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ENVIRONMENTAL SCIENCE &
PLANNING

ASSESSMENT FOR ANNEX IV SPECIES (BATS) FOR WHITESTOWN UNAUTHORISED LANDFILL, CO. WICKLOW

Assessment for Annex IV Species (Bats)

Prepared for:
Wicklow County Council



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Assessment for Annex IV Species (Bats) - Whitestown Unauthorised Landfill, Co. Wicklow

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1. INTRODUCTION

Fehily Timoney and Company (FT) was commissioned by Wicklow County Council to prepare an Assessment for Annex IV species (bats) for the final draft remediation plan for Whitestown unauthorised landfill to comply with a High Court order made on 17 July 2017 for the remediation of the site.

Whitestown unauthorised landfill is 14.5 ha and surrounded by agricultural land. This site originally operated as a quarry prior to the deposition of waste. The site is located approximately 2.6 km southwest of Donard Village along the N81 (see Figure 1-1 for location). To facilitate the site description, data gathering, and site assessment, the site was divided into seven Zones, A to G, as outlined in Figure 3-1. The section of Metcalf's lands to the north of Zone G located between the site and the Carrigower River have also been included in the study area. It is noted that the Zone boundaries are indicative as opposed to being definitive boundaries.

This report has been prepared to inform the competent authority in completing their statutory obligations in relation to 'Strictly Protected' animals under Article 12 of the Council Directive 92/43/EEC (Habitats Directive) as implemented in Ireland under the European Communities (Birds and Natural Habitats) Regulations 2011 to 2021.

The original Regulation 54 derogation licence application for bat at the Whitestown unauthorised landfill site was submitted in October 2024. The following response was received from the NPWS licencing department on the 21st of October 2022, stating:

"We notice the surveys mentioned in the report were conducted in August, September and December of last year. Unfortunately, given the amount of time that has now transpired since these surveys were initially conducted means the information is now outdated and cannot be assessed as a result. Could you please resubmit a report with updated survey results included and we can consider your application further."

The justification for the licence under 54(2) of the EC (Birds and Natural Habitats) Regulations 2011 – 2021 is also stated on the application form as being (a - In the interests of protecting wild flora and fauna and conserving natural habitats) and (b - To prevent serious damage, in particular to crops, livestock, forests, fisheries and water and other types of property). The report however makes reference to 54(2)(c) - In the interests of public health and public safety, or for other imperative reasons of overriding public interest, including those of a social or economic nature and beneficial consequences of primary importance for the environment. Could you please clarify under what regulation the application qualifies for a derogation licence and provide a detailed explanation as to why.

Once we have the above information, we can consider your application further."

This report provides the results of additional surveys undertaken in 2023 in response to this request for further information.



1.1 Legislative Context

Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (Habitats Directive) provides legal protection for habitats and species of European importance. This Directive ensures the conservation of a wide range of rare, threatened or endemic habitats, animal and plant species. Articles 3 to 9 provide the legislative means to protect habitats and species of community interest through the establishment and conservation of an EU-wide network of sites known as Natura 2000 sites.

However, Annex IV of the Habitats Directive lists species that require ‘Strict Protection’ throughout their whole territory within EU Member States. Animal (fauna) species are listed under Annex IV(a). Article 12 (Fauna) and 13 (Flora) of the Habitats Directive requires member states to establish a system of ‘Strict Protection’ for Annex IV species, while Article 16 provides for derogations from these provisions in limited circumstances. Article 12, 13 and 16 of the Habitats Directive are transposed into Irish law by Regulation 51, 52 and 54 (respectively) of the European Communities (Birds and Natural Habitats) Regulations 2011 to 2021.

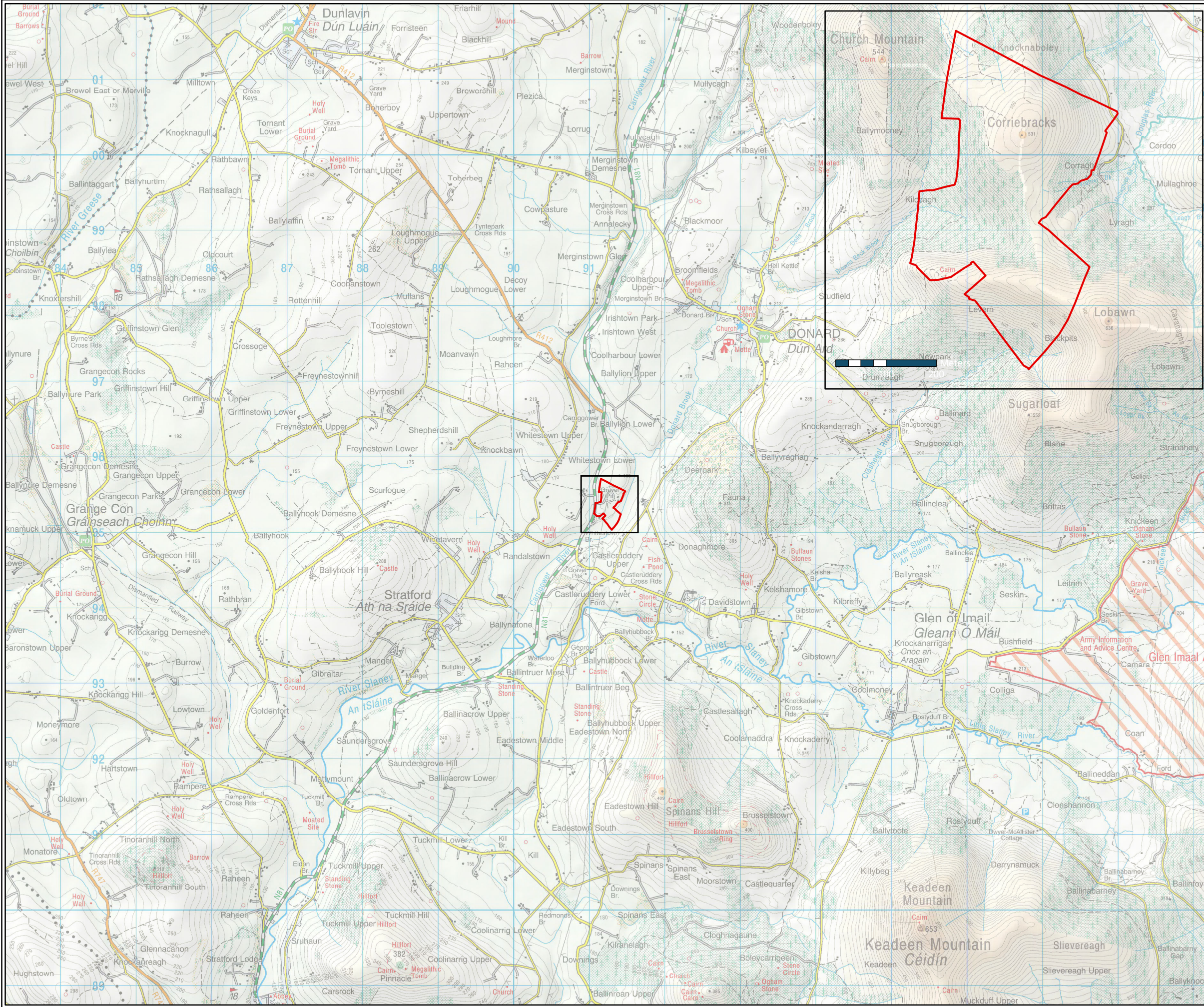
The duties of public authorities relating to nature conservation are set out in Regulation 27 of the EC (Birds and Natural Habitats) Regulations 2011 to 2021. This includes the requirement for public authorities when exercising their functions (including consent functions) to ensure compliance with the requirements of the Habitats Directive and the EC (Birds and Natural Habitats) Regulations 2011 to 2021. Public authorities are required to take appropriate steps to avoid pollution or deterioration of habitats and ensure compliance with the strict protection of Annex IV species.

The fauna species listed in Annex IV(a) which occur in Ireland are as follows:

- Kerry slug,
- Otter,
- Natterjack toad
- All bats,
- Marine turtles
- All cetaceans (whales and dolphins)

All of these species have ‘Strict Protection’ in Ireland. A person who deliberately captures, kills or disturbs a specimen in the wild, who deliberately destroys or takes their eggs from the wild, or who damages or destroys a breeding site or resting place of such an animal, is guilty of an offence. Of the animal and plant species on Annex IV known to occur in Ireland, the following species were identified as relevant to the proposed remediation plan:

- Bats



Site Boundary

| | |
|-------------------|---|
| TITLE: | Site Location |
| PROJECT: | Remediation of Contaminated Lands at Whitestown |
| FIGURE NO: | 1.1 |
| CLIENT: | Wicklow County Council |
| SCALE: | 1:50000 |
| REVISION: | 0 |
| DATE: | 23/09/2022 |
| PAGE SIZE: | A3 |





Site Boundary

Site Zones

- A
- B
- C
- D
- E
- F
- G

| | | | |
|--------------------|---|-------------------|----|
| TITLE: | Site Zones | | |
| PROJECT: | Remediation of Contaminated Lands at Whitestown | | |
| FIGURE NO.: | 1-2 | | |
| CLIENT: | Wicklow County Council | | |
| SCALE: | 1:2750 | REVISION: | 0 |
| DATE: | 26/09/2022 | PAGE SIZE: | A3 |

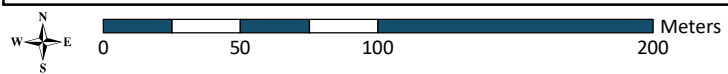




Figure 1-3: Buildings within the site



1.2 Final Draft Remediation Plan

The final draft remediation plan phasing is designed to conduct the works in an order that delivers the remediation objectives for the site in the most efficient and environmentally sound manner. The final phasing of proposed works will be subject to the agreement of the remediation contractor works programme including the mobilisation date (due to potential seasonal constraints).

The final draft remediation plan has been developed on a phased basis. Works associated with each phase, for the most part, will be undertaken sequentially:

- Phase 1A - Site mobilisation, set up and enabling works;
- Phase 1B - Installation of environmental protection measures;
 - surface water management;
 - silt fence installation;
 - installation of additional or replacement monitoring infrastructure;
- Phase 2 - Remediation of Zone C;
 - staged waste excavation and removal of waste and potentially contaminated soil;
 - reprofiling works;
- Phase 3 -Remediation of Zone B;
 - staged excavation and removal of waste and potentially contaminated soil;
 - reprofiling works;
- Phase 4 -Remediation of Zone A;
 - staged excavation and removal of waste and potentially contaminated soil;
 - reprofiling works;
- Phase 5- Landscaping and Fencing;
 - Landscaping;
 - Fencing;
 - Biodiversity Enhancement Measures;
- Phase 6 – Demobilisation;
- Phase 7 – Post Remediation Monitoring;
 - Validation Monitoring Period and Reporting;
 - Handover and Maintenance.

A description of each of the proposed work phases of the final draft remediation plan is provided in Section 3 of Volume 2 (Final Draft Remediation Plan). Further detail on the biodiversity of the proposed site is provided in Volume 5 (Ecological Impact Assessment).



2. METHODOLOGY

2.1 Guidance

The assessment was conducted in accordance with the following guidance:

- European Commission (2021). Guidance document on the strict protection of animal species of Community interest under the Habitats Directive. Brussels, 12.10.2021 C (2021) 7301 final.
- Mullen, E., Marnell, F. & Nelson, B. (2021). Strict Protection of Animal Species Guidance for Public authorities on the Application of Articles 12 and 16 of the EU Habitats Directive to development/works undertaken by or on behalf of a Public authority.
- 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.
- CIEEM (2021). Bat Mitigation Guidelines. A guide to impact assessment, mitigation and compensation for developments affecting bats. Beta version 1.0.
- National Roads Authority (2006) Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes.
- NRA (2006). Guidelines for the Treatment of Bats during the Construction of National Road Schemes. National Roads Authority (now named Transport Infrastructure Ireland), Ireland.
- Collins, J. (Editor) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edition). Bat Conservation Trust, London.

2.2 Process

Mullen et al. (2021) sets out a four-stage process to guide decision making about works which may impact on the strict protection of Annex IV(a) species. A conclusion is made at each stage on whether the works can proceed in compliance with the obligations under Article 12 / Regulation 51 or if further consideration is required under the next stage.

The following is a summary of these four stages:

Stage 1: Using existing information to determine the probability of the protected species being present in the area affected by the works

This is an information gathering stage examining the likely presence or absence of an Annex IV(a) species at the location of the works. It may involve a site walkover as well as desktop studies. Where an Annex IV(a) species is not present or will not affect the species, the works are compliant and may proceed. Alternatively, if the species is present and could be affected, the decision making must proceed to Stage 2.

Stage 2: Ecological Survey

Stage 2 requires an ecology survey to be carried out for the species in question. If the survey finds that the Annex IV(a) species does not occur at or use the site, the works may proceed as they are compliant with Regulation 51 (Article 12) and may be undertaken (once any other required permissions are in place). If an



Annex IV(a) species is found to be present (or to use the site at certain times of the year) during the ecological survey, the decision-making process must proceed to Stage 3.

Stage 3: Examination of Impacts and Satisfactory Alternatives

In circumstance where the ecological survey undertaken has found that an Annex IV species is present, the next step in the process is the examination of the potential impacts associated with the proposed works. This examination considers if impacts can be avoided by the design (including extent, timing of the works, etc). If avoidance is not possible the public authority must determine if there are any satisfactory alternatives to the works that fulfil the same objective but avoid the potential impact on the Annex IV species. Mitigation measures to reduce or avoid potential impacts can be considered during this stage. Where no satisfactory alternative is available the proposed works must proceed to Stage 4.

Stage 4: Application for Regulation 54 (Article 16) Derogation Licence

Where there is no satisfactory alternative to proceeding with the works, the public authority can consider whether to apply to the Minister for a derogation licence under Regulation 54 of the Regulations.



3. STAGE 1: DETERMINING THE LIKELIHOOD OF PRESENCE OF ANNEX IV SPECIES USING EXISTING INFORMATION

This section details the findings of the desktop study and initial site surveys for bats.

3.1 Desktop Study - Bats

A data search was conducted in December 2021 and again in January 2024 to revise existing information from the footprint of the proposed planning boundary. The following information sources were examined:

- Known bat records within a 10 km radius of the proposed sites from the Bat Conservation Ireland database
- Ad hoc and observational bat records from the National Bat Database held by the National Biodiversity Data Centre (www.biodiversityireland.ie)
- Records of designated sites within a 15 km radius of the proposed sites where bats form part or all of the reason for designation (<https://www.npws.ie/protected-sites>)
- Collation of data on known caves within a 4 km radius of the proposed sites from the Cave Database for the Republic of Ireland, compiled by Trinity College (http://www.ubss.org.uk/search_irishcaves.php)

3.2 Bat Landscape

(Lundy, 2011) produced a landscape model by analysing data contained in the Irish National Bat Database, maintained by Bat Conservation Ireland and the National Lesser Horseshoe Bat database maintained by National Parks and Wildlife Service. The maps are a visualisation of the results of the analyses based on a ‘habitat suitability’ index. The index ranges from 0 to 100 with 0 being least favourable and 100 most favourable for bats. Table 3-1 below shows the projected suitability for the subject site. Overall the site is moderately suitability for bats. Common Pipistrelle bats show high suitability.

Table 3-1: Landscape model of the site

| All bats result | Species | Suitability result |
|------------------|----------------------------------|--------------------|
| 22.56 (green) | <i>Pipistrellus pygmaeus</i> | 33 |
| | <i>Plecotus auritus</i> | 32 |
| | <i>Pipistrellus pipistrellus</i> | 41 |
| | <i>Rhinolophus hipposideros</i> | 1 |
| | <i>Nyctalus leisleri</i> | 34 |
| | <i>Myotis mystacinus</i> | 12 |
| | <i>Myotis daubentonii</i> | 20 |
| | <i>Pipistrellus nathusii</i> | 4 |
| | <i>Myotis nattereri</i> | 26 |



3.2.1 2.3.2 Historical Bat Records

A review of historical bat roosts is provided in Table 2-2 (Appendix 1) with general and ad hoc records listed in Table 2-3 (Appendix 1). The result of the historical roost search are provided in Figure 2.2 (Appendix 1).

A desktop review of information available from the NBDC, NPWS and BCI indicated however that six species of bat have been recorded within the grid square S99C. Table 3-2 detail the species records.

Six roosts were recorded within 4km of the site. The closest historical roost is located c. 600m from the proposed site recorded in 2009. This roost contains a maternity colony of Soprano Pipistrelle and likely Leisler’s roost. Given the distance, connectivity and habitats within the subject site, it should be considered an important habitat for the continued usage of this roost.

In relation to ad hoc records; no bat records have been recorded within the 2km square the site resides in however 7 have been recorded within the S99 Hectad.

Table 3-2: Desktop records of bats within and adjacent to the proposed development.

| Species | Legal Protection | Conservation Status (Marnell <i>et al.</i> 2019) |
|--|---|--|
| Brown Long-eared Bat (<i>Plecotus auratus</i>) | EU Habitats Directive (92/43/EEC) Annex IV, Wildlife Act 1976, as amended | Least Concern |
| Daubenton's Bat (<i>Myotis daubentonii</i>) | | |
| Common Pipistrelle (<i>Pipistrellus sensu lato</i>) | | |
| Soprano Pipistrelle (<i>Pipistrellus pygmaeus</i>) | | |
| Leisler's bat (<i>Nyctalus leisleri</i>) | | |
| Natterer's bat (<i>Myotis nattereri</i>) | | |
| Nathusius's Pipistrelle (<i>Pipistrellus nathusii</i>) | | |

3.2.2 Results of Initial Field Surveys

An initial ecological site walkover was undertaken by Jon Kearney Technical Director (Ecologist) FT on the 2nd of July 2018. The site walkover was carried out to inform the scope of ecological surveys required for the proposed remediation works. During the ecological site walkover several potential roosting features were noted within the site including:

- mature and semi mature trees were noted along the margins of the site.
- an old house containing openings, cracks and crevices suitable for bat.
- adjoining garage/store building offer roosting potential for bat.



The semi natural grasslands, wetlands, scrub, young woodland and proximity to the Carrigower river offered potential foraging habitats for bats.

3.2.3 Outcome of Stage 1 Assessment

The presence of one of more bat species within the site was considered likely. Therefore, the assessment must progress to Stage 2.



4. STAGE 2: ECOLOGICAL SURVEY

This section details the findings of the bats survey conducted at Whitestown Unauthorised Landfill, Co. Wicklow.

4.1 Bat survey methodology

Bat surveys have been completed within the study area during the 2021 season and the 2023 season by Faith Wilson and John Curtin (Ecological Consultants). The surveys consisted of tree inspections, building inspections, activity surveys (emergence / transect) and static detector survey.

Surveys were undertaken in accordance with the following best practice guidance:

- Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn.) (Collins, 2023);
- Bat Surveys: Good Practice Guidelines (Hundt, 2012);
- Bat mitigation guidelines for Ireland V2. (Marnell et al, 2022);
- Bat Mitigation Guidelines for Ireland (Kelleher & Marnell, 2006);
- Environmental Planning and Construction Guidelines Series (National Roads Authority, 2005 – 2011);
- Evaluation of sites for flora, fauna and fisheries in Environmental Impact Assessment (NRA, 2006 (revised 2009));
- Bat Roosts in Trees. A guide to identification and assessment for tree-care and ecology professionals (Andrews, 2018);
- CIEEM (2021). Bat Mitigation Guidelines. A guide to impact assessment, mitigation and compensation for developments affecting bats. Beta version 1.0;
- NIEA, Natural Environment Division (2021). Guidance on Bat Surveys, Assessment and Mitigation for Onshore Wind Turbine Developments in Northern Ireland.

4.1.1 Preliminary Roost Assessment

Trees

Inspections of the exterior of trees were undertaken on 24th August 2021, 10th September 2021 and 16th December 2021 to look for features that bats could use for roosting (Potential Roost Features, or PRFs) from ground level. The aim of the surveys was to determine the actual or potential presence of bats and the need for further survey and/or mitigation.

Tree inspections and identification of PRFs were assessed using the following standard criteria, which were created by bat specialists from Bat Conservation Ireland for use in the assessments of tree roosts on large infrastructural projects and are summarised in NRA (2006). These include:

- Presence or absence of bat droppings (these can be hard to find amongst leaf litter or may be washed away following periods of wet weather);
- Bat droppings may also be seen as a black streak beneath holes, cracks, branches, etc.;
- Presence or absence of smooth edges with dark marks at potential entrances to roosts;
- Presence or absence of urine stains at potential entrances to roosts;
- Presence of natural cracks and rot holes in the trunk or boughs of the tree;



- Hollow trees;
- Presence or absence of creepers such as ivy or honeysuckle on trees (ivy clad trees are often used by bat species such as pipistrelles as roosts);
- Presence or absence of loose bark such as that of sycamore, or flaky bark on coniferous species such as cedars, cypress and Scot's pine;
- Presence or absence of bracket fungi which may indicate a rotten or potentially hollow centre to the tree;
- Known bat roosts previously identified;
- Trees with storm or machinery damage or broken boughs;
- Clutter level - where the branches and trunk are easily accessible, this is considered a better tree for bat roosts;
- Adjoining habitat - if there are a variety of feeding opportunities for bats, this increases the potential of a tree as a bat roost;
- Adjoining potential roosts / known roosts. This raises the likelihood of a tree being of benefit as bats may move roosts if the roost becomes too hot or cold during roosting and a nearby alternative roost is highly desirable.

Structures

Buildings within the site were subject to a visual inspection (interior and exterior) for evidence of, and potential for, bats on 24th August 2021, 10th September 2021 and re-examined on 16th December 2021. The exterior of the structures was visually assessed for potential bat access points and evidence of bat activity using binoculars, a high-powered torch and an endoscope (endoscope surveys carried out under appropriate NPWS licence). Features such as crevices and small gaps in the building structure, such as between the brick or stonework, beneath roofing material, at eaves and around window frames which had potential as bat access points into the buildings were inspected. Evidence that these features/ access points were actively being used by bats includes staining within the gaps, urine staining and bat droppings.

Indicators that potential access points are not actively used by bats include general detritus and cobwebs within the access point. A note of potential features used by bats was made where present.

Internal inspections involved looking for features that may be suitable for roosting bats, such as joints and crevices in wood, holes or crevices between stonework in the walls and searching for bat droppings, urine stains and feeding signs on the floor.



Figure 4-1: Whitestown Former Quarry Site Location



4.1.2 Bat Activity Surveys (Emergence / Transect)

Dusk surveys of structures within the site were undertaken on 24th August and the 10th September 2021. The purpose of the surveys was to watch and listen for bats exiting from roosts to determine the presence or absence of bats at the time of survey. The dusk emergence surveys commenced approximately 15 minutes before sunset and ended approximately 90 minutes after sunset. After the emergence survey, the surveyor progressed into a transect survey of the study area.

Between March and August 2023, night time surveys combined emergence surveys towards dusk and dawn and walked transects of bat favourable habitats within and surrounding the study were conducted (see).

Transects targeted a range of foraging and commuting habitats present within and surrounding the study area, those associated with linear features such as woodland edges, hedgerows, treelines and waterbodies.

The survey targeted foraging and commuting habitats present within the study area, including those associated with linear features such as roadside margins, woodland edges, hedgerows, treelines and waterbodies.

The survey was undertaken in suitable weather conditions (avoiding periods of very heavy rain, strong winds (> Beaufort Force 5), mists and dusk temperatures below (12°C)).

Echometer Touch Pro handheld detector and two Bat Box Duets (heterodyne detectors) were utilised for the survey. The bat detectors used a Full Spectrum Analysis to make the real-time recorded calls visible for display purposes. Bats were identified by their ultrasonic calls coupled with behavioural and flight observations.

Bat activity is governed by the activity of their insect prey and insect abundance is in turn governed by weather conditions and climate. Insects, and therefore bats, are unlikely to be present at temperatures below 7°C or during periods of strong winds or heavy rainfall so surveying in such conditions is not possible. All field surveys were undertaken within the active bat season and during good weather conditions (dry conditions and temperature at 8°C and greater).

Nocturnal bat activity is mainly bi-modal taking advantage of increased insect numbers on the wing in the periods after dusk and before dawn, with a lull in activity in the middle of the night. This is particularly true of 'hawking' species – i.e., bats which capture prey in the open air. However, 'gleaning' species remain active throughout the night as prey is available on foliage for longer periods. Gleaning is the term for taking prey from foliage or the ground.

4.1.3 Static Detector Surveys

Passive Static Bat Surveys involve leaving a static bat detector unit (with ultrasonic microphone) in a specific location and 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 the monitoring unit are recorded and their calls are stored for analysis post surveying). The bat detector is effectively used as a bat activity data logger. This results in a far greater sampling effort over a shorter period of time. Bat detectors with ultrasonic microphones are used as the ultrasonic calls produced by bats cannot be heard by human hearing.

Song Meter SM4BAT Full spectrum bat recorders 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. Full spectrum bat recorders were utilised for the static surveys.



Is this the case the results are depicted on a graph showing the number of bat passes per species per hour/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.

A static unit (Song Meter Mini) were programmed to commence half an hour before sunset and finish half an hour after sunrise to ensure that bat species that emerge early in the evening and return to roosts late are recorded. Detectors were left out for 17 nights between 1st August 2021 and 17th August 2021.

A Song Meter Mini Full spectrum bat recorder was also deployed within the study area throughout 2023. The detector was placed attached to an ESB pole close to the derelict dwelling. The aim of this survey was to examine how bats utilise the site throughout the year. The detector was erected ensuring microphone height was set at 2m.

While the detector was placed close to the known roost by the dwelling, the overall habitats surrounding the detector are not the best bat habitats found within the site. A section of scrub can be found surrounding the dwelling but this does not join up with the greater landscape. A treeline of Aspen and Willow can be found to the south of the shed running NE-SW. Much of the habitat within a 50m buffer of the detector consists of open grassland.

The static unit programmed to commence half an hour before sunset and finish half an hour after sunrise to ensure that bat species that emerge early in the evening and return to roosts late are recorded. Detectors were left out for 31 nights in 2023. Data from a previous 2021 static survey (17 nights in August) was also used for comparison. See Appendix 1 for further details.

4.1.4 [Static Detector Survey Analysis](#)

All recordings were made in full spectrum, retaining all amplitude and harmonic information from the original bat call for subsequent analysis. The data was analysed with Wildlife Acoustic's Kaleidoscope Pro; version 5.6.0). All calls not labelled Soprano or Common Pipistrelle Bats were manually verified. Results presented below show some Myotis calls the surveyor is confident the bat are Natterer's bat and Daubenton's bat. Distinguishing between Myotis species recordings is difficult (unless distinctive social calls are recorded thus several calls are recorded to genus level only. These could be either Whiskered, Daubenton's or Natterer's bat. Similarly, several Pipistrelle calls were recorded with a peak frequency of around 40 kHz. These calls are lower than expected for Common Pipistrelle but higher than typical for Nathusius's.

An individual bat can pass a particular feature on several occasions while foraging. It is therefore not possible to estimate the number of individual bats. In accordance with best practice guidance (Collins, 2023) an activity index is used; calculated from bat records per hour which allows analysis of bat activity to estimate abundance and/ or activity. The calculation is as follows:

BAI (Bat Activity Index) = Total number of bat records / number of hours of recording.

Table 4-1: Median percentile range and corresponding bat activity category

| Percentile | Bat Activity |
|------------|------------------|
| 81 to 100 | High |
| 61 to 80 | Moderate to High |
| 41 to 60 | Moderate |



| Percentile | Bat Activity |
|------------|-----------------|
| 21 to 40 | Low to Moderate |
| 0 to 20 | Low |

4.2 Results

4.2.1 Results of Bat Field Surveys

Table 4-2 below provides an overview of the results of bat surveys undertaken at Whitestown unauthorised landfill, Co. Wicklow. Further details on the results of surveys are provided in the separate bat survey report available in appendix 1.

In total, seven species of bat were positively identified during the various bat surveys:

- Common Pipistrelle (*Pipistrellus pipistrellus*),
- Soprano Pipistrelle (*Pipistrellus pygmaeus*),
- Leisler’s bat (*Nyctalus leisleri*),
- Brown Long-eared Bat (*Plecotus auritus*),
- Natterer’s bat (*Myotis nattereri*),
- Daubenton’s Bat (*Myotis daubentonii*) and
- Whiskered Bat (*Myotis mystacinus*).

Several contacts have been labelled as 40 kHz Pipistrelle. This recording had a peak frequency of 40.0 kHz. This frequency is lower than usual for a Common Pipistrelle whilst a Nathusius typical peak frequency is 39.3 kHz.

Table 4-2: Bat Survey Effort Summary

| Survey | Date | Survey type | Details | Surveyor |
|---------------------|--------------------------|-------------------|---|----------|
| 2021 Surveys | | | | |
| 1 | 01/08/2021 to 19/08/2021 | Static Bat Survey | Static set by derelict dwelling for 17 nights. High Common Pipistrelle (average of 22.8 BP/Hr) activity recorded. | FW |



| Survey | Date | Survey type | Details | Surveyor |
|---------------------|--------------------------|---|---|----------|
| 2 | 24/08/2021 | Daylight inspection, emergence and transect | Three buildings identified as potential roosts; derelict dwelling (1), Garage (2) and Agri-shed (3). Bats confirmed roosting in dwelling and garage with no roosting bats recorded from shed. Common / Soprano Pipistrelle maternity roost recorded from dwelling while Pipistrelles also noted emerging from garage – likely satellite roost. Transect surveys showed good Daubenton’s activity to south by Carrigower River and over floodplain, with Leisler’s bat, Common and Soprano Pipistrelle recorded throughout site. Unidentified Myotis bats also recorded. | FW |
| 3 | 10/09/2021 | Daylight inspection, emergence and transect | | FW |
| 2023 Surveys | | | | |
| 1 | 04/03/2023 to 23/03/2023 | Static Survey | Winter season static survey conducted by dwelling within site. During the 17 nights 179 registrations were recorded with highest activity recorded from Common Pipistrelle (120 registrations). Overall low activity (average 0.8 BP/Hr), typical for this time of year. | FW |
| 2 | 16/04/2023 | Static Survey | One night of recording in April. Increase in Leisler’s activity compared to March. This is typical as Leisler’s activity strongly correlates with temperature. Static was set recording for a short period (c.4 hours) over the period of night where activity is highest thus the average BP/Hr (38.4) is higher than typical for this time of year. | FW |
| 3 | 30/05/2023 to 01/06/2023 | Static Survey | Three nights recording in May / June. Soprano Pipistrelle was the highest recorded species with 686 registrations. Overall activity levels are high, averaging 46.9 BP/Hr. | FW |
| 4 | 03/06/2023 | Emergence survey and transect | Up to 40 Pipistrelle bats light sampling in shed (building 3). This shed did not contain a bat roost in 2021. During transects, bats noted hunting over Newt pond. | FW |
| 5 | 30/06/2023 | Static Survey | One nights recording with 94 registrations averaging at 11.6 BP/Hr | FW & JC |



| Survey | Date | Survey type | Details | Surveyor |
|--------|--------------------------|---|---|----------|
| | | Emergence, transect, and re-entry surveys | <p>Daylight search and Emergence survey. Accumulation of bat droppings in shed both within breeze blocks (crevice dwelling bats), on the floor, and on shelves in the small enclosed area with the sink (former office?) and on its roof. Droppings were also noted on wooden shelves and on the ground alongside butterfly and moth prey remains in the large shed. The garage was also inspected. This building has an attic space with tiles and bitumen felt and while slightly low is still of good bat roosting potential. Scattered Brown Long-eared bat droppings were noted here and the ridge beam was devoid of cobwebs indicating bat activity. Several access points provide access. An attic opening in the NW room of the garage provides good access. In addition, gaps in the NE and by the fascia along the gable end provide access to the attic of the garage. Bat droppings were collected for DNA analysis from both the garage and the shed.</p> <p>Emergence survey recorded 16 Brown long-eared bats within both sections of shed (building 3) along with 2 Common Pipistrelles and 1 Soprano Pipistrelle. Canon XA10 camcorder aided emergence count.</p> <p>The thermal scope by the rear of the dwelling did not find emerging bats however a Leisler's bat was recorded flying inside the building towards dawn.</p> | |
| 6 | 16/07/2023 to 22/07/2023 | Static Survey | 1503 registrations recorded a seven night period. High Brown Long-eared bat activity with multiple social calls and several recordings with more than one bat. | FW |
| 7 | 31/07/2023 | Emergence survey | Brown Long-eared, Common and Soprano Pipistrelle noted in shed (building 3) and Common, Soprano Pipistrelle and Leisler's bat, whiskered bat observed emerging from derelict dwelling. | FW |
| 8 | 16/08/2023 | Emergence survey | Surveys again conducted at buildings. 2 x bats recorded roosting in garage, a single brown long eared and Soprano Pipistrelle. | FW & JC |



| Survey | Date | Survey type | Details | Surveyor |
|--------|------|---------------|--|----------|
| | | Static Survey | <p>SM Mini placed in shed (3) throughout the night. During this survey 526 registrations were recorded with Brown Long-eared represented 72%, Soprano Pipistrelle 14%, Common Pipistrelle 11% and Natterer's bat 2% (11 recordings).</p> <p>Given the amount of bats flying within the shed, these Natterer's could easily be missed during typical surveys.</p> | |

- FW – Faith Wilson, JC- John Curtis

4.2.2 Bat roosts

During the 2023 surveys, 3 buildings containing bat roosts have been confirmed on the site. These are the dwelling house, the adjoining garage and the shed/hay barn.

Since 2021 the condition of the roof of the dwelling house has degraded with loss of tiles and increased air movement as a result and the maternity, Pipistrelle roost is reduced to a satellite roost used by low numbers.

The garage remains in good condition from the perspective of roosting bats and is used by low numbers of bats.

The shed is a new roost used by rarer woodland bat species such as Brown Long-eared, whiskered and Natterer's bats.

The shed has connectivity towards the river via aspen and a willow scrubby treeline, which acts as an important commuting route for bats. Table 4-3 provides details on each roost.

Table 4-3: Roost results.

| Structure | Species | Max No observed? | Roost type | Details of roost |
|--------------|---------------------|------------------|------------|--|
| Dwelling (1) | Soprano pipistrelle | 1 | Satellite | Roost structure has degraded since 2021. Maternity roost previously recorded was not present. Survey on the 30 th June did not note bats emerging from the dwelling, however on the 31 st July four species were recorded likely emerging, while two non-echolocating bats were recorded emerging on the 16 th of August. |
| | Common Pipistrelle | 1 | Satellite | |
| | Leisler's bat | 1 | Satellite | |
| | Whiskered bat | 1 | Satellite | |
| | Unidentified bat | 2 | Satellite | |



| Structure | Species | Max No observed? | Roost type | Details of roost |
|------------|----------------------------------|----------------------------------|-----------------|---|
| Garage (2) | Brown Long-eared bat | 2 | Satellite | Building is in good condition although attic space is somewhat low thus reducing potential for large roost. Scattered droppings within and bats observed exiting. Surveys showed regular usage by low number |
| | Soprano Pipistrelle | 1 | Satellite | August survey revealed Soprano Pip emerging from NW corner. |
| Shed (3) | Brown Long-eared | 16 | Maternity roost | Building is in good condition with an internal office type structure within providing a sheltered location for bats. |
| | Pipistrelle (Soprano and Common) | 40 | Satellite | Surveys consistently show multiple Brown Long-eared bats using the shed. They typically emerge from the NW and fly SE to Aspen treeline. On the 03 rd June c. 40 Pipistrelle bats were noted using the shed. Numbers dropped through the season with lower numbers of Soprano and Common Pipistrelle recorded on the 30 th of June and recordings noted on static from the 16 th of August. |
| | Natterer's bat | Droppings and recorded on static | Satellite | Fresh droppings noted in breeze block cavity within office type section within building. Identification confirmed via DNA testing. Static placed within shed on the 16th of August recorded Natterers bats. |
| | Whiskered bat | Droppings | Satellite | |

4.2.3 [Comparison to 2021 data](#)

During the 2021 survey period the majority of bats recorded were Common Pipistrelle. This corresponds with the emergence survey carried out at the time where a maternity roost was recorded by the derelict house.

During the 2023 surveys this maternity roost was not present with low levels of roosting bats recorded. It is likely the derelict dwelling is falling into a state of disrepair that has forced this roost to relocate.

In 2021, Brown Long-eared bats were rarely recorded; averaging 0.1 BP/Hr compared to a rate of 6.3 for the July 2023 static survey period.

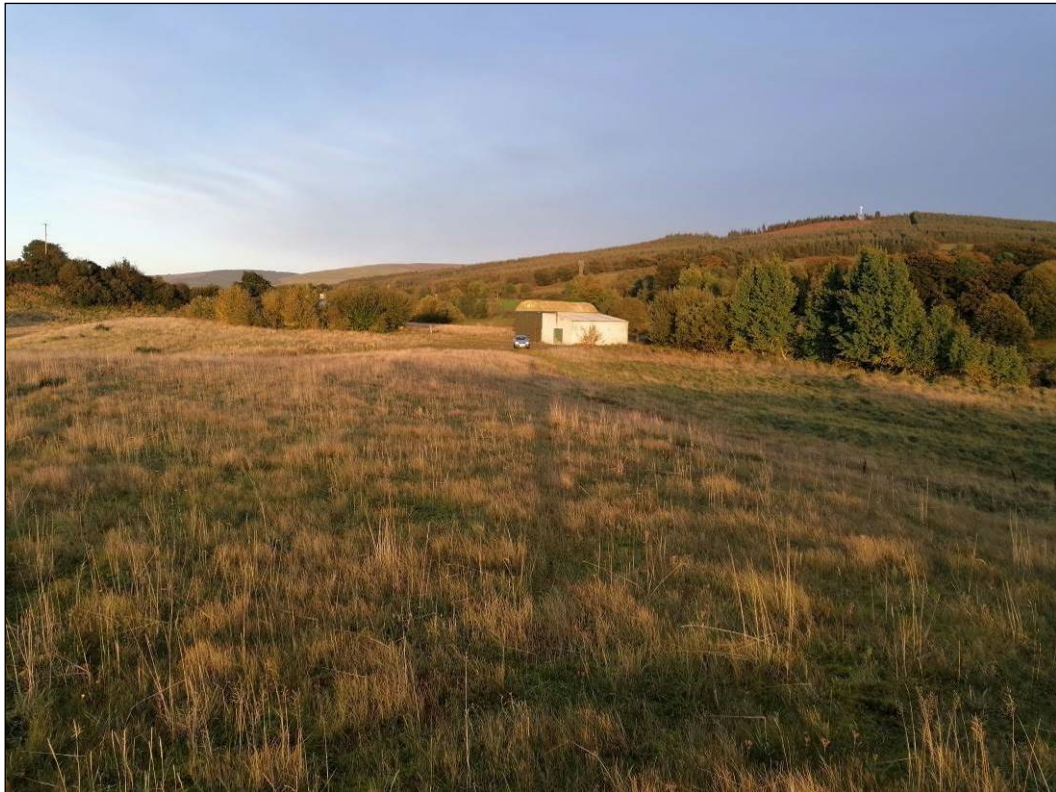


Plate 4-1: Looking north over Zone C towards the house and barn.



Plate 4-2: Confirmed maternity roost - flat roofed extension favoured by roosting pipistrelle bats.



Plate 4-3: Confirmed maternity roost from the south.



Plate 4-4: Existing vegetation surrounding the house.



4.3 Outcome of Stage 2 Assessment

Confirmed maternity roost and satellite roosts within the dwelling (satellite formally and maternity roost), garage (satellite) and shed (maternity roost). The garage and the dwelling are confirmed as winter roosts. Therefore, the assessment must progress to Stage 3.



5. STAGE 3: EXAMINATION OF IMPACTS AND ALTERNATIVE SOLUTIONS

5.1 Requirement for the proposed works

Over the past decade or so, there were various High Court actions taken by the owners of the site (Brownfield Restoration Ltd) and Wicklow County Council culminating in five High Court Judgements issued in July 2017. The court dealt with the various actions in a modular fashion (Modules 1 through IV). At the culmination of Module II (Judgement 3), the High Court made an order for remediation (subject to refinement in Module III) in essence as follows:

“...the council will be required to remove to a licensed waste disposal facility all waste (and all soil or other materials contaminated or potentially contaminated by such waste) from all areas of the site including areas that are already the subject of attempted remediation and to appropriately fill and landscape the site with inert matter sourced elsewhere and to return to the possession of the site to Brownfield within a period of 78 months from the date of the order.

The final draft remediation plan includes the removal of all waste from the site and re-profiling all areas in keeping with the proposed landscaping.

During the excavation works, further investigations will be undertaken to determine if contaminated soils encroached under or surrounding the bat roost buildings. There is the potential therefore that all buildings may need to be demolished to allow excavation of same. In addition, it is likely the treeline used as a commuting route by Brown Long-eared bats will be removed, located to the east of the agricultural shed (3).

5.2 Examination of impacts

5.2.1 Potential Impacts from the Proposed Remediation

Potential Direct Impacts

Pending investigation, there is the potential that all buildings may need to be demolished as part of the remediation works. This could result in the loss of a Brown Long-eared maternity roost as well as 10 other satellite roosts (see Table 4-3) used by six bat species.

Potential Indirect Impacts

- **Disturbance**

Works associated with development will lead to an increase in human presence at the site, extra noise and changes in the site layout and local environment. Given the restricted nature of the site, the site compound will be set up next to the shed. This compound will include vehicle refuelling area, vehicle maintenance area, waste quarantine area and leachate holding tank(s).

- Physical structures will change the landscape surrounding the three buildings and have a risk of blocking bat exit points.
- There will be an increase in human activity and substantial increase of noise. (Finch, 2020) demonstrated that traffic noise impacted bat activity at least 20m away from the noise source. (Allen, 2021) corroborates this finding.
- There is the potential for bats to be disturbed given the buildings proximity to the area of works and the site compound.



- Construction & Operational phase lighting may impact emerging bats commuting routes and use of commuting routes.

- **Loss of commuting route**

During numerous surveys, Brown Long-eared bats were observed utilising the Aspen treeline to the east of the buildings. This treeline is important as, barring this feature and some scrubby willow surrounding the dwelling the roosts lack good connective features. This is less impactful for Pipistrelle species and Leisler's bats that regularly fly through open habitats. The 2023 surveys however show the roosts are becoming important sites for woodland bat species such as Brown Long-eared, Natterer's bat and less frequently, whiskered and Daubenton's. (Marnell, 2022) P41 refers to new radio tracking studies that show the loss of near features, leave roosts isolated in the landscape and can be damaging.

Regarding the conservation significance, Brown Long-eared bats are a moderately common bat species (3rd most common bat in Ireland after Soprano and Common Pipistrelle), while Natterer's and Whiskered bats are considered rare.

Leisler's bat are relatively widespread, however the Irish population is considered a stronghold for the species in Europe.

Seven species is a very rich diversity of bat species on a single site and highlight its importance for bats. Sites such as Avondale in east County Wicklow have a similar diversity of bat species recorded but there would be few sites known from West Wicklow to have such a rich bat component.

- **Potential Impacts from the Operation of the Site**

It is proposed the site be used for light grazing and pastoral use upon completion of the project, with areas sectioned off for biodiversity (i.e. wetland areas).

- **Overall magnitude of the Impacts**

These potential impacts are characterised as a **Negative, irreversible, long-term, Significant effect in a county context**, in the absence of mitigation.

5.3 Examination of Alternative Solutions and Mitigation measures

No alternatives are available in terms of the extent of excavation works required onsite due to the Court Order to remove all waste and potential contaminated soil from within the site. However, the following mitigation measures and design features have been adopted into the final draft remediation plan to ensure that bats are not killed, they are not disturbed in breeding, or hibernation and a new roost is provided to mitigate the potential deterioration to existing breeding or resting places within the site.



5.3.1 Construction of new bat roost

Prior to any major changes to the landscape in Zone A, a new bat roost will be constructed in Zone D close to the new pond. This sheltered area has excellent features suited for woodland bats, with bat activity regularly noted here.

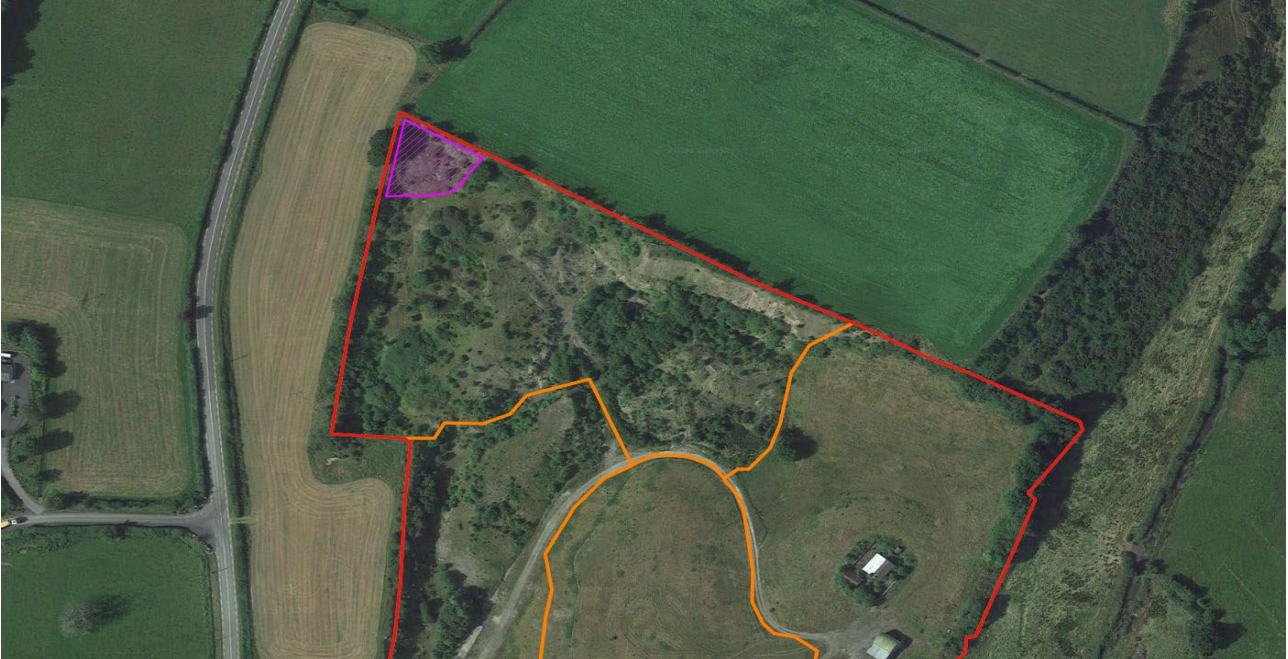


Figure 5-1: Proposed location of new bat roost (pink polygon) in Zone D.



Plate 5-1: Location of new bat roost in Zone D

The proposed roost shall consist of the following:



- The proposed roost shall consist of the following:
- 5m high hollow core concrete block building with cut timber peaked roof.
- Approximately 25m² internal area.
- 2.5 m high loft space (eave height) - large void space to allow the bats to fly around.
- Standard concrete tiles with traditional Hession bitumen roofing felt.
- 2.5m high ground floor space.
- No external lighting around the bat roost'
- Integrating roost feature including:
 - bat loft access with predator guard on both side gables
 - Rough sawn lapped timber cladding on north gable to provide additional roosting habitat under cladding.
 - Vent / bat access strip along soffit
 - Single lockable steel door (for bat specialist access) with bat access slot on door.

5.3.2 Landscaping for the new bat roost

- No large trees planted to the south with potential to cast shading.
- Tree planting to be provided linking the new bat roost barn site to the surrounding treelines (to create pathway to the new roost) – up to 15 whips all native trees, and up to 10 semi-mature trees 4.0 m).
- All native tree species a mixture of oak (*Quercus robur*), aspen (*Populus tremula*), alder (*Alnus glutinosa*), grey willow (*Salix cinerea*), hawthorn (*Crataegus monogyna*), birch (*Betula pubescens*), goat willow (*Salix caprea*) and crack willow (*Salix fragilis*).
- Tree planting to link existing treelines to the new bat roost must be planted during construction of the bat roost or immediately afterwards.
- Semi mature trees defined by the British Standards Institution and HTA as 'Trees with an overall height in excess of 4 metres and or a stem girth measurement (circumference) of 20 centimetres or larger.'

5.3.3 Exclusion of bats from existing bat roosts

Work at the site are scheduled to commence in January 2025. As works will be required in close proximity to the bat roost measures shall be implemented to discourage bats from using the 3 bat roost buildings onsite. The following measures shall be implemented once the new bat roost is in place and prior to the hibernation period commencing on the 1st of October 2024 to minimise the displacement of bat during the hibernation period and continue through the breeding period in May - August 2025.

- Artificial lighting shall be directed at the existing roosts onsite to discourage bats from using these buildings;
- Doors shall be left open to reduce temperatures inside the structures and make conditions less favourable for bats.



5.3.4 Destruction of bat roost

Pending further site investigation there is the potential that all buildings may need to be demolished as part of the remediation works. Most roosting sites are used seasonally and therefore will be unoccupied for some period of the year. Bats are at their most vulnerable in buildings during the summer, when large numbers may be gathered together and young bats, unable to fly, may be present (Marnell et al, 2022). The timing of demolition work outside these periods off occupation greatly reduces the potential for the disturbance to bats using the roost.

As 2 of the 3 structures onsite are occupied during both the breeding and hibernation season, the timing of demolition works (if required) shall follow the recommendations in Marnell et al (2022):

'Where the same structure is used throughout the year, the optimum time for works of all types is likely to lie outside the main breeding season, to avoid times when non-flying pups may be present, and the main hibernation season, to avoid times when disturbance may impact on survival or bats may not be sufficiently active to get out of the way. Spring and autumn generally provide the optimum period for such operations.'

There is the potential that all bat roost structures will be destroyed. Should this occur the following procedure will be followed once a bat derogation licence is secured;

- Demolition should be completed outside the bat active season from the 1st of October to mid-November or in February to March. A suitably qualified ecologist with bat handling training will be present to complete a pre-demolition daylight survey and supervise demolition works.
- Removal of tiles and roof sheeting will be completed by hand. Should bats be found the ecologist will remove and place into a pre-erected temporary bat boxes located close to the buildings. The plywood roof in the inner office portion of the shed will also be removed at this point.
- Once portions of the roofs have been removed, works will halt for one week allowing bats vacate due to lowered suitability.
- Breeze block removal in the shed if required will be completed by hand with ecological oversight. Similarly, the dwelling and garage have been used by crevice dwelling thus walls need to be carefully dismantled. Any loft insulation in the dwelling needs to be checked by hand for bats.

5.3.5 Potential tree roosts in Zone A

None of the trees present on site would be classified as high potential bat roosts on account of their immaturity with the exception of some of the sycamore along the north eastern boundary, which may offer roosting opportunity for small individual bats under flaking bark. No confirmed bat roosts were recorded within these trees during surveys however, a preconstruction survey shall be carried out to reconfirm the findings on the baseline surveys to ensure that future changes (if any) are considered for prior to works commencing onsite. An exclusion area shall be set up around the tree and works will follow the same strategy of trying to avoid works at a time of year when bats are most likely to be present.

5.3.6 Site Supervision

A suitably qualified Environmental Manager (EM) with appropriate experience and expertise will be appointed for the duration of the project to ensure the effective supervision of all works including operation and maintenance of drainage and other mitigation measures associated with water control and management during the remediation process. The Environmental Manager will monitor the implementation of the mitigation measures detailed in this report and in accordance with the relevant management plans within the CEMP ensuring successful implementation. In relation to bats, the Environmental Management will be assisted by an Ecologist (bat specialist) to ensure that all the mitigation measures outlined in relation to bats are implemented.



5.3.7 [Toolbox talk](#)

Toolbox talks will be provided to all staff by the EM prior to starting any works onsite, providing relevant information on disturbance to the key environmental and ecological receptors on site. This will ensure all personnel present receive the relevant information for the areas they are working on each given day.

5.3.8 [Lighting](#)

In general, artificial light creates a barrier to bats so lighting should be avoided where possible. Works will take place predominantly during the hours of daylight to minimise disturbances to faunal species at night. Where lighting is required, directional lighting (i.e., lighting which only shines on work areas and not nearby countryside) will be used to prevent overspill. This can be achieved by the design of the luminaire and by using accessories such as hoods, cowls, louvers and shields to direct the light to the intended area only. Lighting will not be directed at the new bat roost for the full duration of works onsite. The exclusion area for lighting must encompass the existing treelines around the perimeter of the site and in particular treelines linking the new bat roost to the Carrigower River and surrounding habitats.

No lighting is proposed post remediation works.

5.3.9 [Removal of treeline within Zones A and B](#)

The high court order specifies that all waste must be removed from the site. The treelines along the eastern boundary of Zones A and B extend along the margins (bank side edge) of the unauthorised landfill. Therefore, a portion of or all these treelines are likely to be growing on top of waste deposited historically within the site. Where trees must be removed to comply with this court order, it is proposed that this removal shall be carried out outside the bird breeding season (and bat active season) 1st April– 1st October exclusion period. Treeline reinstatement shall be carried out once remediation has been completed.

5.3.10 [Retained trees and vegetation.](#)

If areas of vegetation, trees and shrubs are to be retained within Zone A, B or C these will be provided adequate protection from accidental damage by machinery during remediation works. These areas will be clearly delineated by fencing and appropriate signage provided.

5.3.11 [Bat boxes](#)

To further enhance the site, bat boxes shall be installed on the existing trees following the completion of works. This shall include tree crevice-type boxes, (with 25-35mm crevices). The location of bat boxes shall be decided by an ecologist (with expertise in bat ecology) who will oversee their deployment onsite.

5.3.12 [Monitoring](#)

Monitoring of the new bat roost and the existing buildings shall commence in 2024. Surveillance will continue at the new roost and old sites for the duration of the proposed remediation works.

5.4 **Outcome of Stage 3 Assessment**

As the proposed remediation plan will require at a minimum works adjacent to 3 buildings containing roosting bats and potentially pending further investigation the removal of these buildings, a derogation licence in relation to bats is required and the assessment must progress to Stage 4.



6. STAGE 4: DEROGATION LICENCE

Over the past decade or so, there were various High Court actions taken by the owners of the site (Brownfield Restoration Ltd) and Wicklow County Council culminating in five High Court Judgements issued in July 2017. The court dealt with the various actions in a modular fashion (Modules 1 through IV). At the culmination of Module II (Judgement 3), the High Court made an order for remediation (subject to refinement in Module III) in essence as follows:

“...the council will be required to remove to a licensed waste disposal facility all waste (and all soil or other materials contaminated or potentially contaminated by such waste) from all areas of the site including areas that are already the subject of attempted remediation and to appropriately fill and landscape the site with inert matter sourced elsewhere and to return to the possession of the site to Brownfield within a period of 78 months from the date of the order. “

The final draft remediation plan includes the removal of all waste from the site and re-profiling all areas in keeping with the proposed landscaping.

However, as the final draft remediation plan will require at a minimum works adjacent to 3 buildings containing roosting bats and potentially pending further investigation the removal of these buildings, a derogation licence in relation to bats must be sought from the Minister under Regulation 54(2) of the EC (Birds and Natural Habitats) Regulations 2011 - 2021.

The following the reason for seeking derogation is set out in Regulation 54(2) (a)–(e), specifically:

(b) To prevent serious damage, in particular to crops, livestock, forests, fisheries and water and other types of property.

Although the extent of waste under the existing building is unconfirmed, the overall remediation works should result in a net positive for the local bat populations. Of particular importance is the retention of semi natural grasslands, woodland and ponds. These all contribute to an increase in invertebrate prey for bats. The Slaney River SAC to the east acts as an ecological corridor for bats in the surroundings, enabling access to the site. With the implementation of the prescribed mitigation measures and design of works, potential impacts to bats resulting from the project are considered **Temporary, Not significant in the county context**.



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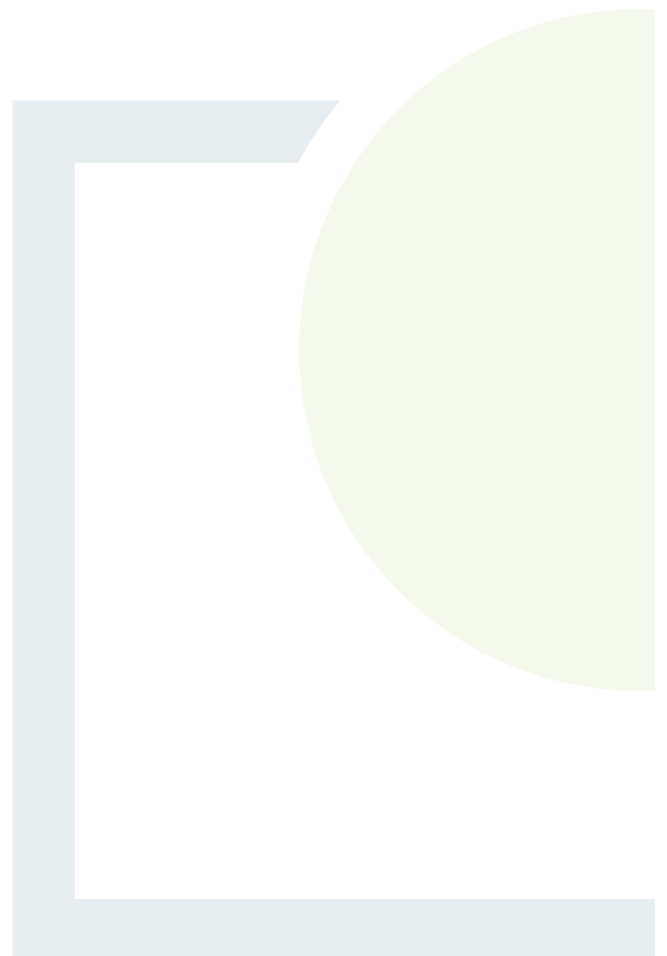
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APPENDIX 1

Whitestown Bat Survey
Report



1 INTRODUCTION

This report details the findings of a bat survey completed as part of an assessment for Annex IV species (bats) for the final draft remediation plan for Whitestown unauthorised landfill to comply with a High Court order made on 17 July 2017 for the remediation of the site. Whitestown unauthorised landfill is 14.5 ha and surrounded by agricultural land. This site originally operated as a quarry prior to the deposition of waste. The site is located approximately 2.6 km southwest of Donard Village along the N81. This document reports on the findings of bat surveys conducted in 2023 within the site.

This report aims to;

- Identify species of bats using the site.
- Examine buildings within and surrounding the site for roosting potential.
- Examine feeding and commuting routes.
- Potential impacts of bats by the proposed development.

In order to assess the presence and activity of bats within the proposed development grounds the following surveys were undertaken within the proposed planning boundary:

- Roost assessment
- Bat activity (emergence surveys, walked transects and static surveys)

Bat surveys were conducted from March to September 2023. The survey types were determined most appropriate to establish a baseline species assemblage, along with spatial and temporal distribution of species activity within the proposed planning boundary.

1.1 RELEVANT GUIDANCE DOCUMENTS

This survey and report draws on the following guidelines and documents:

- 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
- Collins, J. (Editor) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edition). Bat Conservation Trust, London
- National Roads Authority (2006) Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes
- McAney, K. (2006) A conservation plan for Irish vesper bats, Irish Wildlife Manual No. 20 National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.
- The status of EU protected habitats and species in Ireland: Conservation status in Ireland of habitats and species listed in the European Council Directive on the Conservation of Habitats, Flora and Fauna 92/43/EEC. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government.
- NRA (2006). Guidelines for the Treatment of Bats during the Construction of National Road Schemes. National Roads Authority (now named Transport Infrastructure Ireland), Ireland.
- Aughney, T., Kelleher, C. & Mullen, D. (2008). Bat Survey Guidelines: Traditional Farm Buildings Scheme. The Heritage Council, Áras na hOidhreachta, Church Lane, Kilkenny.
- BTHK (2018). Bat Roosts in Trees – A Guide to Identification and Assessment for Tree-Care and Ecology Professionals. Pelagic Publishing, Exeter UK.

- European Commission (2021). Commission notice. Guidance document on the strict protection of animal species of Community interest under the Habitats Directive
- CIEEM (2021). Bat Mitigation Guidelines. A guide to impact assessment, mitigation and compensation for developments affecting bats. Beta version 1.0.
- NIEA, Natural Environment Division (2021). Guidance on Bat Surveys, Assessment and Mitigation for Onshore Wind Turbine Developments in Northern Ireland.

1.2 STATEMENT OF AUTHORITY

The bat surveys were undertaken by Faith Wilson BSc CEnv MCIEEM and John Curtin BSc. Faith is a highly experienced ecologist specialising in flora, badger, otter, bats, deer, ornithological surveys, environmental impact assessment, impact mitigation and habitat creation/restoration, native woodland surveys, cetacean surveys, and public lectures. Faith is an active member of Bat Conservation Ireland (BCI) and previously served on the board of BCI. Faith attended and helped to deliver the BCI Bat Detector and Bat Handling Workshops which are the standard training for the carrying out of bat surveys in Ireland and also authored the guidance for surveying bats in wind farms in Ireland.

John qualified in Environmental Science at NUI Galway in 2010 and has been working as an ecologist ever since. John has been conducting bat surveys at commercial sites since 2012. He has also completed the Bat Conservation Ireland, Bat Detector Workshop and Bat Handling Workshop which are the standard training for the carrying out of bat surveys in Ireland. In addition, John is an active member of Bat Conservation Ireland, which monitors bat populations in Ireland, and facilitate the education of bat communities to the public.

Faith holds the following licences

| Description | Licence No |
|--|-----------------------|
| Licence to capture protected wild animals for educational, scientific or other purposes (bats) | Licence No. C168/2021 |
| Roost disturbance (bats) | Numerous |
| Licence to photograph / film wild animals (bats) | 125/2021 |

John holds the following bat licences.

| Description | Licence No |
|--|-----------------|
| Licence to capture protected wild animals for educational, scientific or other purposes (bats) | C12/2023 |
| Roost disturbance (bats) | Der/Bat 2023-07 |
| Licence to photograph / film wild animals (bats) | 23/2023 |

2 DESKTOP STUDY

2.1 BATS IN IRELAND – LEGISLATIVE PROTECTION

There are two main pieces of legislation which cover wildlife protection in Ireland – the Wildlife Act and the Habitats Regulations. These are outlined below, with particular reference to the protection afforded to bat species in Ireland.

2.1.1.1 *The Wildlife Acts 1976 and 2000*

The primary domestic legislation providing for the protection of wildlife in general, and the control of some activities adversely impacting upon wildlife is the Wildlife Act of 1976, as amended. The aims of the wildlife act according to the National Parks and Wildlife Service are “... to provide for the protection and conservation of wild fauna and flora, to conserve a representative sample of important ecosystems, to provide for the development and protection of game resources and to regulate their exploitation, and to provide the services necessary to accomplish such aims.” All bat species are protected under the act. The Wildlife (Amendment) Act of 2000 amended the original Act to improve the effectiveness of the Act to achieve its aims.

It is an offence to:

- Intentionally kill, injure or take a bat
- Possess or control any live or dead specimen or anything derived from a bat
- Wilfully interfere with any structure or place used for breeding or resting by a bat
- Wilfully interfere with a bat while it is occupying a structure or place which it uses for that purpose

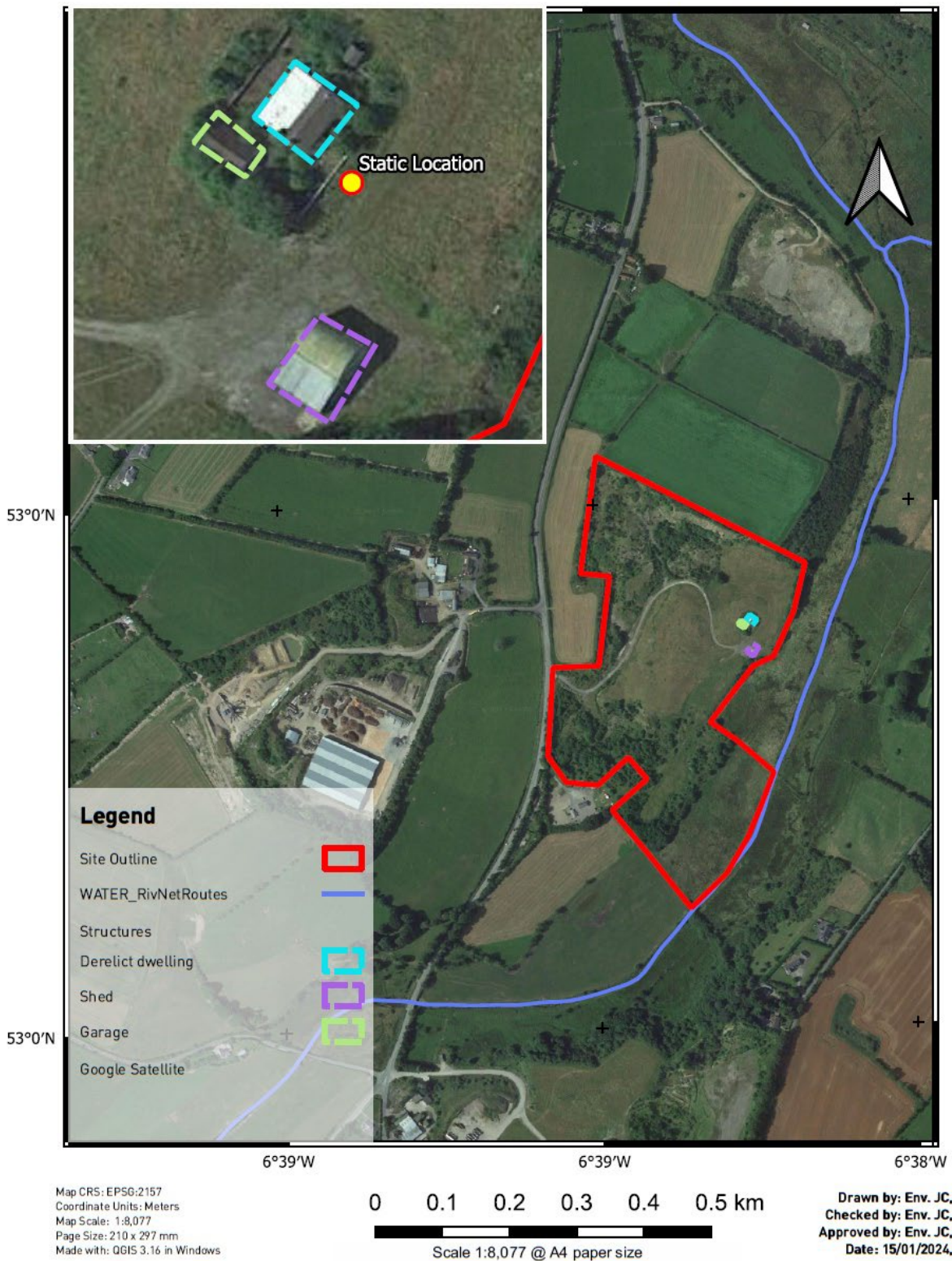
2.1.1.2 *European Communities (Birds and Natural Habitats) Regulations 2011 to 2021*

The EC (Birds and Natural Habitats) Regulations 2011-2021 provide strict protection for all of the Irish species listed on Annex IV of the EU’s Habitats Directive. It does this by prohibiting certain activities which could impact on the conservation status of those species. Those activities may only be permitted by way of a derogation licence. All bat species found in Ireland are listed under Annex IV of the Directive, while the lesser horseshoe bat is afforded further protection under Annex II.

2.2 LANDSCAPE CONTEXT

The subject site consists of a former quarry that has since succeeded into a variety of habitats including semi-natural woodland, grassland and springs.

Whitestown Former Quarry Site Location



DISCLAIMER
Although great care was taken in the preparation of this map, the authors cannot be held responsible for any loss or damage emanating from its use.



Figure 2-1: Site Outline

2.3 BAT SPECIES RECORDED IN THE SURROUNDING AREA

A data search was conducted in December 2021 and again in January 2024 to revise existing information from the footprint of the proposed planning boundary. The following information sources were examined:

- Known bat records within a 10 km radius of the proposed sites from the Bat Conservation Ireland database
- Ad hoc and observational bat records from the National Bat Database held by the National Biodiversity Data Centre (www.biodiversityireland.ie)
- Records of designated sites within a 15 km radius of the proposed sites where bats form part or all of the reason for designation (<https://www.npws.ie/protected-sites>)
- Collation of data on known caves within a 4 km radius of the proposed sites from the Cave Database for the Republic of Ireland, compiled by Trinity College (http://www.ubss.org.uk/search_irishcaves.php)

2.3.1 Bat Landscape

(Lundy, 2011) produced a landscape model by analysing data contained in the Irish National Bat Database, maintained by Bat Conservation Ireland and the National Lesser Horseshoe Bat database maintained by National Parks and Wildlife Service. The maps are a visualisation of the results of the analyses based on a 'habitat suitability' index. The index ranges from 0 to 100 with 0 being least favourable and 100 most favourable for bats.

Table 2-1 below shows the projected suitability for the subject site. Overall the site is moderately suitability for bats. Common Pipistrelle bats show high suitability.

Table 2-1: Landscape model of the site

| All bats result | Species | Suitability result |
|-----------------|----------------------------------|--------------------|
| 22.56 (green) | <i>Pipistrellus pygmaeus</i> | 33 |
| | <i>Plecotus auritus</i> | 32 |
| | <i>Pipistrellus pipistrellus</i> | 41 |
| | <i>Rhinolophus hipposideros</i> | 1 |
| | <i>Nyctalus leisleri</i> | 34 |
| | <i>Myotis mystacinus</i> | 12 |
| | <i>Myotis daubentonii</i> | 20 |
| | <i>Pipistrellus nathusii</i> | 4 |
| | <i>Myotis nattereri</i> | 26 |

2.3.2 Historical Bat Records

A review of historical bat roosts is provided in Table 2-2 below with general and ad hoc records listed in Table 2-3.

Table 2-2: Historical Bat Roosts within the vicinity of the site

| Species | Distance from site | Date of last record | Details | Potential connectivity with subject site (for roost records) |
|---|--------------------|---------------------|---|--|
| <i>Pipistrellus pygmaeus</i> & <i>Nyctalus leisleri</i> | 600m east | 2009 | Large maternity roost of Soprano Pipistrelle within dwelling. Probable Leisler's roost in same building | According to BCT the CSZ for both species is 3km thus the subject site lies within this zone. Further, (Shiel, 1999) found that the maximum (mean) flight distance recorded for individuals from two Leisler's bat maternity roosts ranged from approximately 4.5 km to 7.5 km. The subject site, containing both edge habitat and semi-natural grassland is likely to be utilised regularly by the bats using this roost, should it still be occupied. There is also potential for both species to utilise the roost buildings within the subject site as satellite roosts. |
| <i>Pipistrellus species</i> | 900m south | 1999 | Unknown Pipistrelle species observed within house. No details on numbers. | This is an old record with little detail. The site does sit within the CSZ for this species. |
| <i>Plecotus auritus</i> | 1.2km south-east | 1998 | Droppings found within Church. | The subject site lies inside the CSZ for this species (3km). This is an old record and it is unknown if it is still active however Church bat roosts can persist for a considerable period. There is good connectivity via rivers, treelines and hedgerows. |
| <i>Pipistrellus pygmaeus</i> , <i>Pipistrellus pipistrellus</i> | 1.9km north-east | 2007 | No other details | The subject site lies inside the CSZ for these species and connectivity exists via river network. Record lacks details on size of roost. |
| <i>Plecotus auritus</i> , <i>Myotis spp.</i> , <i>Pipistrellus pygmaeus</i> , <i>Pipistrellus pipistrellus</i> | 2.5km north-east | 2004 | House roost. No other details | The subject site lies inside the CSZ for all these species baring Common Pipistrelle and connectivity exists via river network. Record lacks details on size of roost. |
| Unidentified bat | 3.4km | 1999 | No details | This is an old record with little detail. |
| Unidentified bat | 4.4km | 2017 | Over stable door | Record lacks details. |

Whitestown Historical Roost Search

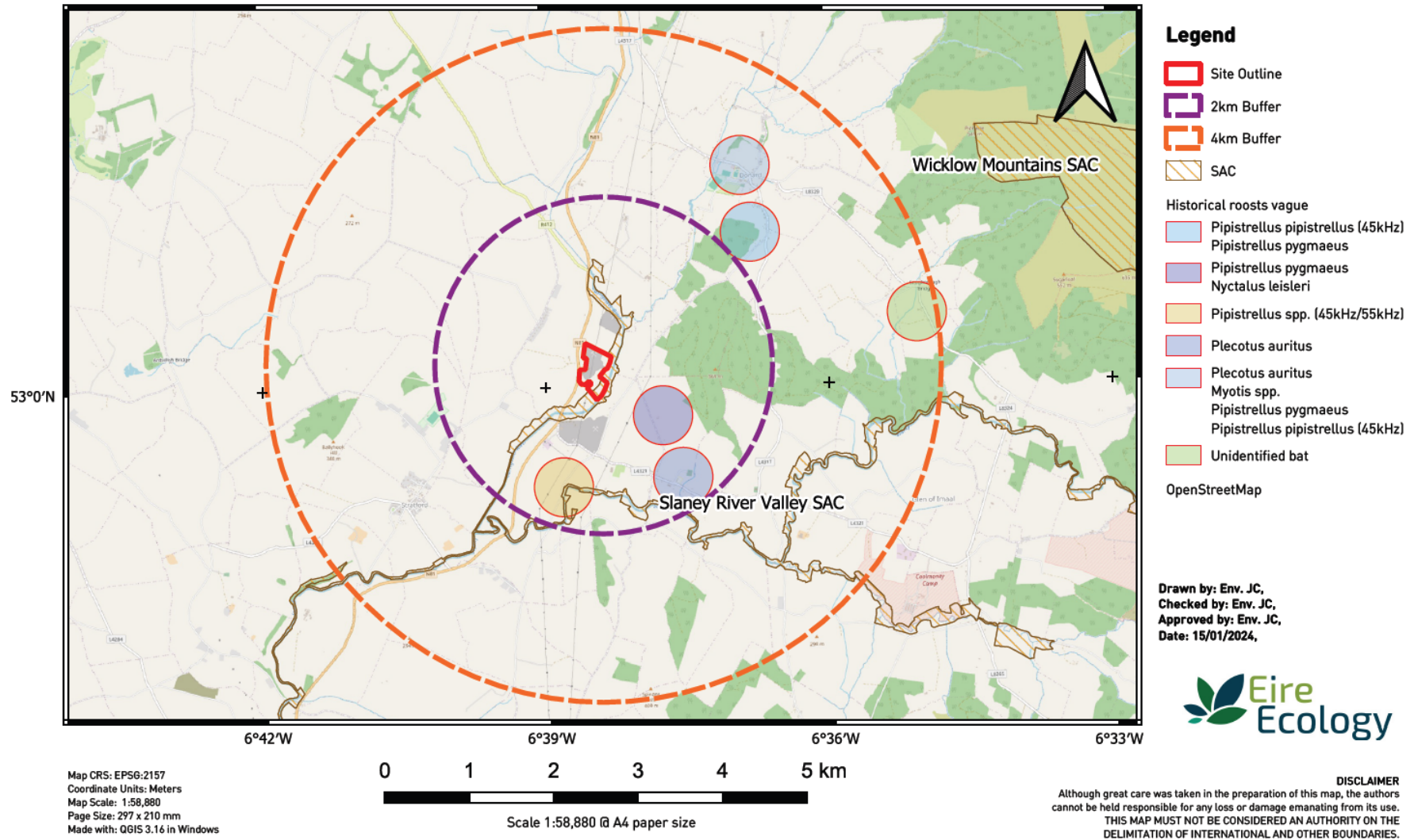


Figure 2-2: Historical review of bat roosts within Core Zones of Influence for Irish Bats

The NBDC and Bat Conservation Ireland database was consulted for details on bat records held for the site and the surroundings. The databases were consulted on the 12/01/2024 for details on historical records from the site and up to 4km; the furthest zone of influence for any Irish bat species. A core sustenance zone (CSZ), as applied to bats, refers to the area surrounding a communal bat roost within which habitat availability and quality will have a significant influence on the resilience and conservation status of the colony using the roost. (BCT, 2020) estimates distances for UK bats.

Six roosts were recorded within 4km of the site. The closest historical roost is located c. 600m from the proposed site recorded in 2009. This roost contains a maternity colony of Soprano Pipistrelle and likely Leisler's roost. Given the distance, connectivity and habitats within the subject site, it should be considered an important habitat for the continued usage of this roost.

In relation to ad hoc records; no bat records have been recorded within the 2km square the site resides in however 7 have been recorded within the S99 Hectad.

Table 2-3: Irish bat species recorded in the S99 Hectad

| Common Name | Latin Name | Legal Protection | Conservation Status (Marnell et al. 2019) |
|-------------------------|----------------------------------|---|---|
| Brown Long-eared Bat | <i>Plecotus auritus</i> | EU Habitats Directive (92/43/EEC) Annex IV, Wildlife Act 1976, as amended | Least Concern |
| Daubenton's Bat | <i>Myotis daubentonii</i> | | |
| Lesser Noctule | <i>Nyctalus leisleri</i> | | |
| Nathusius's Pipistrelle | <i>Pipistrellus nathusii</i> | | |
| Natterer's Bat | <i>Myotis nattereri</i> | | |
| Common Pipistrelle | <i>Pipistrellus pipistrellus</i> | | |
| Soprano Pipistrelle | <i>Pipistrellus pygmaeus</i> | | |

3 SURVEY METHODOLOGY

3.1 BAT ACTIVITY AND EMERGENCE SURVEYS

The bat detectors used during the emergence and transect surveys were Wildlife Acoustics Inc. (Massachusetts, USA) Echo Meter Touch Pro 2 which is triggered to record when a bat call is emitted louder than 18dB for 1sec. These detectors use full spectrum sampling; detecting all frequencies simultaneously, meaning that multiple bat calls can be recorded at the same time. Several heterodyne detectors (Bat Box 2, Pettersson D100) were also used.

Night time surveys combined emergence surveys towards dusk and dawn and walked transects of bat favourable habitats within and surrounding the study were conducted between March and August 2023.

Transects targeted a range of foraging and commuting habitats present within and surrounding the study area, those associated with linear features such as woodland edges, hedgerows, treelines and waterbodies.

A contact describes a bat observed by the surveyor. This contact can range from a commuter passing quickly to a foraging bat circling a feature lasting for several minutes. Some observations contain multiple bats. When several bats of the same species are encountered together they are recorded under the one contact. A separate contact is recorded for each species. A contact finishes when the recorder assumes the bat is no longer present. It is likely that the same bat is recorded in several contacts throughout the night. This survey type cannot estimate abundance of bats, rather activity; the amount of use bats make of an area / feature.

Where possible, a positive identification to species level was made. Information on the behaviour was also recorded where available.

Bat activity is governed by the activity of their insect prey and insect abundance is in turn governed by weather conditions and climate. Insects, and therefore bats, are unlikely to be present at temperatures below 7°C or during periods of strong winds or heavy rainfall so surveying in such conditions is not possible. All field surveys were undertaken within the active bat season and during good weather conditions (dry conditions and temperature at 8°C and greater).

Bats were identified by their ultrasonic calls coupled with behavioural and flight observations and on computer by sound analysis of recorded echolocation and social calls with dedicated software (Wildlife Acoustic's Kaleidoscope Pro; version 5.6.0).

3.2 STATIC BAT DETECTOR SURVEYS

Passive Static Bat Surveys involve leaving a static bat detector unit (with ultrasonic microphone) in a specific location and 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 the monitoring unit are recorded and their calls are stored for analysis post surveying). The bat detector is effectively used as a bat activity data logger. This results in a far greater sampling effort over a shorter period of time. Bat detectors with ultrasonic microphones are used as the ultrasonic calls produced by bats cannot be heard by human hearing.

A Song Meter Mini Full spectrum bat recorder was deployed within the study area throughout 2023. The detector was placed attached to an ESB pole close to the derelict dwelling (see Figure 2-1 above). The aim of this survey was to examine how bats utilise the site throughout the year.

While the detector was placed close to the known roost by the dwelling, the overall habitats surrounding the detector are **not** the best bat habitats found within the site. A section of scrub can be found surrounding the dwelling but this does not join up with the greater landscape. A treeline of Aspen and Willow can be found to the south of the shed running NE-SW. Much of the habitat within a 50m buffer of the detector consists of open grassland.

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.

Per SNH (2019) guidance, the static unit programmed to commence half an hour before sunset and finish half an hour after sunrise to ensure that bat species that emerge early in the evening and return to roosts late are recorded. Detectors were left out for 31 nights in 2023. Data from a previous 2021 static survey (17 nights in August) was also used for comparison. See Table 4-1 below for further details.

The data was analysed with Wildlife Acoustic's Kaleidoscope Pro; version 5.6.0). This software identifies many of the calls made by Irish bats. All calls not labelled Soprano or Common Pipistrelle Bats were manually verified. Results presented below show some Myotis calls the surveyor is confident the bat are Natterer's bat and Daubenton's bat. Distinguishing between Myotis species recordings is difficult (unless distinctive social calls are recorded thus several calls are recorded to genus level only. These could be either Whiskered, Daubenton's or Natterer's bat. Similarly, several Pipistrelle calls were recorded with a peak frequency of around 40 kHz. These calls are lower than expected for Common Pipistrelle but higher than typical for Nathusius's.

The detector was erected ensuring microphone height was set at 2m.

3.2.1 Survey and Analysis Limitations

- It is not always possible to identify a bat call to species level due to the recorded call not being clear. Recorded files from automated detectors may contain only fragments of a call, or the bat may be calling from a distance (from the detector) in which case it may not be clear enough to assign the call to a specific species. In these cases the call has been assigned to genus level;
- Some caution must be taken when comparing activity levels between species, as bias can be shown towards those species with 'louder' or 'lower frequency' echolocation calls. For example, *Nyctalus* species have louder and low frequency echolocation calls which carry further than the quieter and more broad-band brown long-eared bat echolocation calls;
- A bat contact is defined as a single detector file which contains at least one bat call. Multiple contacts at any given detector location do not necessarily indicate the presence of more than one bat and should therefore be interpreted as a level of activity rather than the number of bats recorded;

4 RESULTS

Table 4-1 provides details of bat surveys conducted on the site including summarising those of baseline surveys conducted in 2021.

Table 4-1: Bat Survey Effort Summary

| Survey | Date | Survey type | Details | Surveyor |
|---------------------|--------------------------|---|---|----------|
| 2021 Surveys | | | | |
| 1 | 01/08/2021 to 19/08/2021 | Static Bat Survey | Static set by derelict dwelling for 17 nights. High Common Pipistrelle (average of 22.8 BP/Hr) ¹ activity recorded. | FW |
| 2 | 24/08/2021 | Daylight inspection, emergence and transect | Three buildings identified as potential roosts; derelict dwelling (1), Garage (2) and Agri-shed (3). Bats confirmed roosting in dwelling and garage with no roosting bats recorded from shed. Common / Soprano Pipistrelle maternity roost recorded from dwelling while Pipistrelles also noted emerging from garage – likely satellite roost. | FW |
| 3 | 10/09/2021 | Daylight inspection, emergence and transect | Transect surveys showed good Daubenton's activity to south by Carrigower River and over floodplain, with Leisler's bat, Common and Soprano Pipistrelle recorded throughout site. Unidentified Myotis bats also recorded. | FW |
| 2023 Surveys | | | | |
| 1 | 04/03/2023 to 23/03/2023 | Static Survey | Winter season static survey conducted by dwelling within site. During the 17 nights 179 registrations were recorded with highest activity recorded from Common Pipistrelle (120 registrations). Overall low activity (average 0.8 BP/Hr), typical for this time of year. | FW |
| 2 | 16/04/2023 | Static Survey | One night of recording in April. Increase in Leisler's activity compared to March. This is typical as Leisler's activity strongly correlates with temperature. Static was set recording for a short period (c.4 hours) over the period of night where activity is highest thus the average BP/Hr (38.4) is higher than typical for this time of year. | FW |
| 3 | 30/05/2023 to 01/06/2023 | Static Survey | Three nights recording in May / June. Soprano Pipistrelle was the highest recorded species with 686 registrations. Overall activity levels are high, averaging 46.9 BP/Hr. | FW |
| 4 | 03/06/2023 | Emergence survey and transect | Up to 40 Pipistrelle bats light sampling in shed (building 3). This shed did not contain a bat roost in 2021. During transects, bats noted hunting over Newt pond. | FW |
| 5 | 30/06/2023 | Static Survey | One nights recording with 94 registrations averaging at 11.6 BP/Hr | FW & JC |
| | | Emergence, transect, and re-entry surveys | Daylight search and Emergence survey. Accumulation of bat droppings in shed both within breeze blocks (crevice dwelling bats), on the floor, and on shelves in the small enclosed area with the sink (former office?) and on its roof. Droppings were also noted on wooden shelves and on the ground alongside butterfly and moth prey remains in the large shed. The garage was also inspected. This building has an attic space with tiles and bitumen felt and while slightly low is still of good bat roosting potential. Scattered Brown Long-eared bat droppings were noted here and the ridge beam was devoid of cobwebs indicating bat activity. Several access points provide access. An attic opening in the NW room of the garage provides good access. In addition, | |

¹ Bat passes per hour

| Survey | Date | Survey type | Details | Surveyor |
|--------|--------------------------|------------------|---|----------|
| | | | <p>gaps in the NE and by the fascia along the gable end provide access to the attic of the garage. Bat droppings were collected for DNA analysis from both the garage and the shed.</p> <p>Emergence survey recorded 16 Brown long-eared bats within both sections of shed (building 3) along with 2 Common Pipistrelles and 1 Soprano Pipistrelle. Canon XA10 camcorder aided emergence count.</p> <p>The thermal scope by the rear of the dwelling did not find emerging bats however a Leisler's bat was recorded flying inside the building towards dawn.</p> | |
| 6 | 16/07/2023 to 22/07/2023 | Static Survey | 1503 registrations recorded a seven night period. High Brown Long-eared bat activity with multiple social calls and several recordings with more than one bat. | FW |
| 7 | 31/07/2023 | Emergence survey | Brown Long-eared, Common and Soprano Pipistrelle noted in shed (building 3) and Common, Soprano Pipistrelle and Leisler's bat, whiskered bat observed emerging from derelict dwelling. | FW |
| 8 | 16/08/2023 | Emergence survey | Surveys again conducted at buildings. 2 x bats recorded roosting in garage, a single brown long eared and Soprano Pipistrelle. Two non echo locating bats (probably Brown Long-eared) probably emerged from the dwelling during emergence period. | FW & JC |
| | | Static Survey | SM Mini placed in shed (3) throughout the night. During this survey 526 registrations were recorded with Brown Long-eared represented 72%, Soprano Pipistrelle 14%, Common Pipistrelle 11% and Natterer's bat 2% (11 recordings). Given the amount of bats flying within the shed, these Natterer's could easily be missed during typical surveys. | |

4.1.1 Bat activity and emergence surveys

Table 4-2 details weather data taken during surveys.

Table 4-2: Weather data

| Date | Temp | Cloud Cover | Rain | Wind | Sunset / Sunrise | Start | Finish |
|------------|----------|-------------|------|--------------|------------------|-------|--------|
| 04/03/2023 | 6 | 100% | Dry | F2 to 4 | 18:08 | 18:00 | 19:00 |
| 16/04/2023 | 14 | 75% | Dry | F2 to 3 | 20:26 | 20:37 | 23:30 |
| 30/05/2023 | 11 | 80% | Dry | F2 to 4 | 21:40 | 21:40 | 22:40 |
| 03/06/2023 | 14.5 | 0% | Dry | F1 | 21:44 | 21:45 | 00:45 |
| 30/06/2023 | 14.5 | 100% | Dry | F4 – 5 gusts | 21:56 | 22:24 | 00:10 |
| 01/07/2023 | 12.5 | 100% | Dry | F1 | 05:01 | 03:10 | 05:00 |
| 31/07/2023 | 16 to 14 | 0% | Dry | F2 to 4 | 21:22 | 21:00 | 23:17 |

| Date | Temp | Cloud Cover | Rain | Wind | Sunset / Sunrise | Start | Finish |
|------------|------------|-------------|------|---------|------------------|-------|--------|
| 16/08/2023 | 16.5 -13.5 | 10% | Dry | F2 to 3 | 20:51 | 18:55 | 23:55 |
| 17/08/2023 | 15 | 0% | Dry | F2 to 3 | 06:07 | 04:00 | 06:30 |

4.2 EMERGENCE AND WALKED SURVEY RESULTS

4.2.1 04th March 2023

Survey conducted by Faith Wilson. Fresh bat droppings were noted on the wall of the small room at the rear of the garage. Fresh bat droppings also noted within the derelict house. There are unlimited locations for bats to avail of in these structures. The barn was also examined and there was no evidence of a bat using the barn. No bat activity was noted at dusk and the static bat detector was deployed.

4.2.2 16th April 2023

Survey conducted by Faith Wilson. The first bat was recorded at 20.58 over the site (a Leisler's bat). Three soprano pipistrelles emerged from the garage. Fresh droppings were noted on the wall below holes to the attic for pipework. At 21:09 a single soprano pipistrelle emerged from the garage, followed at 21:12 a single soprano pipistrelle emerged from the rear of the garage. At 21:14 a Leisler's bat was detected and at 21:19 a possible Brown long-eared bat was heard and a Leisler's bat was recorded overhead and again at 21:26 and at 21:30 when it was joined by a common pipistrelle bat. At 21:38 and 21:52 a soprano pipistrelle was recorded foraging over the house. At 21:44 a Leisler's bat was recorded and at 21:46 a soprano pipistrelle was recorded. A general walkover survey was then completed and Leisler's bat, common pipistrelle and soprano pipistrelle were recorded throughout the site. There was very good hunting activity over the newly created newt pond. The survey concluded at 11.30 and the static was collected.

4.2.3 03rd June 2023

Survey conducted by Faith Wilson. First time shed (3) noted being used as a bat roost. Bat droppings were scattered throughout. The shed building consists of two parts; the north-eastern section is constructed of corrugated sheeting similar to the typical hay barn style with rounded roof and metal frame. The adjoining south-western section is constructed from breeze blocks and has a sloped metal roof. Within this section is a small office type section constructed from blocks and with a plywood roof. An internal door provides access between the rooms while each section has an external door. Fresh bat droppings were also noted in the garage building (2).

The night time survey primarily focused on the shed. During the survey c. 40 Pipistrelle; both Common and Soprano were noted flying within the shed. In addition, unidentified Myotis bats were also recorded.

After the emergence period a transect was conducted where four Leisler's bats were noted hunting over the pond.

4.2.4 30th June 2023 – 1st July 2023

4.2.4.1 Shed (3)

Survey conducted by Faith Wilson & John Curtin. During the emergence period a surveyor was positioned to the south-west looking at the two doorways of the shed; the most likely exit for bats. The surveyor used a Canon CA10 with Infra-red nightfox torches. In total 16 Brown Long-eared bats were recorded in addition to 2 Common Pipistrelle and a Soprano Pipistrelle. Bats light sampled in the large section of shed before emerging through both doors.



Plate 4-1: BLE flying within shed.



Plate 4-2: BLE emerging from shed

4.2.4.2 Dwelling and garage

While the main survey work was carried out at the shed (3) during the emergence period, a Guide track thermal scope was set to the rear of the dwelling (1) and garage (2) set to record emerging bats from the rear of the building. The scope has good range and can record flying bats from several hundred meters.

At 22:39 and 22:40 single bats were recorded emerging from the garage. No bats were found emerging from the dwelling.



Plate 4-3: Bat emerging from garage

Towards dawn a surveyor was positioned to the front of the dwelling. A single Leisler's bat was recorded within the building at 03:34



Plate 4-4 Dawn survey by dwelling. @ 03:34 Leisler's bat flew within building through room

Whitestown Emergence 30th June

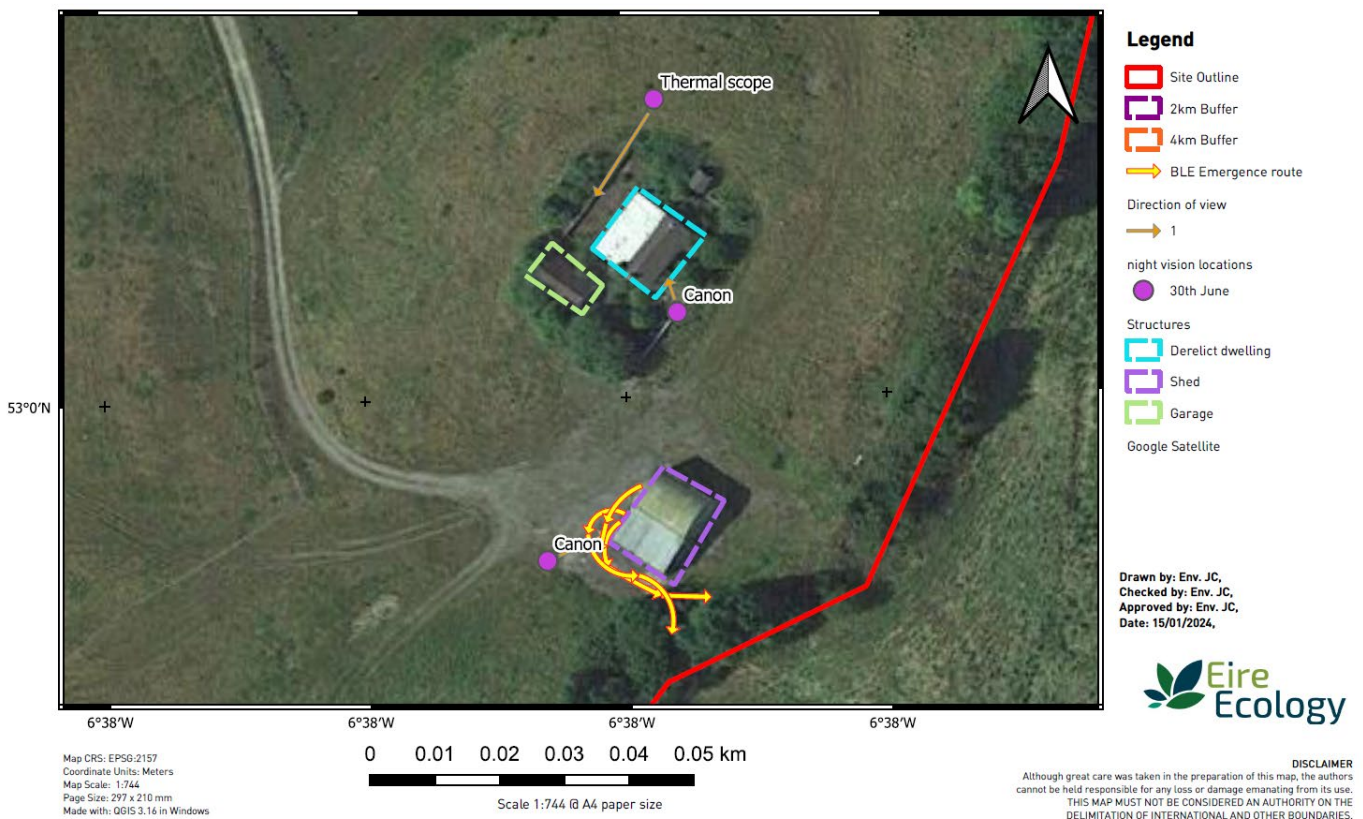


Figure 4-1: Location of bat activity

4.2.4.3 DNA Analysis

Bat droppings were collected from a variety of locations within the shed during the daylight survey including from within the breeze block cavities. Samples were sent for DNA analysis to Swift Ecology who confirmed the presence of Brown Long-eared, Natterer's and Whiskered bat. The latter two species can more regularly be found as crevice dwelling bats.

4.2.5 31st July 2023

Emergence survey conducted by Faith Wilson focusing on the dwelling house and garage. Brown long eared bats were recorded light sampling in the darkened barn at dusk. During the survey a Common Pipistrelle, Soprano Pipistrelle, Leisler bat and Whiskered bat were recorded likely emerging from dwelling however numbers of bats exiting was low. Later in the night Common Pipistrelle, Soprano Pipistrelle, and Brown long eared bats were recorded foraging in the larger barn. Wind speed increased and a bright moon deterred bats from emerging after 23.16 and the survey was then concluded as the temperature decreased to 14 degrees.

4.2.6 16th and 17th August 2023

During this survey, surveyors were again positioned by the buildings observing bat activity. Weather conditions were good during the survey. Initially five brown long eared bats were visible in the shed, 4 in the main lean to and one in the small enclosed area where the sink is. One brown long eared bat was present in the attic of the garage at 21:26. A single soprano pipistrelle emerged from the west gable of the garage and also one from the

eastern end. Two possible *Myotis* bats were recorded at the north west corner of the house between 21:35 and 21:45 and are likely to be roosting there. Leisler's bat was recorded hunting overhead. Common pipistrelle, soprano pipistrelle and brown long eared bats were all recorded hunting in the vicinity of the barn and the treeline of aspen are used as a commuting route from the barn to the remainder of the site and to the river. Daubenton's bats were recorded hunting over the river. 10 brown long eared bats were recorded at dawn in barn the barn and the north west and north eastern corner of the barn were the main roosting areas identified.

4.2.6.1 Garage (2)

During this survey the Canon Camcorder was set by the garage (building 2) at a northern aspect looking south facing the door from 21:36 for 37 minutes. After 36 minutes while one bat flew in through the door a second bat was recorded leaving. This demonstrates the building was actively used as a bat roost. After this time the camcorder was repositioned into the office section of the shed (building 3) aimed at a gap where bat droppings were previously noted. The aim was to record emerging Pipistrelle or *Myotis* bats. The camera was set recording for 55 minutes set from 22:46. After 9minutes of recording a Brown Long-eared was recorded flying briefly within the room.



Plate 4-5: Bat access point – garage (structure 2)



Plate 4-6: Location of cavities within shed (structure 3)

4.2.7 Transects

Transect surveys were conducted through navigable sections of the site. Daubenton's bats were recorded by the river on the 16th of August while good bat activity of Common pipistrelle, Soprano pipistrelle and Leisler's bat was noted by the Newt pond to the west during transects in July and August.

Whitestown Contact Locations - July & August 2023

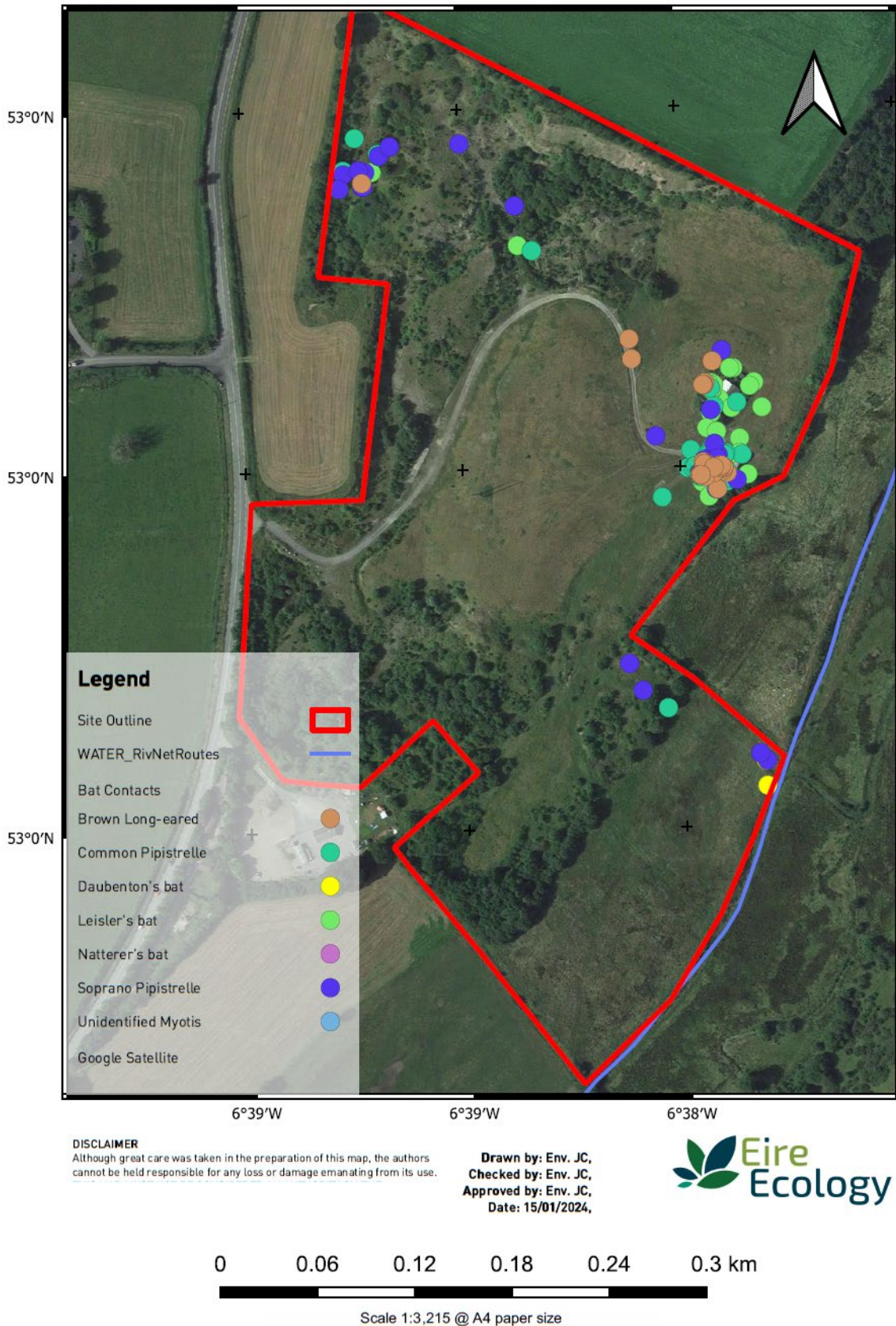



Figure 4-2: Location of bat contacts

4.3 DNA ANALYSIS

Two samples of bat droppings were collected from the garage and the shed and sent for DNA analysis to Swift Ecology in the UK for genetic determination. These confirmed that the garage was used by Brown long-eared bats and the shed by Brown long-eared, Whiskered and Natterer's bats.

| Order Number: 2099 | |  | | | johncurtin10@gmail.com | | |
|--|---------------------|--|-------------------|---------------|-----------------------------------|--|-------------------------------|
| Samples submitted | | | | | | | |
| Sample Code | Multi-species? | Sample Type | Date Sample Found | Species Group | Site postcode/post town /grid ref | Site description / comments (Optional) | Suspected identity of species |
| SEL-2099-1 | Yes | Faecal | 28/06/2023 | C. Bats | 53.001997, - 6.639557 | Shed | BLE |
| SEL-2099-2 | Yes | Faecal | 28/06/2023 | C. Bats | 53.002355, - 6.639731 | Garage | BLE |
| Analysis Results | | | | | | | |
| Sample Code | DNA Extraction Code | Species Identified | ID Method | Ct value | % match | | |
| SEL-2099-1 | EG-2023-0745 | Plecotus auritus (Brown long-eared bat), Myotis mystacinus (Whiskered bat) and Myotis nattereri (Natterer's bat) | qPCR | 21/21/22 | | | |
| SEL-2099-2 | EG-2023-0746 | Plecotus auritus (Brown long-eared bat) Note: All UK bat species tested for - | qPCR | 21 | | | |
| Company No. 6233860. Registered in England and Wales. VAT Reg No. 901 5587 33 | | | | | | | |
| Page 2 of 5 | | | | | | | |

4.4 STATIC DETECTOR SURVEYS

Six species of bats were recorded during the surveys. An individual bat can pass a particular feature on several occasions while foraging. It is therefore not possible to estimate the number of individual bats. In accordance with best practice guidance (Collins, 2016) an activity index is used; calculated from bat records per hour which allows analysis of bat activity to estimate abundance and/ or activity. The calculation is as follows: BAI (Bat Activity Index) = Total number of bat records / number of hours of record.

Highest overall activity was recorded on the 31st of May where 431 bat registrations were recorded. Soprano pipistrelle was the most commonly recorded species with 1201 registration (39 %), followed by Common Pipistrelle 830 (27%), Leisler's bat 585 (19%) and Brown Long-eared 431 (14%). Other species were recorded in low numbers.

As expected March activity (representing winter / early spring) levels were lowest with an average of 0.8 Bat passes per Hour (BP/Hr). Activity peaked 29th of May to the 01st of June with an average of 46.9 BP/Hr.

The July data saw an increase in Brown Long-eared activity with a substantial number of social calls. During this seven-night period Brown Long-eared were the most recorded bat species (26%).

Table 4-3: Static results 2023 combined data

| Detector | Leisler's Bat | Common Pipistrelle | Soprano Pipistrelle | Pipistrelle 40 kHz | Brown Long-eared | Natterer's Bat | Daubenton's Bat | Unidentified Myotis | Total | Minutes recorded | Bat passes per hour |
|-----------------------|---------------|--------------------|---------------------|--------------------|------------------|----------------|-----------------|---------------------|-------|------------------|---------------------|
| Total | 585 | 830 | 1201 | 2 | 431 | 14 | 6 | 38 | 3107 | 15412 | 12.1 |
| Bat passes per hour | 2.3 | 3.2 | 4.7 | 0.01 | 1.7 | 0.1 | 0.02 | 0.1 | | | |
| % proportion of calls | 19 | 27 | 39 | 0 | 14 | 0 | 0.2 | 1 | | | |

| March 2023 - 17 nights | | | | | | | | | | | |
|------------------------|---------------|--------------------|---------------------|--------------------|------------------|----------------|-----------------|---------------------|-------|------------------|---------------------|
| Detector | Leisler's Bat | Common Pipistrelle | Soprano Pipistrelle | Pipistrelle 40 kHz | Brown Long-eared | Natterer's Bat | Daubenton's Bat | Unidentified Myotis | Total | Minutes recorded | Bat passes per hour |
| Total | 2 | 120 | 41 | 0 | 3 | 6 | 0 | 7 | 179 | 13667 | 0.8 |
| Bat passes per hour | 0.0 | 0.5 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | |
| April 2023 - 1 night | | | | | | | | | | | |
| Detector | Leisler's Bat | Common Pipistrelle | Soprano Pipistrelle | Pipistrelle 40 kHz | Brown Long-eared | Natterer's Bat | Daubenton's Bat | Unidentified Myotis | Total | Minutes recorded | Bat passes per hour |
| Total | 41 | 19 | 82 | 0 | 3 | 0 | 0 | 1 | 146 | 228 | 38.4 |
| Bat passes per hour | 10.8 | 5.0 | 21.6 | 0.0 | 0.8 | 0.0 | 0.0 | 0.3 | | | |

| May / June 2023 - 3 nights | | | | | | | | | | | |
|------------------------------|---------------|--------------------|---------------------|--------------------|------------------|----------------|-----------------|---------------------|-------|------------------|---------------------|
| Detector | Leisler's Bat | Common Pipistrelle | Soprano Pipistrelle | Pipistrelle 40 kHz | Brown Long-eared | Natterer's Bat | Daubenton's Bat | Unidentified Myotis | Total | Minutes recorded | Bat passes per hour |
| Total | 121 | 341 | 686 | 2 | 23 | 2 | 1 | 9 | 1185 | 1517 | 46.9 |
| Bat passes per hour | 4.8 | 13.5 | 27.1 | 0.1 | 0.9 | 0.1 | 0.0 | 0.4 | | | |
| 30th June - 1 night | | | | | | | | | | | |
| Detector | Leisler's Bat | Common Pipistrelle | Soprano Pipistrelle | Pipistrelle 40 kHz | Brown Long-eared | Natterer's Bat | Daubenton's Bat | Unidentified Myotis | Total | Minutes recorded | Bat passes per hour |
| Total | 41 | 7 | 27 | 0 | 18 | 0 | 0 | 1 | 94 | 486 | 11.6 |
| Bat passes per hour | 5.1 | 0.9 | 3.3 | 0 | 2.2 | 0.0 | 0.0 | 0.1 | | | |
| 16th to 22nd July - 7 nights | | | | | | | | | | | |
| Detector | Leisler's Bat | Common Pipistrelle | Soprano Pipistrelle | Pipistrelle 40 kHz | Brown Long-eared | Natterer's Bat | Daubenton's Bat | Unidentified Myotis | Total | Minutes recorded | Bat passes per hour |
| Total | 380 | 343 | 365 | 0 | 384 | 6 | 5 | 20 | 1503 | 3670 | 24.6 |
| Bat passes per hour | 6.2 | 5.6 | 6.0 | 0 | 6.3 | 0.1 | 0.1 | 0.3 | | | |

5 DISCUSSION

During the 2023 surveys, 3 building containing bat roosts have been confirmed on the site. These are the dwelling house, the adjoining garage and the shed/hay barn.

Since 2021 the condition of the roof of the dwelling house has degraded with loss of tiles and increased air movement as a result and the maternity, Pipistrelle roost is reduced to a satellite roost used by low numbers.

The garage remains in good condition from the perspective of roosting bats and is used by low numbers of bats.

The shed is a new roost used by rarer woodland bat species such as Brown Long-eared, whiskered and Natterer's bats.

The shed has connectivity towards the river via aspen and a willow scrubby treeline, which acts as an important commuting route for bats. Table 5-1 provides details on each roost.

Table 5-1: Roost results

| Structure | Species | Max No observed? | Roost type | Details of roost |
|--------------|----------------------------------|------------------|-----------------|--|
| Dwelling (1) | Soprano pipistrelle | 1 | Satellite | Roost structure has degraded since 2021. Maternity roost previously recorded was not present. Survey on the 30 th June did not note bats emerging from the dwelling, however on the 31 st July four species were recorded likely emerging, while two non-echolocating bats were recorded emerging on the 16 th of August. |
| | Common Pipistrelle | 1 | Satellite | |
| | Leisler's bat | 1 | Satellite | |
| | Whiskered bat | 1 | Satellite | |
| | Unidentified bat | 2 | Satellite | |
| Garage (2) | Brown Long-eared bat | 2 | Satellite | Building is in good condition although attic space is somewhat low thus reducing potential for large roost. Scattered droppings within and bats observed exiting. Surveys showed regular usage by low number |
| | Soprano Pipistrelle | 1 | Satellite | August survey revealed Soprano Pip emerging from NW corner. |
| Shed (3) | Brown Long-eared | 16 | Maternity roost | Building is in good condition with an internal office type structure within providing a sheltered location for bats. Surveys consistently show multiple Brown Long-eared bats using the shed. They typically emerge from the NW and fly SE to Aspen treeline. |
| | Pipistrelle (Soprano and Common) | 40 | Satellite | On the 03 rd June c. 40 Pipistrelle bats were noted using the shed. Numbers dropped through the season with lower numbers of Soprano and Common Pipistrelle recorded on the 30 th of June and recordings noted on static from the 16 th of August. |

| Structure | Species | Max No observed? | Roost type | Details of roost |
|-----------|----------------|----------------------------------|------------|---|
| | Natterer's bat | Droppings and recorded on static | Satellite | Fresh droppings noted in breeze block cavity within office type section within building. Identification confirmed via DNA testing. Static placed within shed on the 16 th of August recorded Natterers bats. |
| | Whiskered bat | Droppings | Satellite | |

In total, seven species of bat were positively identified during the various bat surveys:

- Common Pipistrelle (*Pipistrellus pipistrellus*),
- Soprano Pipistrelle (*Pipistrellus pygmaeus*),
- Leisler's bat (*Nyctalus leisleri*),
- Brown Long-eared Bat (*Plecotus auritus*),
- Natterer's bat (*Myotis nattereri*),
- Daubenton's Bat (*Myotis daubentonii*) and
- Whiskered Bat (*Myotis mystacinus*).

Several contacts have been labelled as 40 kHz Pipistrelle. This recording had a peak frequency of 40.0 kHz. This frequency is lower than usual for a Common Pipistrelle whilst a Nathusius typical peak frequency is 39.3 kHz.

5.1.1 Comparison to 2021 data

Table 4-5 shows a summary of the 2021 static survey. During this period the majority of bats recorded were Common Pipistrelle. This corresponds with the emergence survey carried out at the time where a maternity roost was recorded by the derelict house.

Table 5-2: 2021 Static Summary

| Detector | Leisler's Bat | Common Pipistrelle | Soprano Pipistrelle | Pipistrelle 40 KHz | Brown Long-eared | Natterer's Bat | Unidentified Myotis | Total | Minutes recorded | Bat passes per hour |
|---------------------|---------------|--------------------|---------------------|--------------------|------------------|----------------|---------------------|-------|------------------|---------------------|
| Total | 726 | 3453 | 271 | 0 | 15 | 4 | 37 | 4506 | | |
| Bat passes per hour | 4.8 | 22.8 | 1.8 | 0.0 | 0.1 | 0.01 | 0.2 | | 9088 | 29.7 |

During the 2023 surveys this maternity roost was not present with low levels of roosting bats recorded. It is likely the derelict dwelling is falling into a state of disrepair that has forced this roost to relocate.

In 2021, Brown Long-eared bats were rarely recorded; averaging 0.1 BP/Hr compared to a rate of 6.3 for the July 2023 static survey period.



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