oldstreet Substation Bat House, Co. Galway.

### **Additional roosting**

- External walls

9 Bat Tubes were along the external front wall to provide roosting sites for crevice dwelling bats. These were inserted at a minimum of 3m height.

[Bat Tube 1FR and 2FR - Veldshop.nl](http://Veldshop.nl) – please see illustrations of bat tubes and there construction as a façade part of the wall.



Series of Bat Tubes inserted into the external wall of Oldstreet Substation Bat House, Co. Galway (pre-plaster).



Finished bat house with bat tubes (south facing external wall), Oldstreet Substation Bat House, Co. Galway.

On the north facing aspect of the wall, 4 winter bat boxes were inserted individually into the wall. Again these were built into the wall at the highest point to ensure that the exit points at the base of the bat boxes are 3.2m off the ground (to prevent predation of emerging bats).

[Winter Batbox 2WI - Veldshop.nl](http://www.veldshop.nl) – please see link for illustrations and descriptions of this type of bat box.



Winter Bat Boxes inserted into wall, prior to plastering (Oldstreet Substation bat House, Co. Galway).



Winter Bat Boxes inserted into wall, post plastering (Oldstreet Substation bat House, Co. Galway).

- Internal walls

10 units of bat tubes (1 FR), were hung on the walls on the ground floor level (attached to the wall at the highest point possible).



Bat Tubes fixed onto internal ground floor wall (Oldstreet Substation bat House, Co. Galway).