2025

Lesser horseshoe bat roost, Transformer Building, Ardnacrusha, Co. Clare: Derogation Application Supporting Information

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Bat Eco Services

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NPWS licence C17/2023 (Licence to handle bats, expires 23rd January 2026);
NPWS licence 017/2025 (Licence to photograph/film bats, expires 31st December 2025);
NPWS licence DER/BAT 2025-171 (Survey licence, expires 31st December 2025).

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

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

Client: ESB

Project Name & Location: Lesser horseshoe bat Roost, Transformer Building, Ardnacrusha, Co. Clare

Report Revision History

Date of Issue	Draft Number	Issued To (process of issuing)
6th October 2025	Draft 1	By email to ESB & NPWS

Purpose
This document has been prepared as a Report for ESB. Only the most up to-date report should be consulted. All previous drafts/reports are deemed redundant in relation to the named site.

Bat Eco Service accepts no responsibility or liability for any use that is made of this document other than by the client for the purposes for which it was originally commissioned and prepared.

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

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

Citation: Bat Eco Services (2025) Lesser horseshoe bat roost, Transformer Building, Ardnacrusha, Co. Clare. Supporting Information for Derogation Licence Application. Unpublished report prepared for ESB.

6th October 2025

RE: Application for a Derogation Licence to undertake investigative works in Transition Room and Basement of the Transformer Building, Ardnacrusha, Co. Clare.

To whom it many concern:

On behalf of the client ESB Ardnacrusha, Bat Eco Services Limited are applying for a second derogation licence, pertaining to the Transformer Building, to undertake investigative works on Transition Room and Basement of the Transformer Building. A lesser horseshoe bat colony use different sections of the Transformer Building which is located at the ESB Ardnacrusha Power Station, Ardnacrusha, Co. Clare.

The lesser horseshoe bat colony roosts in three sections of the building
- Substation (main maternity colony space and the location of works completed earlier in 2025, under licence (DER-BAT-2025-98);
- Transition Room (room attached to the Substation, shared maternity roost space)
- Basement Room (hibernation roost).

As a result of the surveys, it was recorded that the lesser horseshoe bat colony roosted in the Basement of the Transformer Building (Hibernation roost) while the principal Summer Roost was in a room named the Transition Room as well as the Substation that is connected to the Transformer Building. This substation was an active substation and is under the management of ESB Networks. Due to the fact that a large amount of bat droppings had accumulated on the equipment within the substation ESB Networks retired the substation and permitted works to increase the suitability of this structure as a maternity roost for the colony. These works were permitted under licence, completed in 2025 and a report was issued to NPWS along with the licence returns.

The next step is to investigate how to provide an alternative access point from the Transition Room to the Basement. Currently, the bats fly through gaps in the wall plate of the internal wall between the Transition Room and the main space of the Transformer Building into the main space of the Transformer Building and then down steps through a door into the basement. The proposed alternative access is required to reduce impact on the lesser horseshoe bat colony as maintenance works are required for the Transformer Building. By providing this alternative access to the basement directly from the Transition Room, it will ensure that lesser horseshoe bat colony will be confined to using the Substation, Transition Room and basement without entering the main space of the Transformer Building and therefore will reduce potential disturbance of the bat colony and increase ease of access between the principal roosting areas used by the bat colony.

A preliminary programme of works was compiled by ESB Networks. Therefore, please find below an application for a derogation licence along with the proposed works, bat mitigation measures and monitoring programme.

If you require any further information, please do not hesitate to contact me.

Yours sincerely,
Dr Tina Aughney

Contents

1. Introduction

1.1 Objective of Proposed Project

To investigate how to provide an alternative access point from the Transition Room directly to the Basement. Currently, the bats fly through gaps in the wall plate of the internal wall into the main space of the Transformer Building and then down steps through a door into the basement. The proposed alternative access is required to reduce impact on the lesser horseshoe bat colony during maintenance works required for the Transformer Building. By providing this alternative access to the basement directly from the Transition Room will reduce potential disturbance and increase ease of access between the spaces the colony use.

The investigative works proposed involve:

- Drilling a test hole in the floor of the basement;
- Determine the depth of concrete between the Transition Room and the Basement;
- Determine if a new tunnel, suitable for lesser horseshoe bats, could be provided as an alternative access for the bat colony.

1.2 Ecological Team

In preparation for this report, an array of surveys have been undertaken in 2024 and 2025. These surveys were completed by Bat Eco Services Ltd., under the guidance of the principal bat specialist, Dr Tina Aughney.

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

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2. Background Information

2.1 Location & Ownership

The Transformer Building (AKA Traffo Building) is the original structure built in the 1920s as part of the operation of the Ardnacrusha Hydroelectric Power Station. It is currently a disused building and is a large warehouse structure with a basement. This building is under the ownership and management of ESB.

Figure 1: Location of the transformer building (Red Circle) with reference to the Ardnacrusha Hydroelectric Power Station, Co. Clare.

2.2 Description of Building

The transformer building was the principal location for bat surveys. This is a large building with a number of internal rooms (offices) and additional buildings attached to the western external wall (e.g. badminton court and associated rooms). The basement covers one small area of the ground floor of the building and there is stairwell access to this room from the main internal part of the building. This basement is located along the western side of the building and is approximately 24m long x 8m wide. There are two tunnels off the basement, one (hereafter known as the northern tunnel) is approximately 5m long while the second tunnel (hereafter known as the southern tunnel) is approximately 12m long.

Table 1: Description of Transformer Building, Ardnacrusha, Co. Clare.

Building No.	Description	Survey Details	Survey Results
Transformer Building	Large warehouse type building of mixed construction and roofing materials	Series of daytime inspections, static surveillance and dusk surveys	Roosts for the following bat species: Lesser horseshoe bats Common pipistrelles Natterer's bat

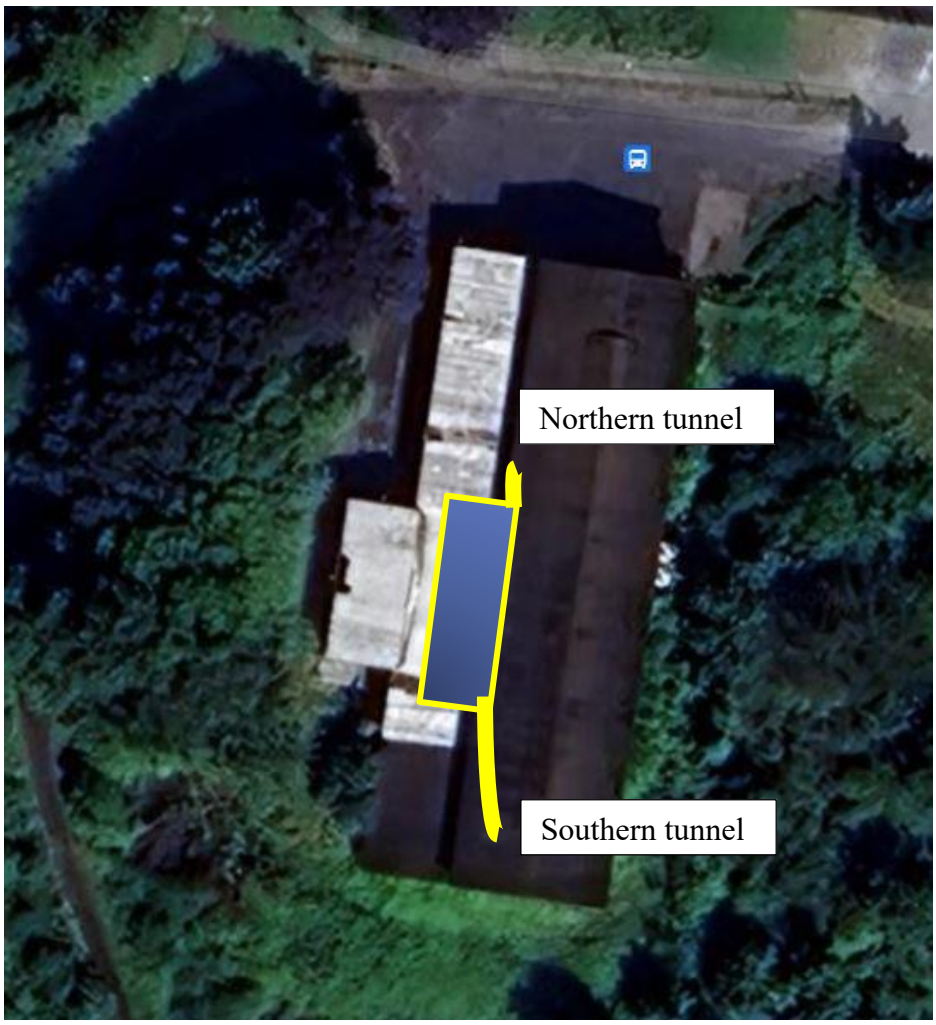

Figure 2: Transformer Building, Ardnacrusha, Co. Clare (approx. located of basement shown in yellow and blue with labels showing tunnel locations).

2.2.1 Summary – How is the Transformer Building used by lesser horseshoe bats?

As a result of dusk surveys, lesser horseshoe bat individuals were confirmed to be roosting within the Transition Room and Substation Rooms. In addition, the use of Night-Vision Aids (NVAs – i.e. thermal scopes and IR camera) allowed the survey team to confirm how the lesser horseshoe bats are entering and accessing the different spaces in the Transformer Building. Lesser horseshoe morphology means that this bat species cannot land or crawl but requires a "post box" entrance to be able to directly fly into a potential roosting space. This reduces the ability for this species to roost in buildings but if such a "post box" entrance is available, they are highly mobile and can fly acrobatically to avail of such roosting spaces through such "post box" entrances. This was greatly demonstrated by the colony of lesser horseshoe bats roosting in a number of spaces in the transformer building recorded during this series of surveys.

The approximate location of each of the spaces used by the lesser horseshoe bats is presented on the aerial photograph below.

- As previously stated, the basement is approximately represented by the Blue Rectangle (outlined in yellow).
- The Transition Room (two connecting rooms) is presented by Red Rectangle (outline in black).
- Substation Rooms (two connecting rooms) is represented by Green Rectangles (outline in darker green).

- Both the Transition Room and Substation Room are open to the rafters approximately 4-4.75m high from the floor level (sloping roof). There are no windows in these two sets of rooms and therefore they are in darkness and highly suitable for roosting bats.

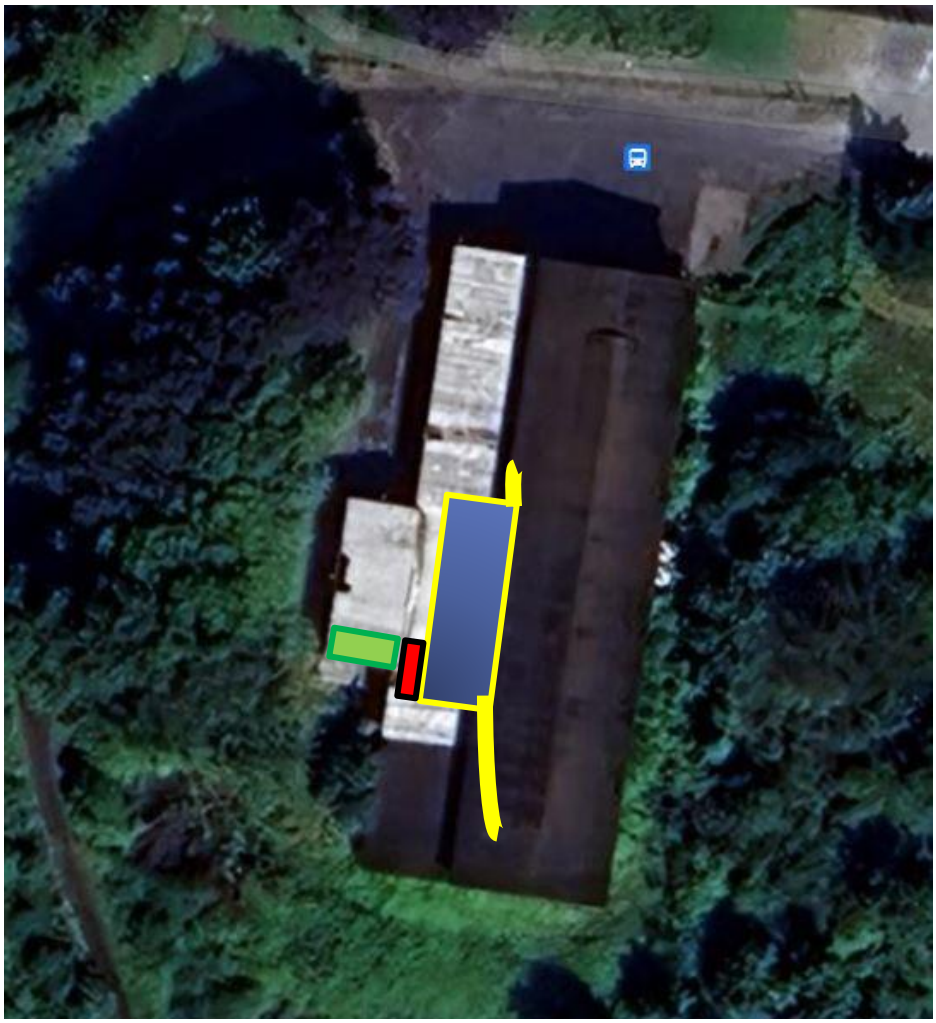

Figure 3: Transformer Building, Ardnacrusha, Co. Clare (approx. located of basement shown in blue and yellow). Transition Room (Red outlined in black) and Substation (Green) also represented.

To further describe the Transition Room (please see drawing below – Figure 4a), this space is in fact two rooms with an internal wall partially separating the space (Red Line). For the surveyor to access the room, the ply wood currently (Plate 4 – shows old ply wood cover of entrance into this space) attached to the external doors is removed and the surveyor climbs through a porthole (Red Arrow). There, one steps down into Part A of the Transition Room and then three steps up into Part B of the Transition Room. There are equipment and shelves in these rooms.

The Substation Room is also two Rooms (Part C and Part D). External access for surveyors is via a steal doorway for each room (access only permitted under supervision of ESB Networks – Blue arrows prior to retirement, since retirement, access is permitted during surveys without supervision as it is no longer an active substation, but a dedicated bat roost space).

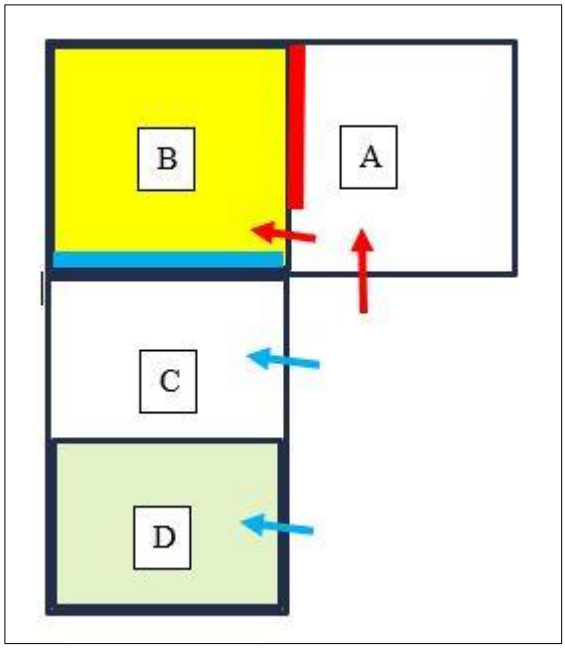

Figure 4a: Drawing of Surveyor access points into Transition Room (Red arrows) and Substation Room (Blue arrows).

Therefore, the pattern of access by lesser horseshoe bats into the Transformer Building, as documented by the series of surveys completed since February 2024, is as follows (please see arrows on Figure 6b):

- The bats enter the Transformer Building through gaps along the wall plate (facia/soffit area – external wall) of the Transition Room (Part A) via the Red Arrows shown on the figure below (Figure 4b). Please see Plate 1 (Yellow Rectangle). Bats were recorded roosting in Part B during both daytime inspections completed to-date (3rd and 10th May 2024).
- To access the Basement, the bats fly through a “post box” entrance at the rafters/wall plate following the Purple arrows (Figure 4b). This brings the bats into the main space of the transformer building (Please see Plate 2 – thermal imagery of the access point).
- To access the Basement, the bats fly from the main space of the Transformer Building, down the steps to the basement and into the basement via an open door.
- To access the Substation Room, the bats fly from the Transition Room and fly through gaps along the wall plate via the Blue Arrows from Transition Room (Part B) in Substation Room (Part C). The majority of the bats recorded during the daytime inspection on the 10th May 2024 were roosting in Part C of the Substation Room.
- To exit the Transformer Building, the bats return along the same routes as described above for accessing the various spaces named. Upon exiting, the bats fly in a direct line to the boundary fence of the Transformer Building as described by the Orange Arrow on Figure 5.

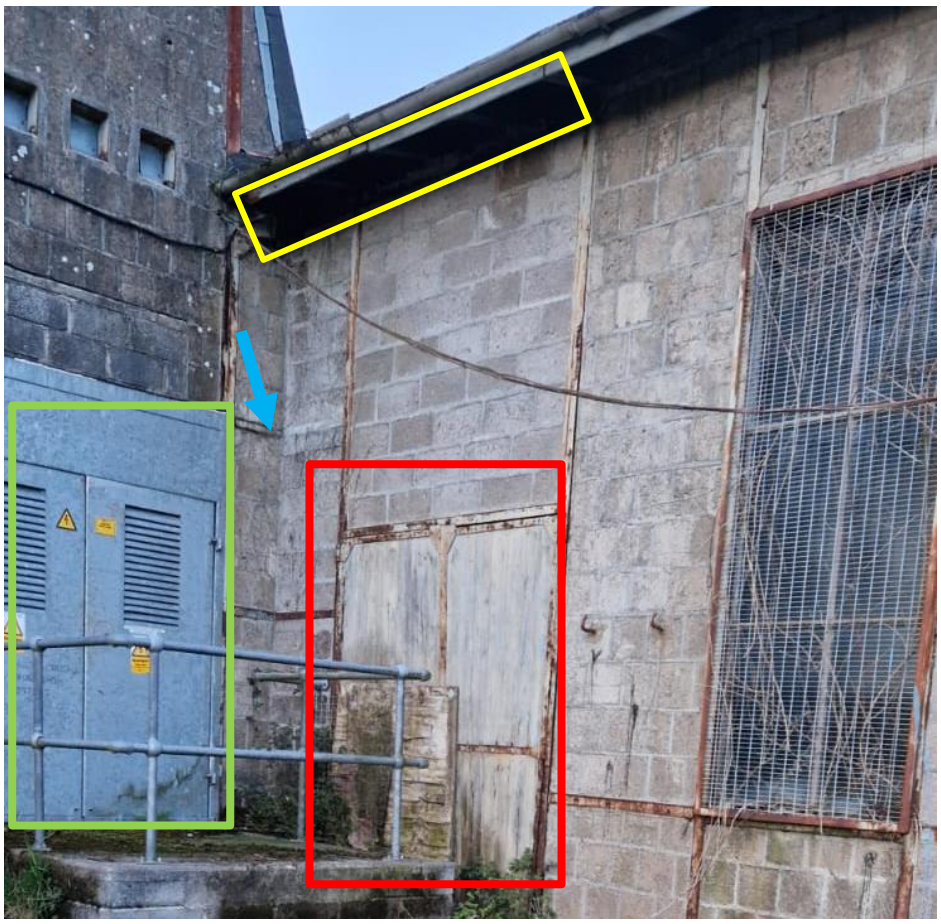

Plate 1: Lesser horseshoe bat exit point (daytime photograph – Yellow box) along the external (western) wall of the transformer building. Blue arrow is the common pipistrelles exit point. The transition room is behind the door marked by Red box. Also depicts the steel door entrance to Substation Room (Part C – marked by Green box).

Plate 2: Point (Yellow box) where lesser horseshoe bats leave the internal space of the transformer building to enter the Transition Room before exiting the building fully (19mm thermal imagery scope).

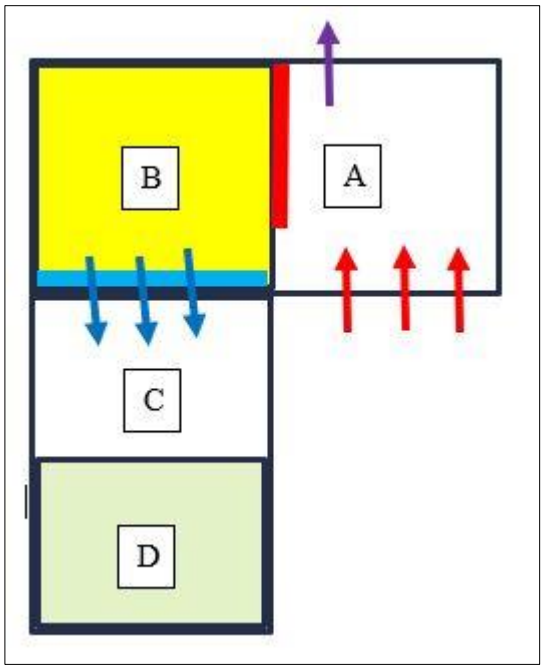

Figure 4b: Drawing of Bat access points into Transition Room (Red arrows), Substation Room (Blue arrows) and main space of the Transformer Building (Purple arrow).

Plate 3: Rafter space in Part C, Substation Room (Lesser horseshoe bats visible – highlighted in yellow).

Plate 4: Bat droppings on substation floor (Part D).
Plate 5: Extent of old bat droppings present on the substation floor (Part C).

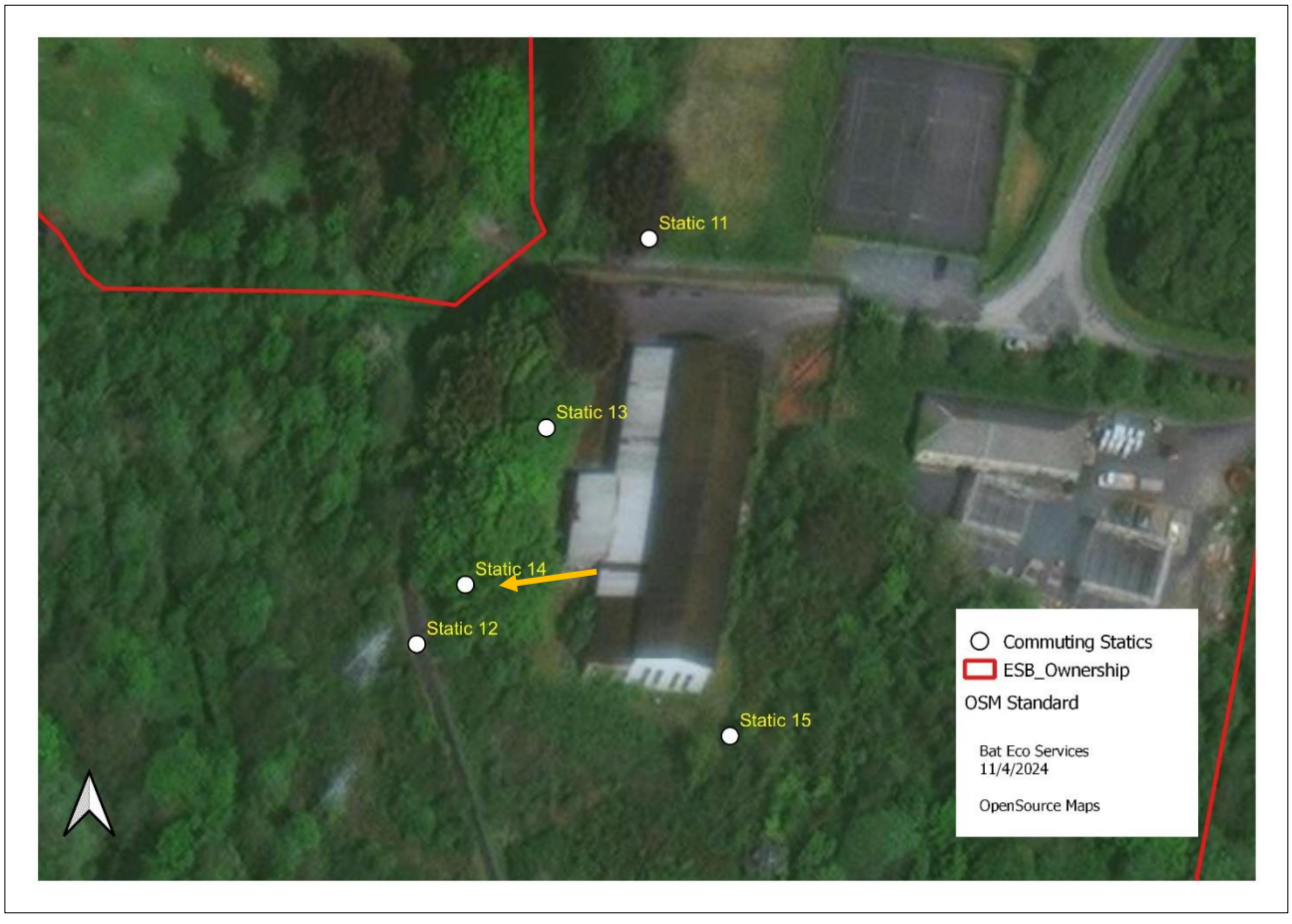

Figure 5: Location of static units around the perimeter of transformer building, Ardnacrusha, Co. Clare (Orange Arrow – exit point recorded for lesser horseshoe bats).

Plate 6: Internal wall in between the two rooms (Part C and Part D) of Substation Room. (Yellow Circle).

Plate 7: Lesser horseshoe bats in Part B of Transition Room on the 10th May 2024.

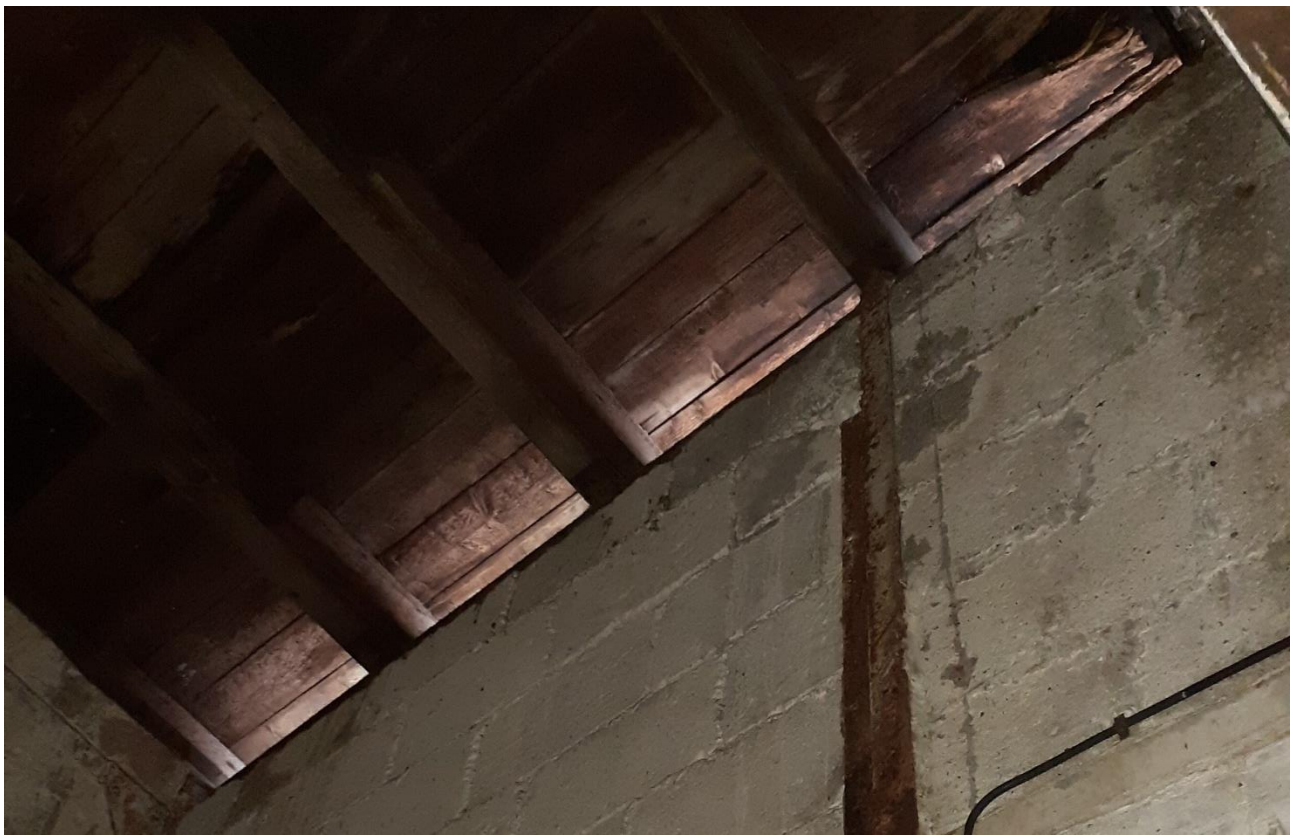

Plate 8: Light entering Part A, Transition Room – exit/entrance point for Lesser horseshoe bats from the Transformer Building.

Plate 9: Internal space of Part A, Transition Room (depicting the wall shared with the main space of the Transformer Building. Entrance/Exit into the main space of the Transformer Building is at the rafter level highlighted by the Red Torch.

Plate 10: Internal space of Part B, Transition Room – primary space for roosting lesser horseshoe bats roosting in this room.

2.2.2 2025 Works Completed on Substation

A Derogation Licence (DER-BAT-2025-98) was received from NPWS in order to undertake works on the Substation. The Substation was retired and this involved removal of equipment and construction a new loft space into each of the Substation rooms to provide a permanent roosting space for the lesser horseshoe bat colony

The new loft rooms were constructed because the equipment in the operating substation would have generated heat. Therefore the removal of such equipment may reduce the temperature within the retired Substation rooms. To mitigate for this, loft rooms were created to reduce the volume required to be heat by solar radiation and therefore aim to maintain the temperature levels preferred by the colony. This is being monitored by temperature data loggers.

Plate 11a,b: New loft floors completed on 30th April 2025.

Plate 12: The underside of new loft floor completed on 30th April 2025.

A daytime inspection was completed on 8th May 2025 and it was confirmed that the bats were roosting in the new loft space. A total of 49 bats were recorded while bat droppings were noted on the floors of the ground floor rooms of the Substation indicating that the bats investigated the spaces constructed for them in the retired Substation. Therefore the works are deemed successful. Two temperature data loggers are in position (one in the ground floor room and one in the loft space) to monitor for 2025.

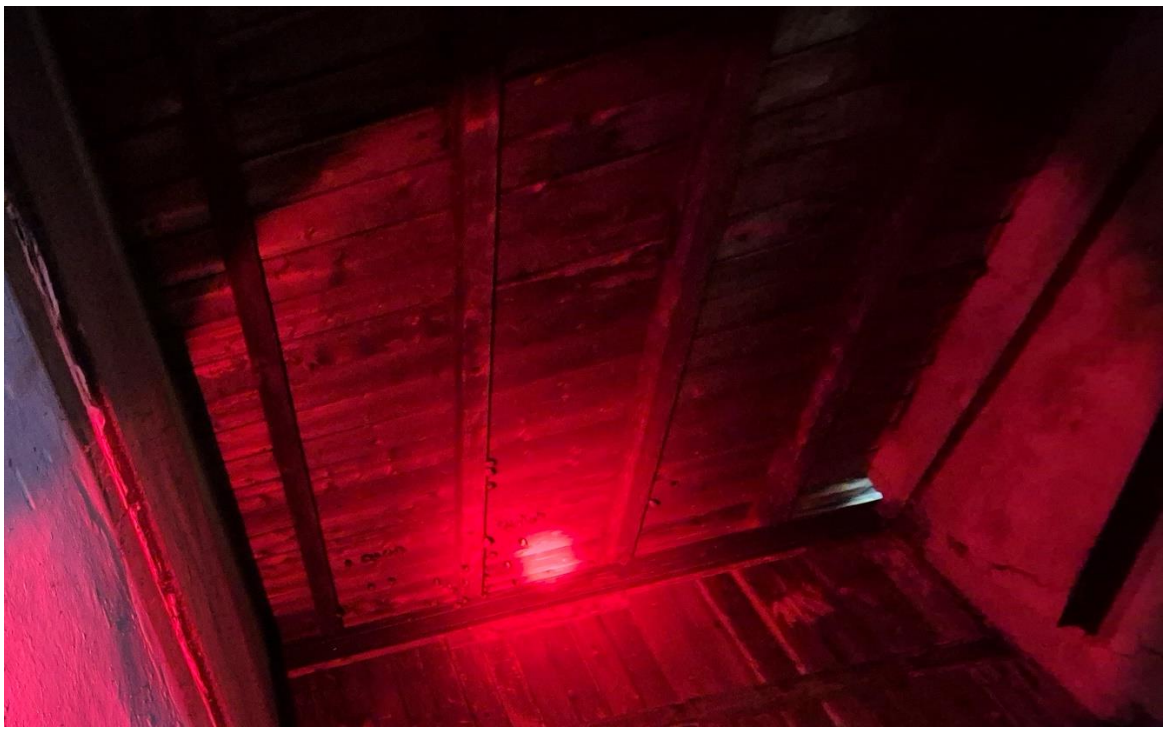

Plate 13: Lesser horseshoe bats in new loft space on 8th May 2025.

Now that the maternity roost space is secured for the bats, the next step is to reduce potential future disturbance on the hibernation colony in the basement by providing a more direct and alternative access point to the basement from the Transition Room.

2.3 Proposed Works

The investigative works proposed involve:

- Drilling a test hole in the floor of the basement;
- Determine the depth and state of concrete between the Transition Room and the Basement;
- Determine if a new tunnel, suitable for lesser horseshoe bats, could be provided.

The proposed investigative works may cause a temporary disturbance (duration of works) to the colony of lesser horseshoe bats but the works may result in a more direct access to the basement during hibernation period from the Transition Room. If this is successful, this will ensure that any future maintenance works on the main building will not disturb the bat colony.

The following is a statement provided by ESB:

The 'Traffo Building' structure which lies within the curtilage of Ardnacrusha Generating Station, Co. Clare, a legally Protected Structure, built in 1925/26. The 'Traffo' Workshop is a rare Irish example of a largely intact early 20th Century steel-framed industrial building. It is likely to be unique in Ireland being constructed of German imported steelwork and is of historical value for its role in the Ardnacrusha project – a significant infrastructure project undertaken by the newly independent Irish State. The 'Traffo' Workshop was built as a temporary power station to contain nine diesel generators for the construction of Ardnacrusha Generation Station in 1925. It is mentioned in the construction project report published by Siemens in October 1926 which includes photographs of the building under construction. The building continued in use as a workshop until the l980s but is now used largely for storage of material, apart from the badminton hall at the north-west corner.

The building is now in poor condition and requires structural repair works to maintain the building and to prevent any further damage. A recent preliminary Condition Assessment (2023) identified cracks/ missing sections throughout the existing roof of the building, missing gutters, corroded panels, steel framed doors in poor condition with missing rails and decaying timber, corroding steel framing in blockwork of external walls, cracking and displacement on external wall blockwork, damaged and blown plaster on internal walls, cracked and missing glass in windows, detaching material from timber rafters, decay of skarting boards - with dry rot noted, damp mould growing on ceiling. Repair works are necessary for the conservation of a protected structure, without which the structure would fall into further disrepair, thus rendering the structure unsafe. Additionally, without repairs, further deterioration of the buildings condition would also reduce it's suitability to support roosting bats.

To maintain the existing roosts and minimise disturbance to roosting bats during repair works, it is proposed to create a new bat access route between the lesser horseshoe bat hibernation roost and the existing entry/ exit point of the building. This would maintain the existing roosts in the building, whilst isolating the entering/ exiting bats away from the main internal space of the building where the majority of the repair works are required. This licence application is for the creation of a new bat route only, any future repair works will likely require separate bat derogation licences which will be subsequently applied for once there is a scope of works available for the require repairs.

3. Ecological Surveys

3.1 Bat Surveys Completed

Bat Eco Services was commissioned by ESB to undertake the bat surveys to determine the usage of the Transformer Building, Ardnacrusha, Co. Clare by Lesser horseshoe bats *Rhinolophus hipposideros,* an Annex II species under the EU Habitats Directive. In early 2024 it was noted that lesser horseshoe bats were roosting in the basement. As a consequence, ESB requested information on the extent of usage of the structure by this species of bat.

The aim of the project was:

- To determine the exit points for lesser horseshoe bats;
- To document the usage of the building by lesser horseshoe bats in 2024;
- To determine if other bat species are roosting in the building;
- To document commuting routes from the transformer building for lesser horseshoe bats;

Bat Eco Services designed a bat survey approach, principally, with reference to Marnell *et al.* (2022) and Collins (2023). An array of bat survey methods were used to compile data during bat surveys. This report presents the bat usage of the building during 2024 and 2025.

3.1.1 Daytime Inspections

3.1.1.1 Building Surveys

The transformer building was inspected during the daytime for evidence of bat usage on various dates in February, March, April, May, August, September and December 2024. Evidence of bat usage is in the form of actual bats (visible or audible), bat droppings, urine staining, grease marks (oily secretions from glands present on stonework) and claw marks. In addition, the presence of bat fly pupae (bat parasite) also indicate that bat usage of a crevice, for example, has occurred in the past.

Inspections were undertaken of the transformer building visually with the aid of a strong torch beam (LED Lenser P14.2). The basement was inspected on each survey dates while access to the Transition Room was achieved for each survey date from the 3rd May 2024 while access to the Substation Rooms was permitted on three survey dates by ESB Networks staff.

3.1.1.2 Night-time Bat Surveys

An array of night-time bat surveys were completed. The methodology for each of these bat surveys is presented below. The following handheld bat detectors were used:

Surveyor 1: Anabat Walkabout Full Spectrum Bat Detector
Surveyor 2: Elekon Bat Logger M2 Full Spectrum Bat Detector

The Night Vision Aids (NVAs) were used to support dusk surveys. The following NVAs were used coupled with Anabat Scout Full Spectrum bat Detector (attached to thermal imagery scope) and Magenta 4 Heterodyne Bat Detector (attached to IR camera and tuned to 110 kHz to indicate the presence of lesser horseshoe bats):

A Guide TrackIR Pro25 thermal imagery scope
A Guide TrackIR Pro19 thermal imagery scope
Sony FDR camcorder with night-shot capability coupled with IR illuminator (Dedolight)

3.1.1.2.1 Dusk Bat Surveys

Dusk surveys started by 15 minutes prior to sunset and were undertaken for a minimum of 2 hours of surveying. Surveys were completed during mild and dry weather conditions.

Preparation for dusk survey started 60 minutes prior to sunset and the following actions were undertaken:

- Re-inspection of building to be surveyed to determine surveyor and filming locations.
- Internal inspection of building to document any visible bats.
- Positioning of filming equipment and surveyors.
- Completion of dusk survey.
- Post surveys, a repeat internal inspection of the surveyed building was undertaken to document any visible bats within the structure.

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

Dusk surveys were completed on the following dates:

- 6th March 2024
- 25th March 2024
- 9th April 2024;
- 3rd May 2024;
- 27th August 2024
- 4th March 2025

3.1.1.2.2 Static Surveillance

A Passive Static Bat Surveys involved 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 near enough to the monitoring unit are recorded and their calls are stored for analysis post surveying). The bat detector was effectively used as a bat activity data logger. This results in a far greater sampling effort over a shorter period of time. Bat detectors with ultrasonic microphones were used as the ultrasonic calls produced by bats cannot be heard by human hearing.

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

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

- Validation that the auto-id function was checked for at least 20% of *Pipistrellus* spp. and Leisler's bat calls apart from Nathusius' pipistrelle calls.
- All Nathusius' pipistrelles calls were manually verified. The reasoning for this is due to frequently misidentification of low 40kHz calls, by auto-id tools, as this species, which may in fact be low frequency common pipistrelle calls.
- All brown long-eared bat calls should be manually verified. The reasoning for this due to frequently misidentification of social calls of *Pipistrellus* spp. frequently identified as this bat species.
- Manual verification of *Myotis* spp., where possible, to species level in order to increase the accuracy of the dataset. Where such calls cannot be identified to species level, they are reported as *Myotis* spp.
- Manual validation was undertaken for all "Unidentified" calls and for approximately 20% proportion of "Noise" calls.

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

The following static units were deployed during this static bat detector survey:

Table 2a: Static Bat Detectors deployed during Static Bat Detector Surveys.

Static Unit Code	Bat Detector Type	Recording Function	Microphone
SM4 Units	Wildlife Acoustics SongMeter 4 Bat FS	Passive Full Spectrum	SMM-U2, 4m cable
SM Mini Bat Units	Wildlife Acoustics SongMeter Mini Bat FS	Passive Full Spectrum	SMM-U2
SM Mini Bat 2 units	Wildlife Acoustics SongMeter Mini Bat 2 FS	Passive Full Spectrum	SMM-U2

The design of the static surveillance was determined by the following criteria:

- Units located in the basement were deployed to document lesser horseshoe bat activity within the basement and to determine if other bat species were present;
- Units located on trees around the perimeter of the transformer building were deployed to document commuting routes from the transformer building to adjacent habitats;
- Units located in the adjacent woodland were deployed to document foraging areas adjacent to the transformer building.
- Static units were set to start recording 30 minutes before sunset and end recording 30 minutes after sunrise as per Collins (2023).
- Static units were deployed for different periods of time depending on the goals of the static surveillance periods.

Static surveillance was undertaken as follows (please refer to Table 2b for details relating to the static units) :

- Basement, Transformer Building
    - Static 1 (dusk on 16th February to dawn on 4th March 2024)
    - Static 16 (dusk on 25th March to dusk survey on 9th April 2024)
    - Static 17 (dusk on 9th April to dawn on 18th April 2024)
    - Static 42 (dusk on 6th December 2024 for 28 nights)
    - Static 45 (dusk on 6th February 2025 for 26 nights)

    - Static 46 (dusk on 4th March 2025 for 42 nights)
- Ground Floor, Transformer Building
    - Static 2 (dusk on 16th February to dawn on 4th March 2024)
    - Static 9 & Static 10 (dusk survey on 25th March 2024)
- Commuting Routes
    - Static 11-15 (10-17 nights surveillance from 25th March 2024).
- Transition Room, Transformer Building
    - Static 41 (dusk on 6th December 2024 for 8 nights)
    - Static 44 (dusk on 6th February 2025 for 26 nights)
- Substation, Transformer Building
    - Static 40 (dusk on 6th December 2024 for 46 nights)
    - Static 43 (dusk on 6th February 2025 for 26 nights)

Additional static surveillance was undertaken in relation to foraging habitats within the adjacent woodlands, but the results of this study is presented in a separate report.

Table 2b: Static Bat Detectors deployed during Static Bat Detector Surveys.

Static Code	Location	ITM Easting	ITM Northing	Deployment Date	No. of Nights
Static 1	Basement of transformer building	558166	661899	16/02/2024	17
Static 2	Ground floor of transformer building	558173	661880	16/02/2024	17
Static 3	Woodland Survey	558234	661644	25/03/2024	1
Static 4	Woodland Survey	558176	661781	25/03/2024	1
Static 5	Woodland Survey	558180	661729	25/03/2024	1
Static 6	Woodland Survey	558119	661705	25/03/2024	1
Static 7	Woodland Survey	558205	661738	25/03/2024	1
Static 8	Woodland Survey	558160	661804	25/03/2024	1
Static 9	Ground floor of transformer building - on fire engine	558179	661916	25/03/2024	1
Static 10	Ground floor of transformer building - room of interest	558161	661891	25/03/2024	1
Static 11	Commuting Route Survey	558173	661949	25/03/2024	10
Static 12	Commuting Route Survey	558130	661874	25/03/2024	10
Static 13	Commuting Route Survey	558154	661914	25/03/2024	10
Static 14	Commuting Route Survey	558139	661885	25/03/2024	10
Static 15	Commuting Route Survey	558188	661857	25/03/2024	17
Static 16	Basement of transformer building	558166	661899	25/03/2024	17
Static 17	Basement of transformer building	558166	661899	09/04/2024	8
Static 40	Substation	558158	661888	3/12/2024	46
Static 41	Transition Room	558163	661885	3/12/2024	8
Static 42	Basement of transformer building	558166	661899	3/12/2024	28
Static 43	Substation	558158	661888	6/02/2025	26
Static 44	Transition Room	558163	661885	6/02/2025	26
Static 45	Basement of transformer building	558166	661899	6/02/2025	26
Static 46	Basement of transformer building	558166	661899	4/3/2025	41

3.1.2 Daytime Inspections

3.1.2.1 Basement

The basement was inspected during 16 of the 18 site visits undertaken. Lesser horseshoe were recorded roosting in the basement during 12 of these visits with numbers ranging from one individual to 59 individuals. The highest number of bats was recorded on the 3/12/2024. But the number of bats varied greatly and it likely to be influenced by the external air temperatures. Generally, during

the summer months, the number of bats in the basement were greatly reduced, reflecting that the colony was primarily roosting in the maternity spaces of the Substation and Transition Room. The location of bats roosting in the basement was primarily at the northern end of the basement, adjacent to the Northern Tunnel (Figure 2). Occasionally, lesser horseshoe bats were recorded roosting in the Northern Tunnel (approx. 2m into the tunnel), but never in the Southern Tunnel.

Plate 14: Lesser horseshoe bats in torpor within the basement(4th March 2024).

3.1.2.2 Transition Room

The Transition Room was unknown to ESB staff until dusk surveys recorded lesser horseshoe bats emerging from gaps along the wall plate. As a result of this, ESB staff investigated the presence of this space and access was provided to a room deemed as the "Transition Room" on the 3rd May 2024 and during this daytime inspection seven lesser horseshoe bats were counted. A total of ten daytime counts were completed of the lesser horseshoe bats roosting in this room and this ranged from one individual to 89 individuals. Higher number of bats were recorded roosting in the space during the maternity season with a small number of bats during the cooler months of the year. The bats were recorded primarily roosting in Room B (Figure 4b).

3.1.2.3 Substation

During the dusk survey completed on 3/5/2024, the number of bats recorded in the Transition Room, during the daytime inspection compared to the number of bats emerging, did not tally (i.e. greater number of bats emerged). During the emergence count, the Transition Room was accessed and it was noted that the adjacent Substation may also be a roost site. Therefore access was permitted to the Substation on the 10th May 2024 by ESB Networks and 66 bats were recorded in the rafters (please note – the substation has two rooms. There is an internal wall with a gap of approximately 1.2m from the top of the wall to the rafters proving ease for the bats to move between the two rooms of the substation. It was also noted that there were suitable "post box" gaps between the wall of the Substation and Transition Room.

As a consequence, counts were undertaken in the Substation when an ESB Networks staff was available to open the Substation during routine site visits. The number of lesser horseshoe bats recorded in the space ranged from one individual to 66 individuals, with higher numbers during the

maternity season. The following table provides a summary of the number of bats recorded during daytime inspections.

Table 3: Visual counts of Lesser horseshoe bats in the basement, transition room and substation of the Transformer Building, Ardnacrusha, Co. Clare.

N/A – these rooms were not accessed during the listed dates.

No.	Date	Observed LHB in basement	Observed LHB in transition room	Observed LHB in substation rooms	Total
1	16/02/2024	7	N/A	N/A	7
2	4/03/2024	46	N/A	N/A	46
3	06/03/2024	6	N/A	N/A	6
4	25/03/2024	1	N/A	N/A	1
5	9/04/2024	18	N/A	N/A	18
6	18/4/2024	0	N/A	N/A	0
7	3/5/2024	6	7	N/A	13
8	10/5/2024	0	73	66 (both Room 1 & Room 2)	139
9	4/7/2024	1	8	Not accessible	9
10	14/8/2024	0	59	Room 1 accessible only - 13	72^
11	20/8/2024	0	72	Room 1 – 15, Room 2 - 45	132
12	3/12/2024	59	18	1	78
13	6/2/2025	50	1	1	52
14	4/3/2025	14	4	2	20
15	14/4/2025	53	Not accessed	Exclusion in place	53*
16	29/4/2025	5	83	Exclusion in place	88
17	8/5/2025	Not accessed	Not accessed	49	49
18	19/8/2025	Not accessed	89	Not accessed	89~

Note ^: incomplete count – Substation Room 2 was not accessible on this date.
Note *: incomplete count – Transition Room not accessed on this date/ Exclusion in place in Substation.
Note ~: incomplete count – Transition Room only counted.

3.1.3 Static Surveillance

Static surveillance has been undertaken for a series of dates in 2024 and 2025 to document lesser horseshoe bat activity. Each of these surveillance periods are presented below.

3.1.3.1 Winter Surveillance 2024

Static 1 was located in the basement for a total of 17 nights of recording (dusk on 16th February to dawn on 4th March 2024). Lesser horseshoe bats echolocation calls were recorded on 15 nights of this surveillance period ranging from 1 call (17/2/2024) to 28 calls (24/2/2024). A graph is presented below to show the variation in activity levels from night to night during the surveillance period (Please note – each confirmed audio file is noted as a bat pass – it represents each time a bat flies by the microphone of the detector. It is not a measure of the number of bats). No other bat species were recorded roosting in the basement during this surveillance period.

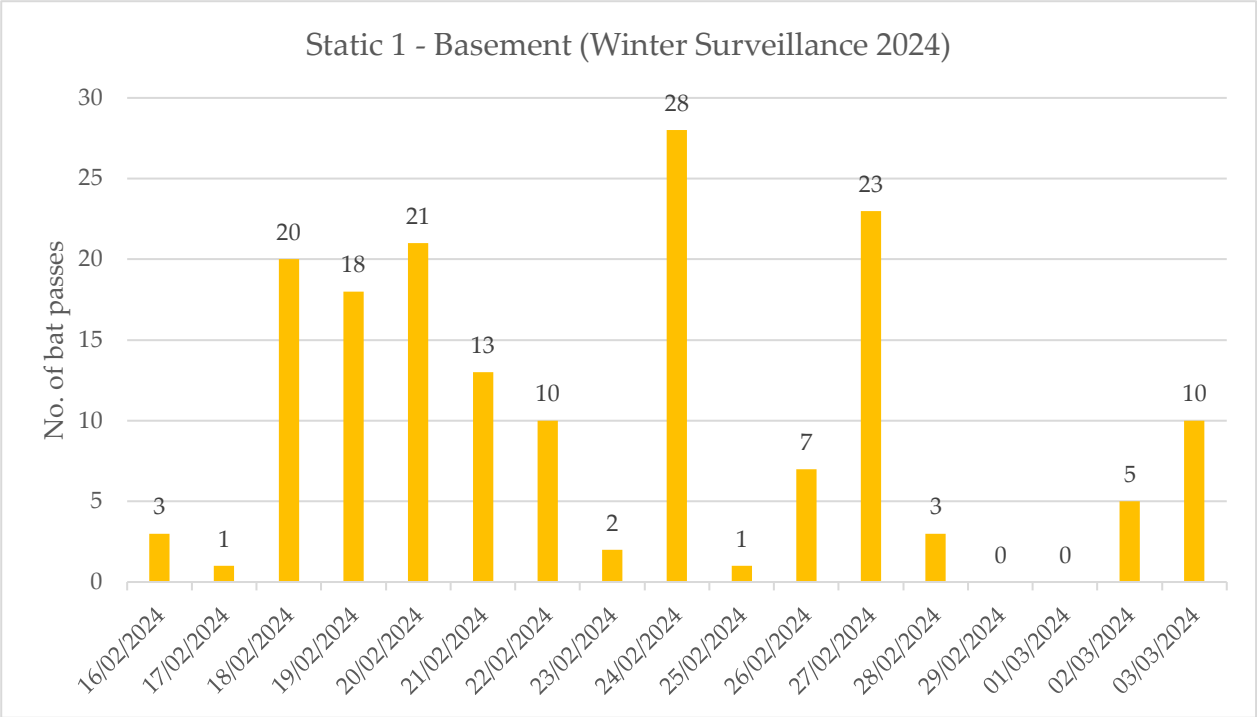

Figure 3a: Number of bat passes recorded on Static 1 during Winter Static Surveillance.

Static 2 was located in the main ground floor space of the Transformer Building for a total of 17 nights of recording (dusk on 16th February to dawn on 4th March 2024). No lesser horseshoe bats were recorded on this unit. However, common pipistrelles *Pipistrellus pipistrellus* (17 passes in total at various times on 16th, 17th and 28th February and 3rd March 2024 – Table 1) and Natterer's bats *Myotis nattereri* (2 passes at 22:36 hrs and 01:10 hrs on 3rd March 2024) were recorded on the detector indicating that individuals of these two bat species are also roosting in the building (ground floor section).

Table 4a: Bat species (dates and time stamps) recorded on Static 2 during Winter Static Surveillance.

DATE	TIME	HOUR	AUTO ID	MANUAL ID
16/02/2024	18:39:11	18	PIPPIP	PIPPIP
16/02/2024	18:39:21	18	PIPPIP	PIPPIP
16/02/2024	18:39:31	18	PIPPIP	PIPPIP
16/02/2024	18:39:41	18	PIPPIP	PIPPIP
16/02/2024	18:39:51	18	PIPPIP	PIPPIP
16/02/2024	18:40:02	18	PIPPIP	PIPPIP
16/02/2024	18:40:24	18	PIPPIP	PIPPIP
16/02/2024	22:00:55	22	PIPPIP	PIPPIP
16/02/2024	22:01:05	22	PIPPIP	PIPPIP
16/02/2024	22:01:16	22	PIPPIP	PIPPIP
16/02/2024	22:16:55	22	PIPPIP	PIPPIP
16/02/2024	22:17:05	22	Noise	PIPPIP
17/02/2024	18:43:31	18	PIPPIP	PIPPIP
17/02/2024	18:48:17	18	PIPPIP	PIPPIP
17/02/2024	18:48:27	18	PIPPIP	PIPPIP
28/02/2024	21:08:34	21	PIPPIP	PIPPIP
28/02/2024	21:09:15	21	PIPPIP	PIPPIP
03/03/2024	01:10:12	1	NoID	MYONAT
03/03/2024	22:36:30	22	NoID	MYONAT

Note: PIPPIP = common pipistrelle, MYONAT = Natterer's bat

3.1.3.2 Spring Surveillance 2024

Static 16 was located in the basement for a total of 15 nights of recording (dusk on 25th March to dawn on 9th April 2024). Lesser horseshoe bats echolocation calls were recorded on all 15 nights of this surveillance period ranging from 4 calls (25/3/2024 and 2/4/2024) to 251 calls (28/3/2024). Static surveillance continued with Static 17 (9th April to dusk of 17th April 2024) and the results of this surveillance was combined with the results of Static 16. The number of nightly passes ranged from 3 passes (10/4/20240 to 90 passes (9/4/2024).

A graph is presented below to show the variation in activity levels from night to night during the Spring surveillance period (Please note – each confirmed audio file is noted as a bat pass – it represents each time a bat flies by the microphone of the detector. It is not a measure of the number of bats). Common pipistrelles and Natterer's bats were also recorded roosting in the basement during this surveillance period (Table 2).

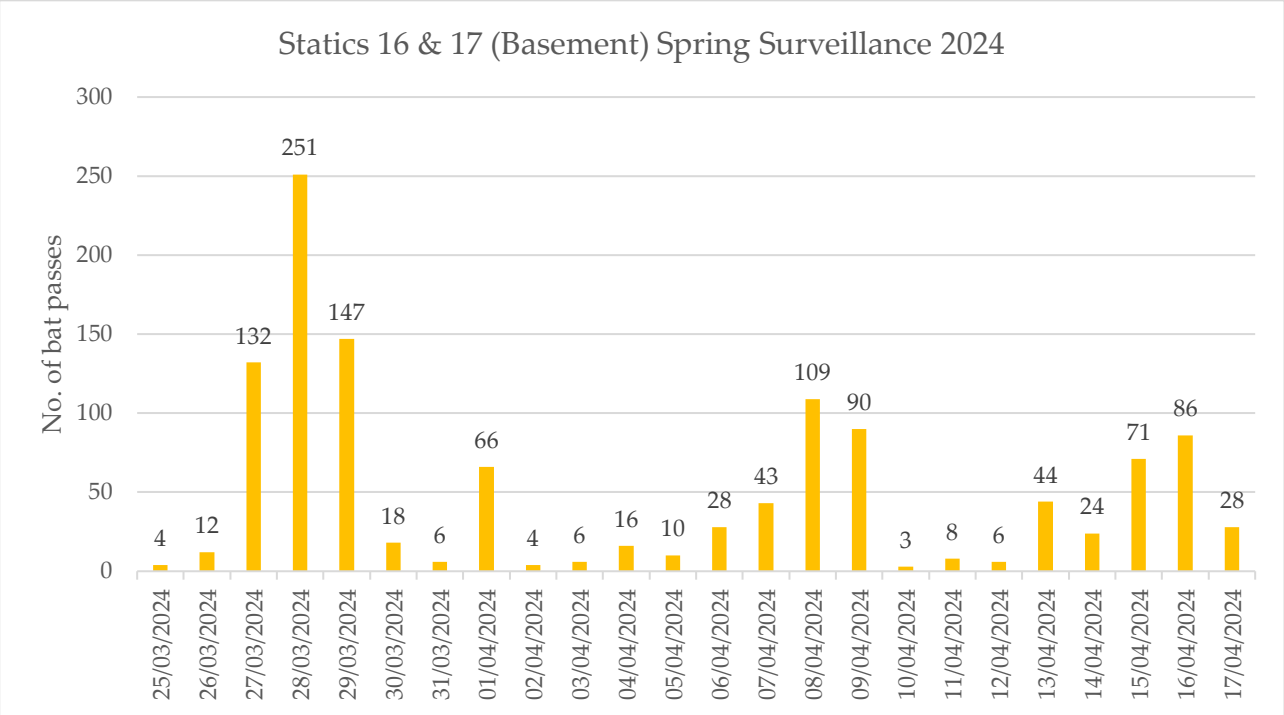

Figure 3b: Number of bat passes recorded on Static 16 & Static 17 during Spring Static Surveillance.

Table 4b: Common pipistrelles (dates and time stamps) recorded on Static 16 & Static 17 during Spring Static Surveillance (basement).

DATE	TIME	HOUR	AUTO ID*	MANUAL ID
25/03/2024	19:23:11	19	PIPPIP	PIPPIP
25/03/2024	20:31:52	20	NoID	PIPPIP
09/04/2024	20:23:10	20	PIPPIP	PIPPIP
09/04/2024	20:24:23	20	NoID	PIPPIP
09/04/2024	20:43:37	20	PIPPIP	PIPPIP
09/04/2024	20:43:44	20	PIPPIP	PIPPIP
09/04/2024	20:48:08	20	NoID	PIPPIP
09/04/2024	20:58:47	20	PIPPIP	PIPPIP
09/04/2024	21:02:24	21	PIPPIP	PIPPIP
09/04/2024	21:10:37	21	PIPPYG	PIPPIP
09/04/2024	21:12:15	21	NoID	PIPPIP
09/04/2024	21:12:31	21	NoID	PIPPIP

Note: PIPPIP = common pipistrelle

Table 5c: Natterer's bat (dates and time stamps) recorded on Static 16 & Static 17 during Spring Static Surveillance (basement).

DATE	TIME	HOUR	AUTO ID*	MANUAL ID
02/04/2024	02:18:41	2	Noise	MYONAT
02/04/2024	20:06:00	20	Noise	MYONAT
08/04/2024	22:09:56	22	Noise	MYONAT
09/04/2024	01:25:48	1	Noise	MYONAT
12/04/2024	03:46:52	3	Noise	MYONAT
12/04/2024	03:50:01	3	Noise	MYONAT
12/04/2024	03:50:26	3	Noise	MYONAT
13/04/2024	23:23:54	23	Noise	MYONAT
13/04/2024	23:25:36	23	Noise	MYONAT
13/04/2024	23:28:29	23	Noise	MYONAT
14/04/2024	01:33:28	1	Noise	MYONAT
17/04/2024	00:32:56	0	Noise	MYONAT

Note: MYONAT = Natterer's bat

3.1.3.3 Winter Surveillance 2024/2025

Static surveillance was set up in the basement (Static 42 – 46 nights recording), Transition Room (Static 41 – 8 nights recording) and Substation (Static 40 – 28 nights recording) from 6/12/2024. These units were collected on 6/2/2025 and downloaded for analysis. Lesser horseshoe bats were recorded on three units during the surveillance. The graphs illustrate the number of bat passes recorded on the static units deployed (Figure 4 a-c). Unfortunately the static unit located in the Transition Room stopped after 8 nights but during this period, the level of lesser horseshoe bat activity recorded was higher in this structure compared to the other two structures, except for Night 2 (7/12/2024). This would be expected since lesser horseshoe bats must enter the Transition Room before flying to either the substation or basement. The static surveillance also recorded Natterer's bats (all three locations) and common pipistrelles (Transition Room and Substation only). There was additional recordings in the Substation only (please note – great number of nights of recording on this unit and therefore there are no corresponding calls to compare from the Transition Room) of soprano pipistrelle (n=56 bat passes) and brown long-eared bats (n=9 bat passes). This provides evidence that an additional two bat species occasionally roost in the building.

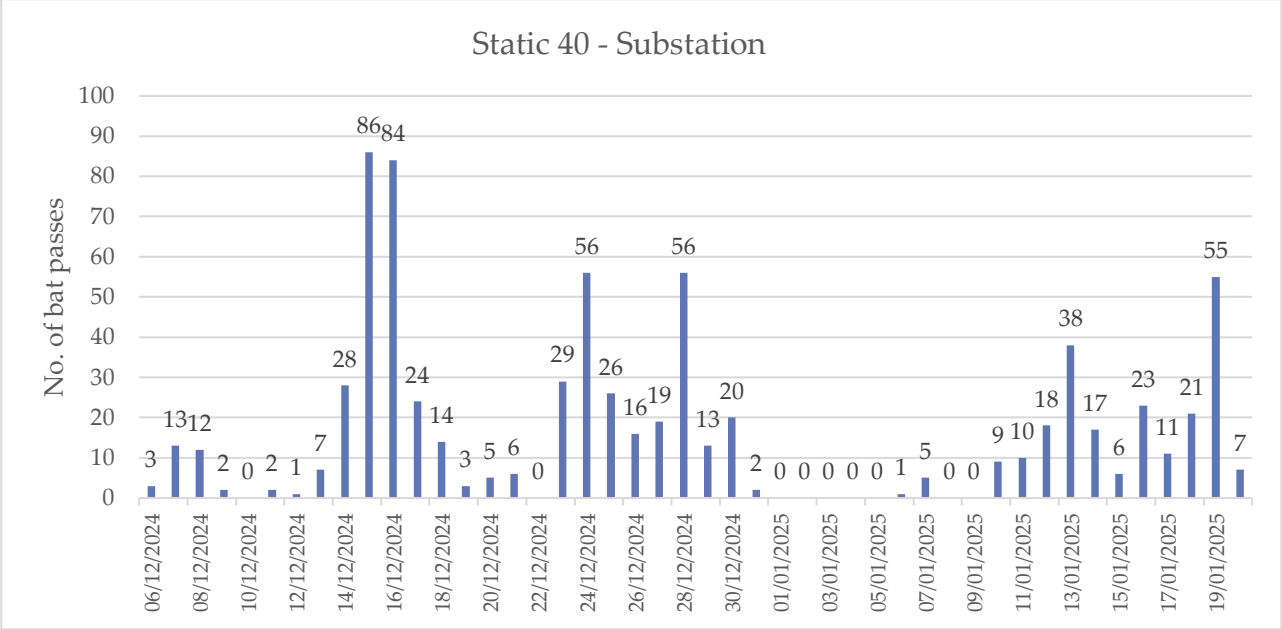

Figure 4a: Number of bat passes recorded on Static 40 during 2024/2025 Winter Static Surveillance.

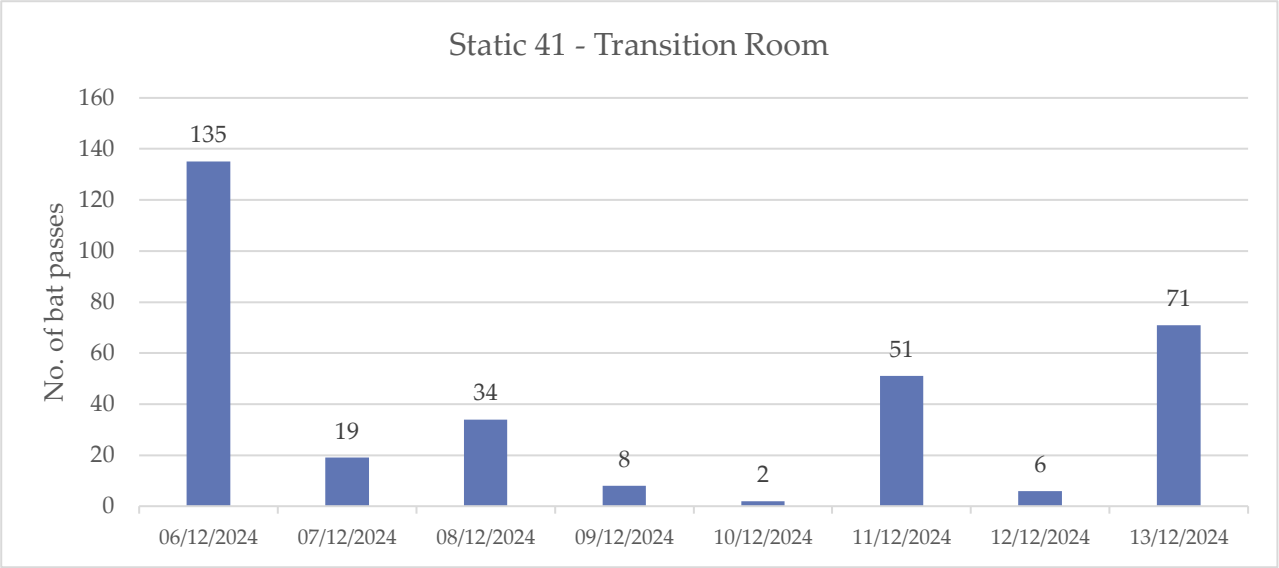

Figure 4b: Number of bat passes recorded on Static 41 during 2024/2025 Winter Static Surveillance.

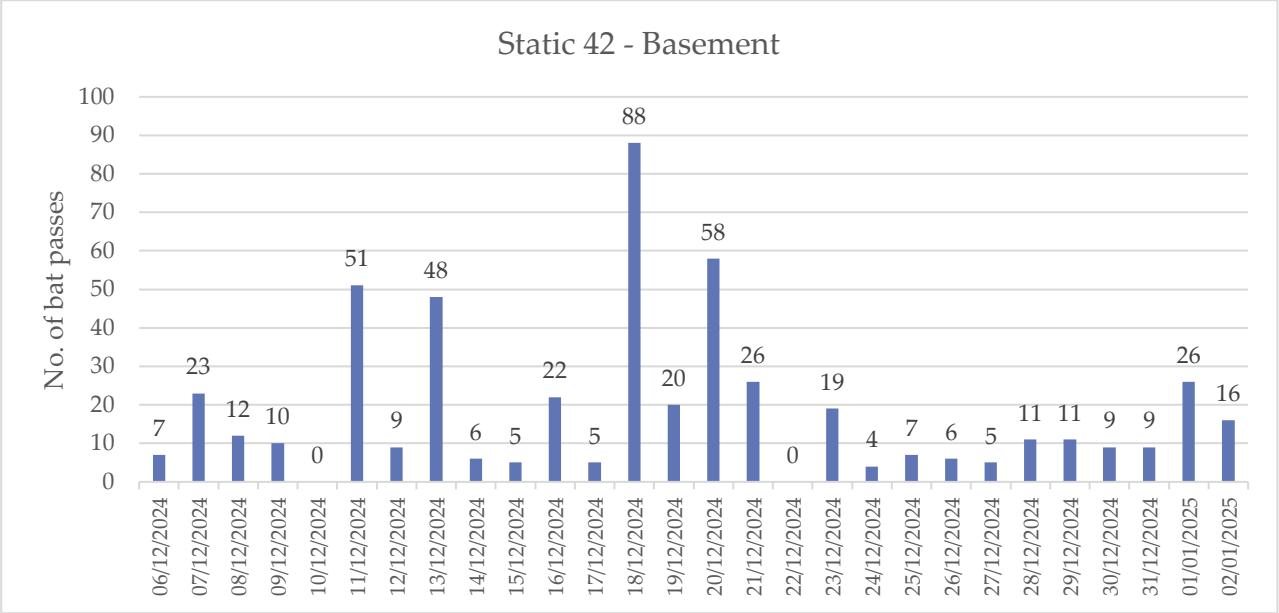

Figure 4c: Number of bat passes recorded on Static 41 during 2024/2025 Winter Static Surveillance.

3.1.3.4 Spring Surveillance 2025

Static surveillance was set up in the basement (Static 45– 26 nights recording), Transition Room (Static 44 – 26 nights recording) and Substation (Static 43 – 26 nights recording) from 6/2/2025. These units were collected on 4/3/2025 and downloaded for analysis. Lesser horseshoe bats were recorded on three units during the surveillance. The following graph illustrate the number of bat passes recorded on the static units deployed (Figure 5).

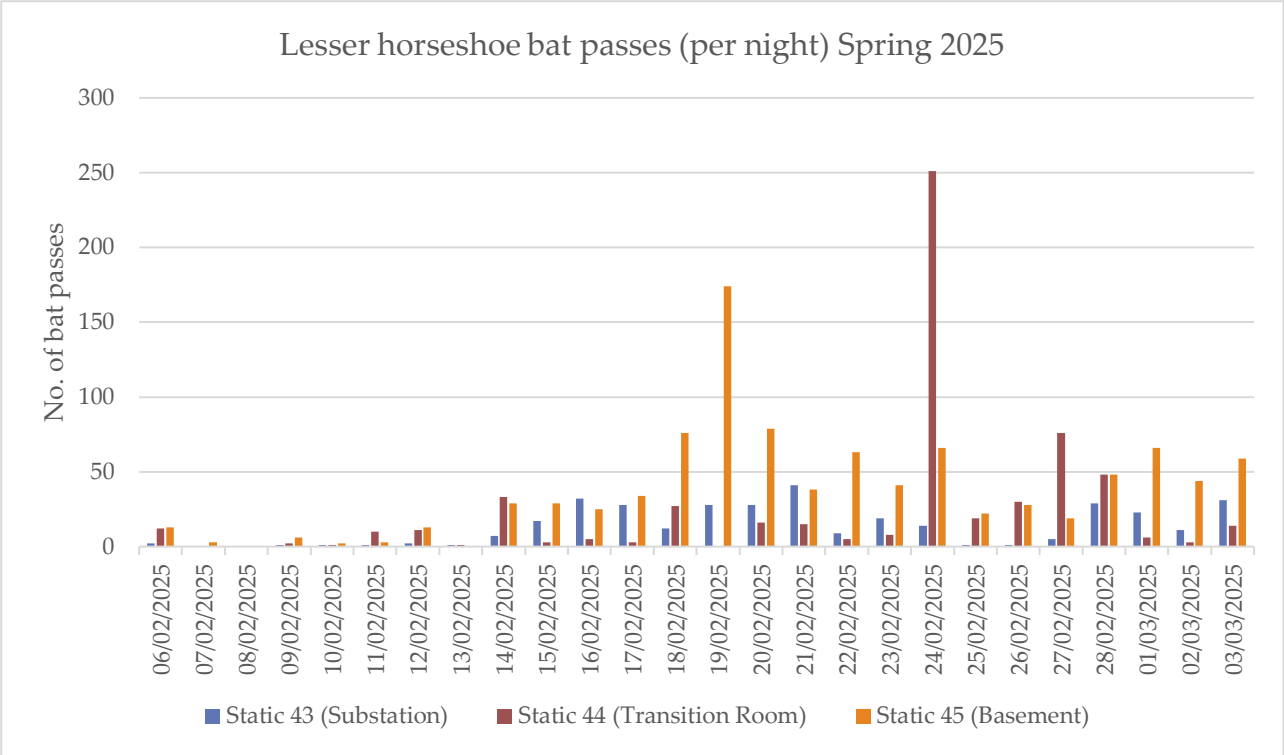

Figure 5: Number of bat passes recorded on Static 40 during 2024/2025 Winter Static Surveillance.

As would be expected, a greater number of bat passes was recorded in the basement for the static surveillance period (980 bat passes, average of 37.7 bat passes per night) compared to the Transition Room (599 bat passes, average of 23 bat passes/night) and the Substation (344 bat passes, average of 13.2 bat passes/night). The Substation is therefore occasionally used during the winter by the lesser horseshoe bat colony while the Basement is consistently used during the winter months.

Additional static surveillance was set up in the basement and transition room while works were being undertaken in relation to the substation (access to this area was blocked, under licence, for bat usage to permit works to be undertaken). Surveillance was completed for 41 nights in the basement and a total of 691 lesser horseshoe bats passes were recorded over that period (one Natterer's bat pass only recorded). This period coincided with warm days but consistent cold nights. A total of 53 lesser horseshoe bats were recorded in torpor on the day of static collection (14/4/2025) demonstrating that while hibernation tends to be associated with the winter months, during cold weather conditions, bats will go into torpor to conserve energy.

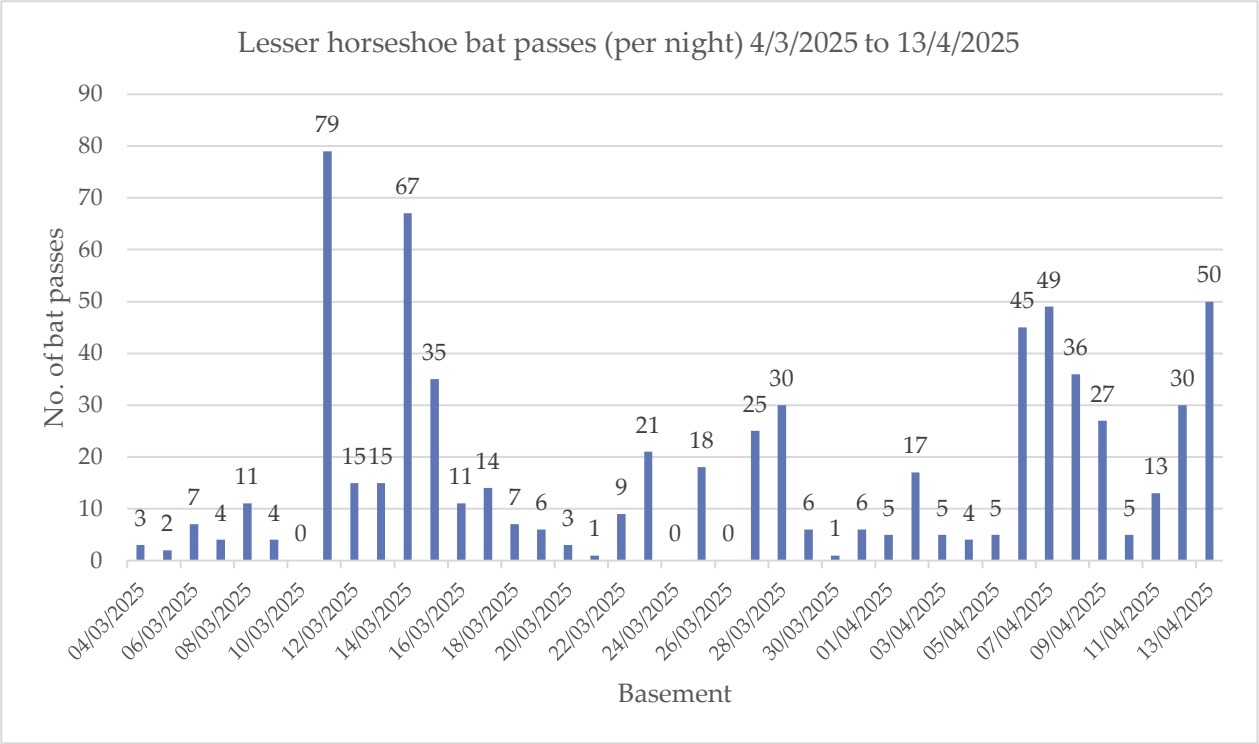

Figure 5b: Number of bat passes recorded on Static 46 (Basement) during 2025 Spring Static Surveillance.

3.1.4 Dusk Bat Surveys

A series of dusk surveys were undertaken in order to determine how roosting lesser horseshoe bats exit from the basement of the transformer building. The original opening identified by David Lyons (NPWS) back in 2012 was blocked with timber plywood in 2023 to prevent crows entering the building. As the bats are still using the building, it was deemed important to leave plywood in place in order to determine the current exit/entrance points.

Dusk survey 4th March 2024 (Full cloud cover, breezy, 10oC with occasional rain showers), survey time - 18:00 hrs to 20:00 hrs.
Two thermal imagery scopes (19mm and 25mm) and one IR camcorder were deployed to determine potential exit points for lesser horseshoe bats. The dusk survey confirmed that the bats emerge from the basement via the door and stairwell and fly into the ground floor adjacent rooms. The exact exit point was not confirmed but lesser horseshoe bats were confirmed to emerge along the gable of the building facing the woodland (western gable wall). A total of 23 bat passes for this species were recorded along the gable side of the building. Common pipistrelles (22 bat passes) and soprano pipistrelles (11 bat passes) were also recorded during the dusk survey. Further surveying is required to confirm exit point(s) for lesser horseshoe bats.

Dusk survey 25th March 2024 (Full cloud cover, calm, 10oC, dry), survey time - 18:35 hrs to 20:35 hrs.
Two thermal imagery scopes (19mm and 25mm) and one IR camcorder were deployed to determine potential exit points for lesser horseshoe bats. The thermal scopes were deployed potential exit points along the western external wall of the transformer building. The filming points did not record the exit points but indicated that bats were potentially emerging further north of the filmed areas. IR camera (located inside one the rooms that lesser horseshoe bats flew into on exiting the basement) was set to film the roof rafters where there was a potential exit points. This filming confirmed that it was not an exit point.

Dusk Survey 9th April 2024 (Full cloud cover, calm, 12oC with occasional rain showers), survey time - 20:00 hrs to 22:20 hrs.
Two thermal imagery scopes (19mm and 25mm) and one IR camcorder were deployed to determine potential exit points for lesser horseshoe bats. The 19mm thermal imagery scope was located in the internal space to film along the rafters above the small office rooms while the 25mm thermal imagery scope was located externally to film the area deemed from previous surveys as the potential exit point. The IR camera was located at basement steps.

Lesser horseshoe bats flew from the basement to the main ground floor internal space. From here they flew through a gap in the wall at rafter level (Plate 2) into a room, hereafter known as the “transition room” (not accessible from the internal space of the building and the external door along the western wall of the transformer building is sealed). From this transition room the bats exited outside along 4 gaps at the rafters (Plate 15).

Dusk Survey 3rd May 2024 (Full cloud cover, calm, 11oC, dry), survey time - 20:45 hrs to 22:30 hrs.
Two thermal imagery scopes (19mm and 25mm) and one IR camcorder were deployed to determine potential exit points for lesser horseshoe bats and other roosting bats. The IR camera was located externally to film the previously recorded exit points from the transition room. Surveyor 1 was also located here in order to count emerging lesser horseshoe bats and common pipistrelles. The thermal imagery scopes were located on other sections of the transformer building to determine other potential exit points now that the maternity season has started (i.e. May to August).

A total of 38 lesser horseshoe bats and 6 common pipistrelles were recorded exiting from the transition room exit points. As a result of the greater number of emerging lesser horseshoe bats compared to the visually counted number during the daytime inspection (i.e. 13 individuals), it was deemed that there is another roost present. An inspection of the transition room indicates that bats are accessing the substation rooms adjoining the main transformer building. These substation rooms were not accessible to the surveyors on the night of the dusk survey and therefore, an additional daytime inspection is required to confirm this.

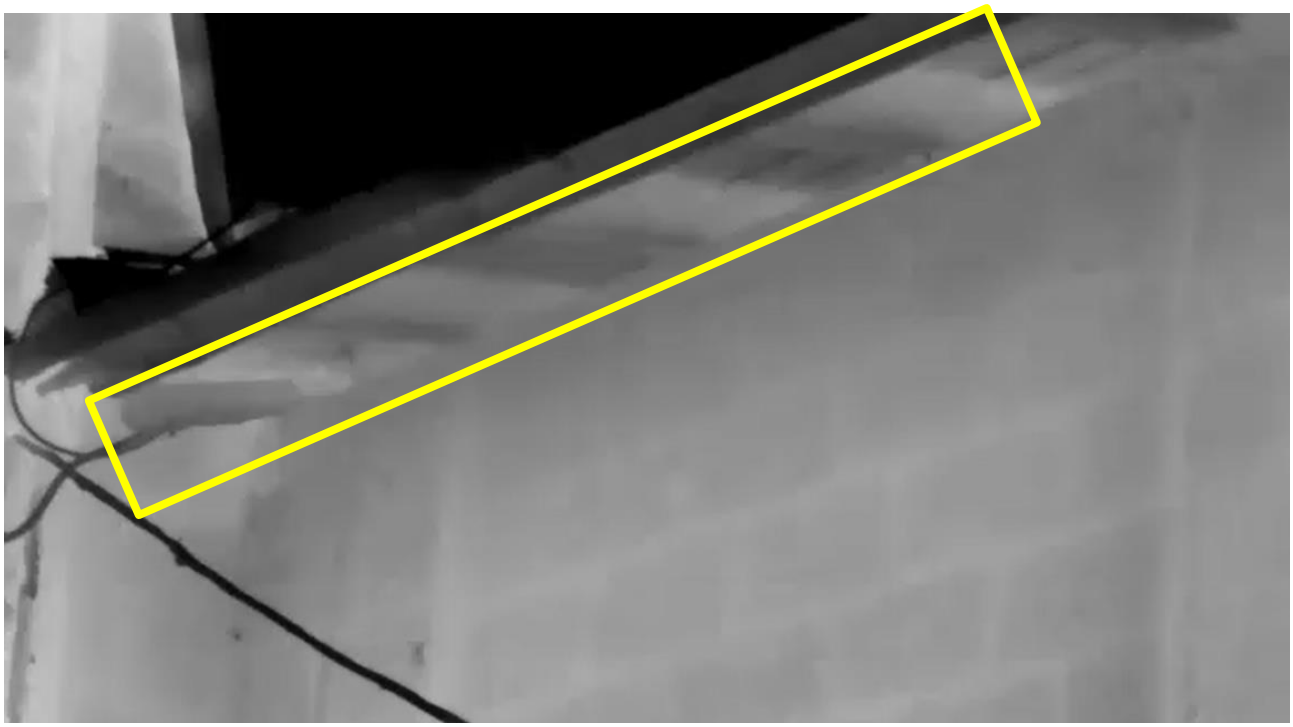

Plate 15: Lesser horseshoe bat exit point thermal imagery screen shot – 25mm thermal imagery scope) along the external (western) wall of the transformer building shown by yellow box.

Dusk Survey 4th July 2024 (patchy cloud cover, calm, 16oC, dry), survey time - 21:44 hrs to 22:45 hrs.
A visual count, with the aid of the IR camera, was undertaken. The first emerging lesser horseshoe bat was noted as 22:12 hrs. A total of 115 individuals were recorded emerging during the survey. The transition room was checked post survey and 4 adults and 2 pups were noted in the rafters. Therefore a total of 119 adult lesser horseshoe bats were counted on this date during the dusk survey.

Dusk Survey 28th August 2024 (Full cloud cover, calm, 16oC, dry, but rained half way through survey), survey time - 20:00 hrs to 21:15 hrs.
A visual count of emerging lesser horseshoe bats was undertaken. The first bat emerged at 20:29 hrs and total of 77 lesser horseshoe emerged before it started to rain (21:09 hrs). The survey was stopped as lesser horseshoe bats started to return to the roost due to rain shower.

Dusk Survey 4th March 2025 (Clear sky, light wind, 8oC, dry), survey time - 18:00 hrs to 20:00 hrs.
A visual count of emerging lesser horseshoe bats was undertaken. The first bat emerged at 18:47 hrs and total of 18 lesser horseshoe bats emerged during the dusk survey period.

3.2 Desktop Review

3.2.1 Lesser Horseshoe Bat Status in Ireland

The lesser horseshoe bat is mainly found in counties on Ireland's western seaboard (Mayo, Galway, Clare, Limerick, Kerry and Cork) and its strongholds are found in County Kerry, west Cork and County Clare. A single animal has also been recorded in Co. Roscommon in 2004 (B. Keeley, pers. comm.) and bat droppings were recorded in Tubercurry, Co. Sligo (C. Kelleher, pers. comm.). A single bat (male) was also recorded in Ballina, Co. Tipperary in 2015 (pers. comm, Dr Áine Lynch, NPWS). The lesser horseshoe bat is Ireland's only Annex II-listed bat species (EU Habitats Directive [92/43/EU]). As a consequence, a roost monitoring scheme is operated by NPWS and managed by Bat Conservation Ireland (BCIreland). BCIreland carried out analysis of the lesser horseshoe bat database in 2012, and concerns were expressed about the state of deterioration of many of its roosting sites (McAney, 2014; Roche *et al.*, 2015) as well as the finding that there are genetically distinct clusters within the Irish population (Dool *et al.*, 2013) that are likely to have arisen due to landscape connectivity constraints.

In Roche *et al*. (2015), the status of the roosting resource of the lesser horseshoe bat was closely examined and the results highlighted a number of locations in Ireland where clusters of roosts or hibernacula appear to have declined, including in parts of Co. Limerick. Figures 8a and 8b, below, are taken from the monitoring report from BCIreland (Aughney *et al.,* 2018) and illustrate the changes in winter and summer roosts monitored annually by NPWS.

The modelled Core Area for lesser horseshoe bat s is a relatively small area is restricted to the Counties on the western seaboard (5,993km^2). Given this small range, significant impacts on this species may occur even with small levels of habitat modification or changes to roost availability (Roche *et al,* 2014).

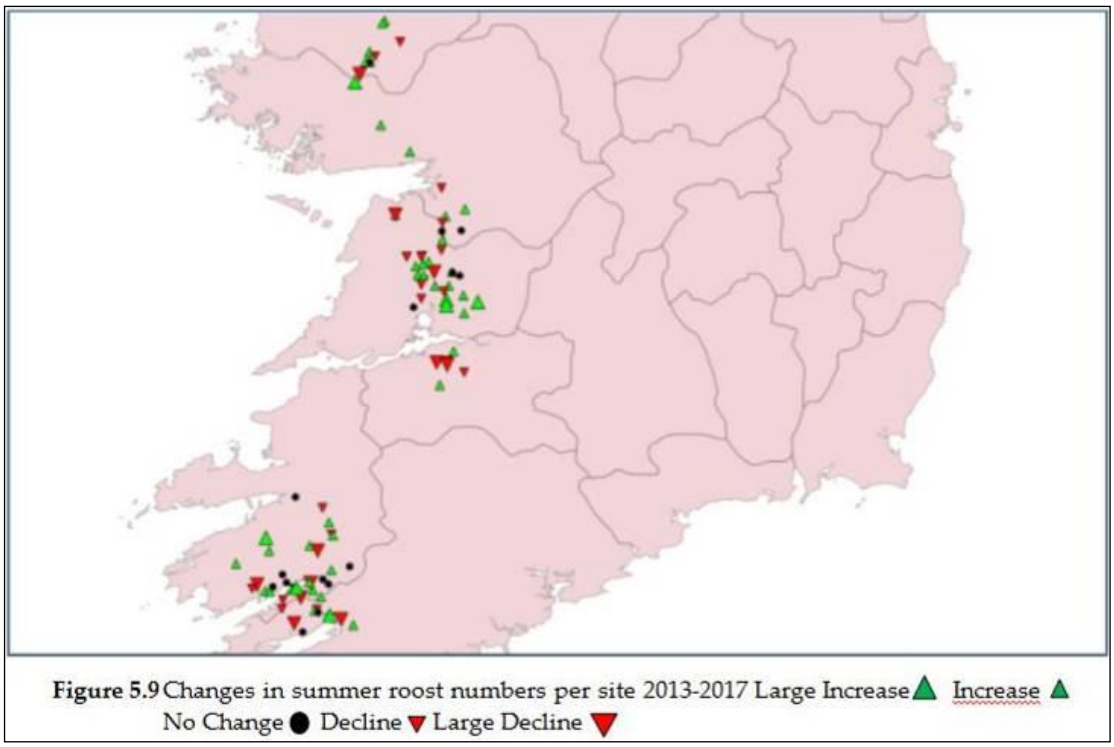

Figure 8a: Changes in Lesser horseshoe bat summer roost numbers (Aughney *et al.,* 2018).

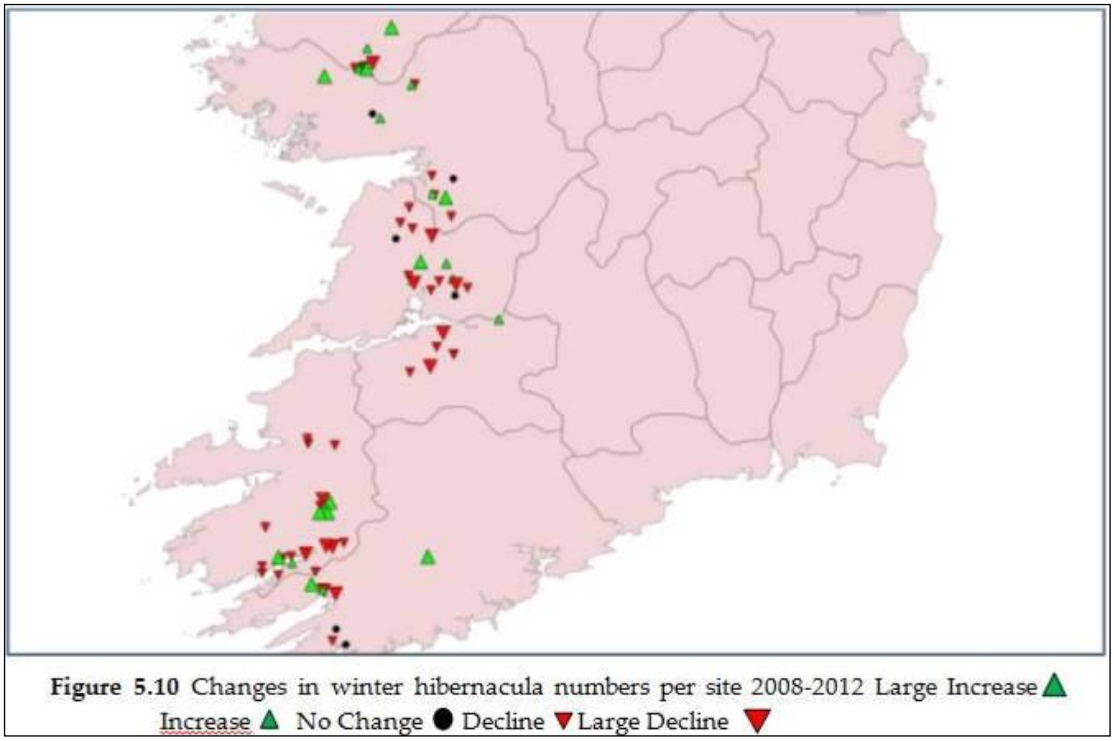

Figure 8b: Changes in Lesser horseshoe bat winter roost numbers (Aughney *et al.,* 2018).

According to Roche *et al, (*2014) the primary concerns for this species is as follows:

- Increased urbanisation;
- Mono cultural landscape (e.g. large swathes of coniferous forestry and high intensity farmed landscapes);
- Roost loss due to deterioration, demolition or renovations;
- Street lighting;
- Recreational cave visits etc to hibernation sites;
- Natural flooding of underground site.

Additional research present by Dr Andrew Harrington on the population genetics of lesser horseshoe bat in Ireland (Dr Harrington's Ph.D. thesis Title: The Development of Non-Invasive Genetic Methods for Bats of the British Isles, July 2018) examined the lesser horseshoe bat's range across Ireland with DNA samples from 21 colonies examined. This was to determine the level of interbreeding and possible risk of inbreeding within this population.

Harrington *et al. (*2019) at All Ireland Mammal Symposium (AIMS) stated that maintaining the gene flow within the Irish population is essential to "prevent the future risk of inbreeding depression or local extinctions". His research work showed that the Irish lesser horseshoe population was further sub-divided than previously thought with evidence of isolated subpopulations in Cork-Kerry (Southern), Limerick, Clare-South Galway (Central) and North Galway-Mayo (Northern). As a consequence, this means that this species is in serious risk of negative effects of operations that increase barriers to dispersal to these current sub-populations. The study further identified that the point separating the North Galway-Mayo population from the Clare-South Galway population is an area to the south-east of Galway City (the Galway Gap).

One aspect of the study was to determine the sex ratio of colonies examined (Harrington *et al.,* 2017). Previously, it was assumed that 25% of the maternity roost colonies was comprised of 25% males. However, Dr Harrington's work showed that in reality the percentage of males can be much higher with a range of 14.2% to 74.3% recorded. As a result the estimated population of lesser

horseshoes in Ireland is considered to be lower than previously reported (14,010 individuals as reported by Roche *et al.,* 2012).

Article 17 reporting (NPWS, 2019) for this species of bat concluded the following:

- Range = Inadequate
- Population = Favourable
- Habitat for species = Inadequate
- Overall Assessment of Conservation Status = Inadequate

3.2.2 Bat Conservation Ireland & NPWS Databases

There are 4 lesser horseshoe bat roosts and one lesser horseshoe bat detector records currently on the BCIreland database for the database search area (10km buffer of ESB owned lands). An additional 2 roosts records are available from the NPWS database. A total of seven geo-referenced lesser horseshoe bat records were available. The nearest record to the boundary of the ESB owned lands is St. Patrick's Church, Parteen, Co. Clare which is located 272m away from the red line boundary but is located 1.1km from the transformer building. This church was recorded as satellite roost for lesser horseshoe bats. A hibernation roost was also recently documented in the basement of ruins on St Thomas Island (pers. comm. David Lyons, NPWS). This is 1.7km south of the transformer building and considering the excellent woodland and river habitats, there is suitable connectivity between the structures listed and the survey area. A total of 18 individuals was recorded in this roost on 18th January 2024 (pers. comm. Jamie Durrant, NPWS). Mr Lyons (NPWS) also surveyed the transformer building in 2012 when 12 lesser horseshoe bats were noted.

Figure 9a: Bat records for 10km radius of ESB, Ardnacrusha, Co. Clare for all bat species (Source: Bat Conservation Ireland database and NPWS LHB database).

3.2.3 Lesser Horseshoe Bat SACs

A total of 41 SACs have been designated for the Annex II species lesser horseshoe bat (1303), of which nine have also been selected for the Annex I habitat 'Caves not open to the public' (8310). The nearest Co. Clare SAC is Ratty River Cave SAC which is located 12km north of the survey area. The nearest Co. Limerick SAC is Curraghchase Wood SAC which is located 20km south-west of the survey area.

There are 17 SACs designed for lesser horseshoe bats in Co. Clare while there is only one SAC for this bat species in Co. Limerick. There is also concern that the Co. Limerick populations is increasingly isolated (both geographically and genetically) in relation to the Co. Clare and Co. Kerry populations as a result of habitat loss in the landscape of the county. As a result, the recording of the roost in the Ardnacrusha area provides a potential transitional area between south Co. Clare and north Co. Limerick lesser horseshoe populations. Therefore it is considered that the roost recorded in the Transformer Building, Ardnacrusha is an important lesser horseshoe bat roost.

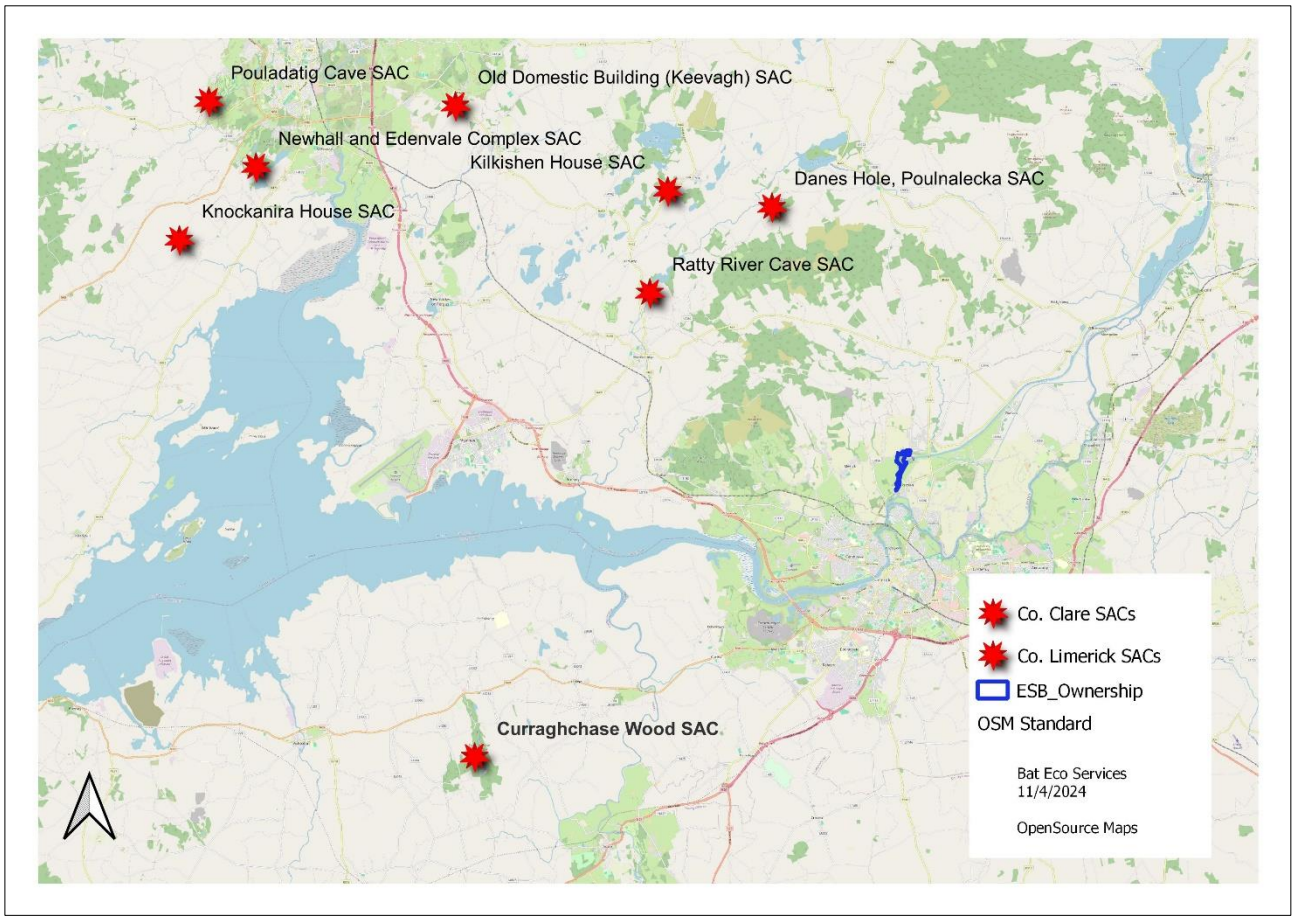

Figure 9b: Location of SACs in Co. Clare and Co. Limerick with reference to ESB, Ardnacrusha, Co. Clare (i.e. ESB ownership).

3.3 Status of bat species recorded

Lesser horseshoe bat is an Annex II bat species under the EU Habitats Directive. The status of this bat species is listed as Least Concern. The national lesser horseshoe bat population is considered to be significantly increasing trend (Aughney *et al.,* 2022). The modelled Core Area for Leisler's bats is a small area confined to the western seaboard counties of Mayo, Galway, Clare, Limerick, Kerry and Cork (5,993km^2). It is considered that this small core area represents the only suitable range for this species in the country. The Bat Conservation Ireland Irish Landscape Model indicated that the lesser horseshoe bat habitat preference for deciduous woodland and riparian vegetation within a few kilometres of roosts and relies on linear landscape features to commute from roosts to feeding areas (Roche *et al.,* 2014).

The most recent population estimates for this species of bat is 14,975 individuals (2023), a cumulative increase of 17.09% from 2017 to 2023. In the long-term, Roche (2024) reports an annual increase of 2.36% from 1999 to 2023 or cumulative growth of 74.93% over the time period (based on the summer trend). A recent publication on modelling the roosting resource for this species of bat in Ireland summarised that there are some gaps in the species network (Fialas & Roche, 2025). In this report, Box 26 (p. 24) is located to the west of the survey area. This area is marked as an area of where suitable habitat is available for local lesser horseshoe bat populations and recommends investigations to increase linkages from Cratloe to cross the Shannon. The lesser horseshoe bat population recorded in Ardnacrusha is therefore an important colony that could assist expansion in this named areas.

The Co. Clare distribution of bat records for this species of bat (Source: www.biodiversityireland.ie) is presented in Figure 2a.

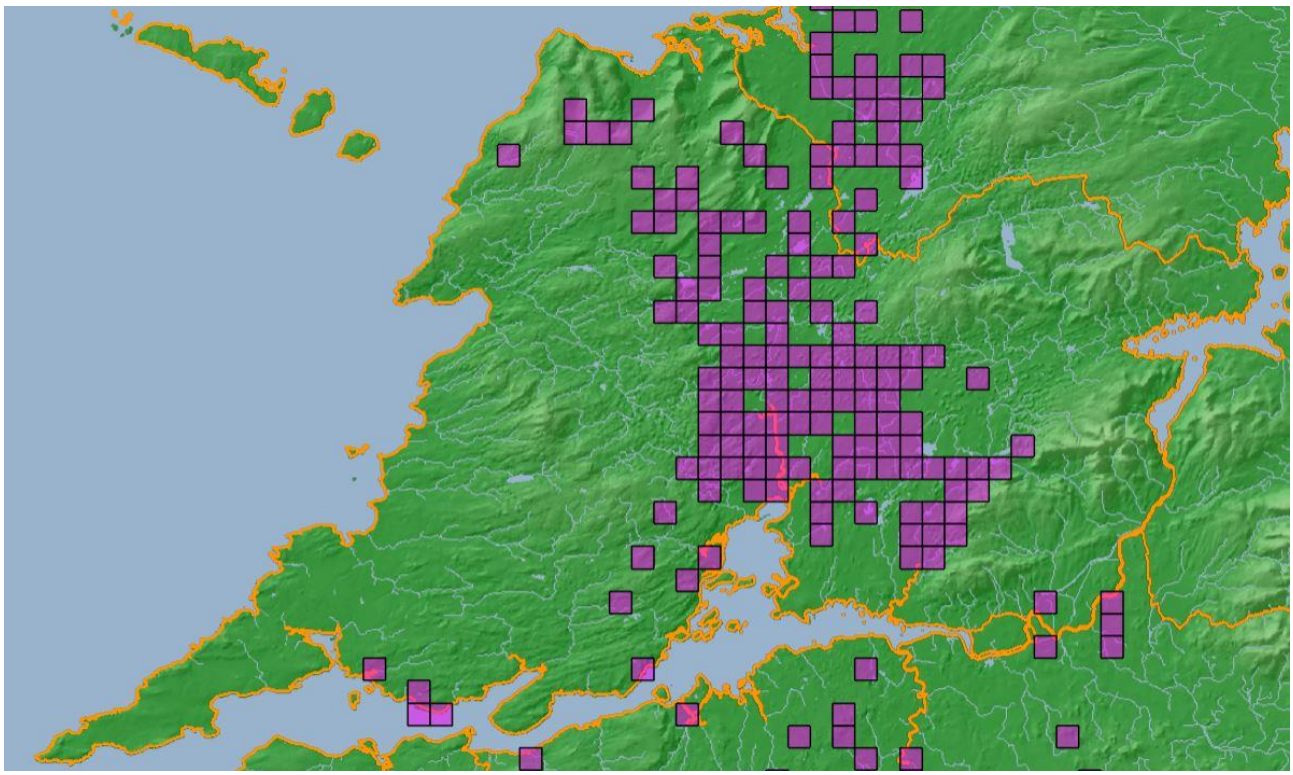

Figure 2a: Distribution of known lesser horseshoe bat records in Co. Clare.

Primary Points from Results:

1. Transformer Building is an important Lesser horseshoe bat roost and provides roosting all year around. Winter roosting is located in the basement where bats were frequently recorded in a torpor state while there is additional roosting in the Transition Room and the Substation Rooms. The latter two places provide roosting during the maternity. All three locations were recorded as roosting sites outside the principal maternity and hibernation months.
2. The number of individuals counted on the 10th May 2024 was 139 bats, this is >100 which is the number deemed required for SAC (Special Area of Conservation) status for maternity site (maternity site to be confirmed with further survey work).
3. The most counted during Winter counts was 59 individuals counted on 3rd December 2024 which meets the status for SAC Hibernation roosts (50 individuals or more is needed to meet SAC status for a hibernation site). Additional count on 6/2/2025 recorded 50 individuals and 53 individuals on 14/4/2025 in the basement re-confirming the importance of this structure as a winter/spring hibernation roost for the colony.
4. The importance of this building as lesser horseshoe bat roost is greatly increased by the fact that there is excellent foraging habitat in the immediate area (River Shannon and associated woodland habitats). Static surveillance (reported separately) of the adjacent woodlands provided evidence that lesser horseshoe bats commute and foraging in the adjacent woodlands.
5. Two additional bat species were recorded roosting in the building during dusk surveys – Common pipistrelle and Natterer's bat but the numbers, to-date, indicate Satellite Roosts and/or Day Roosts, respectively.
6. Two further bat species were recorded during the Winter & Spring 2025 static surveillance – Soprano pipistrelle and brown long-eared bats. It is therefore likely that Daytime Roosts are present for this bat species.

4. Derogation Licence Application

A derogation licence is required to be in place prior to proposed investigative works. Once this is in place, Bat Eco Services Limited will liaise with the contractor to plan supervision of the works.

Derogation Licence

A NPWS Derogation Licence is required for proposed investigative works as it may result in the temporary disturbance of a lesser horseshoe bat colony. However these works will be undertaken outside the main maternity season and bat access to the Substation, Transition Room and Basement will continue throughout the works. In addition, monitoring of bat activity will be undertaken throughout the investigative works to ensure that disturbance is kept to a minimum while supervision of investigative works will be undertaken in the presence of Bat Eco Services Ltd. staff. Additional mitigation measures will be in place to further reduce potential impact on roosting bats.

4.1 Test 1 – Reason for Derogation

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.

The following is a statement provided by ESB in relation to the importance of the building for building heritage and therefore the requirement of maintenance works:

The 'Traffo Building' structure which lies within the curtilage of Ardnacrusha Generating Station, Co. Clare, a legally Protected Structure, built in 1925/26. The 'Traffo' Workshop is a rare Irish example of a largely intact early 20th Century steel-framed industrial building. It is likely to be unique in Ireland being constructed of German imported steelwork and is of historical value for its role in the Ardnacrusha project – a significant infrastructure project undertaken by the newly independent Irish State. The 'Traffo' Workshop was built as a temporary power station to contain nine diesel generators for the construction of Ardnacrusha Generation Station in 1925. It is mentioned in the construction project report published by Siemens in October 1926 which includes photographs of the building under construction. The building continued in use as a workshop until the l980s but is now used largely for storage of material, apart from the badminton hall at the north-west corner.

The building is now in poor condition and requires structural repair works to maintain the building and to prevent any further damage. A recent preliminary Condition Assessment (2023) identified cracks/ missing sections throughout the existing roof of the building, missing gutters, corroded panels, steel framed doors in poor condition with missing rails and decaying timber, corroding steel framing in blockwork of external walls, cracking and displacement on external wall blockwork, damaged and blown plaster on internal walls, cracked and missing glass in windows, detaching material from timber rafters, decay of skarting boards - with dry rot noted, damp mould growing on ceiling. Repair works are necessary for the conservation of a protected structure, without which the structure would fall into further disrepair, thus rendering the structure unsafe. Additionally, without repairs, further deterioration of the buildings condition would also reduce it's suitability to support roosting bats.

To maintain the existing roosts and minimise disturbance to roosting bats during repair works, it is proposed to create a new bat access route between the lesser horseshoe bat hibernation roost and the existing entry/ exit point of the building. This would maintain the existing roosts in the building, whilst isolating the entering/ exiting bats away from the main internal space of the building where the majority of the repair works are required. This licence application is for the creation of a new bat

route only, any future repair works will likely require separate bat derogation licences which will be subsequently applied for once there is a scope of works available for the require repairs.

4.2 Test 2 – Absence of Alternative Solutions

There are no other suitable alternatives to the proposed works.

Alternative Solution	Reasons for "Unsatisfactory"
Do-Nothing	This will cause the building to deteriorate, which will increase the health and safety concerns, reduce structural integrity of the building which will in return reduce the suitability of the structure as a bat roosting site. The investigative works proposed are positive actions that may lead to increased conservation of the existing bat colony.
Temporary Patch-up work	Patch-up works are not viable due to the size of the building and due to the condition repairs that are now required.

There are no alternative solution as maintenance works are required to ensure the safe stabilisation of the building, conservation of the building and conservation of the roosting spaces for the lesser horseshoe bat colony. These routine works are likely to impact on the lesser horseshoe bat colony. However, if a new and separate access point is provided for the bat colony, this separates the bat roosting areas from future proposed maintenance areas.

4.3 Test 3 – Impact of a derogation on Conservation Status

It is considered that potential disturbance to the bat colony will be due to the noise and vibration from the drilling process. Therefore, in preparation for this, a Literature Review was undertaken.

4.3.1 Literature Review – Noise & Vibration

Nocturnal mammal species such as bats rely on sound as their means of orientation, feeding and communication (Hooker *et* al., 2023). Therefore it is generally understood that anthropogenic noise impacts on bat activity by reducing the individual fitness as a result of masking communication signals, impeding prey detection and increasing predation risk.

A study that clearly demonstrates this is one undertaken by Gilmour *et al.* (2021) that investigated that use of noise as a deterrent to influence bat behaviour. By using acoustic noise deterrents (ultrasonic noise at a frequency range of 20-100 kHz with frequency of maximum energy of 50kHz emitted from speakers to produce a range of noise at 98 dB at 1m, 52 dB at 15m, 21 dB at 30m and beyond 40m, 3dB), overall bat activity was reduced by 30% with significant reductions in *Pipistrellus pygmaeus* (27%), *Myotis* species (26%) and *Nyctalus* and *Eptesicus* species (68%) and this impact was generally up to 30m to 40m from the noise source. Bats were also recorded increasing their flight speed and changing their echolocation calls in response to location of the noise deterrent.

Hooker *et al.* (2023) reported the negative impact of festival music on bat activity but this differed for each species of bat. For this experiment, 10 minute sound tracks were created to represent music from the festival (average Fmax 15.5 kHz) and played (average dB 42.82) mixed with 10 minute

ambient noise intervals followed by a two minute break before the next 20 minute music/ambient noise sound track was played. The experiment was undertaken within dark semi-natural landscapes of England and Wales. Bat activity was recorded during Control Nights (no sound track plays) and during Treatment nights (active sound track plays). Activity of Nyctalus/Eptesicus species was reduced by 47% along woodland edge habitats while there was no significant impact was reported for *Myotis* species, *Pipistrellus pipistrellus* and *P. pygmaeus*. To investigate the potential impact of decibel levels, monitoring was also completed at 20m (average dB 67.65) and 40m (average dB 57.97) distances from the sound sources. It was reported that the *P. Pygmaeus* activity increased (on average by 130.6% at the 40m distance) with increasing distances from the sound source. Therefore bat species that used broadband echolocation calls (e.g. *Myotis* species) are less likely to be impacted by anthropogenic noise compared to bat species that use a more narrow range of frequencies (e.g. *Nyctalus* species). This study suggested that bat species that echolocate at high frequencies are less likely to be impacted by noise compared to bat species that echolocate at lower frequencies. It was also indicated that species such as *P. pipistrellus* will actively avoid foraging in areas where there is acute noise but when such noise is absent, will return to forage. Therefore temporary noise, such as music festivals, are likely to result in temporary avoidance by local bat populations of such areas for the duration of the event.

Bunkley *et al.* (20150 investigated the potential impacts of continuous broadband noise from gas compressor stations (treatment sites) on bat activity. Bat detectors were place adjacent to a linear habitat feature, on average at a 50m distance, from the compressor site. It was reported that activity levels for the Brazilian free-tailed bat (*Tadarida brasiliensis* – low frequency echolocators similar to *Nyctalus* spp.) was 40% lower at treatment sites compared to control sites while bat activity for four other bat species was not impacted on (e.g. *Myotis* spp – broadband echolocators). This study also showed that *T.* brasilienis changed its echolocation calls at treatment sites by lengthening the call duration of the search phase of the calls as a mean to compensate for noise interference.

Finch *et al.* (2020) investigated the potential impact of levels of road noise (full spectrum of both the sonic and ultrasonic noise components of typical road traffic noise) on bat activity. In the first experiment, traffic noise recordings were prepared and played back along known bat commuting and foraging habitats with paired Control Station and Experimental Station located 500m apart. Bat detectors were position at the 1.5m and 20m distances from the Control Station and Experimental Station. The traffic noise recordings (both sonic and ultrasonic) were played in order to create a peak sonic frequency of 86dB. Over five nights at the Experimental Stations, no traffic noise was played on Night 1 followed by two nights of sonic traffic noise and two separate nights of ultrasonic traffic noise. Feeding activity was lower on noise treatment nights at the Experimental Locations for both *Pipistrellus pipistrellus* and *P. pygmaeus*. The sonic noise had a greater negative impact on *P. pygmaeus* and *Myotis* species. However, overall, traffic noise negatively impacted on all bat species recorded (including Greater horseshoe bats *Rhinolophus ferrumquinum* and Noctules *Nyctalus noctule*) regardless of their typical type of echolocation calls. However the greater impact of sonic noise compared to ultrasonic noise maybe due to the longer lasting impact of sonic noise (i.e. higher frequency calls typical of ultrasonic noise attenuates quicker in the atmosphere). Potential mitigation strategies include installing noise barriers, using substrate alterations (i.e. most noise is due to tyre movement on the road surface) and lowering speed limits.

A similar study was undertaken to determine the potential impact of rail traffic on bat activity in the UK. Jerem & Mathews (2021) investigated whether rail traffic reduced the bat activity levels of two common bats species to the UK: *Pipistrellus pipistrellus* and *P. pygmaeus*. During the first 60 to 120 seconds after a train passes, the level of bat activity recorded was 30% less than prior to the train passing. It is considered that this reduction is primarily due to avoidance (i.e. evasive action) while

the impact of the noise of the passing train cannot be excluded. Results reported by Anderson *et al.* (2007) indicated that bats evaded the area of the passing trains when noise levels exceeded 88bD.

Cory-Toussaint & Taylor (2022) investigated the potential impact of anthropogenic lighting, noise and vegetation removal on local bat populations of opencast mines in South Africa. The study reported that there was a significant negative impact of increased lighting and vegetation removal on bats while anthropogenic noise had no significant impact on bat activity and species richness.

But as mentioned above, the extent of the negative impact of noise is species specific. Simmons *et al.* (2016) reported that big brown bats (*Eptesicus fuscus*) are less likely to be susceptible to noise-induced hearing losses than compared to other mammals. Hage *et al.* (2014) investigated the impacts of ambient noise on horseshoe bats on the production of their different echolocation call components and showed that the bats altered the CF and FM component of their calls depending on the type of anthropogenic noise and therefore could impact on their ability to detect prey items.

However, the impact of noise may vary depending on the seasonal activity of bats. Lou *et al.* (2014) reported that bats in torpid rapidly habituated to repeated and prolonged anthropogenic noise exposure (e.g. traffic). This study also found that bats become more sensitive to noise as dusk approaches suggesting that the time of the day affects the response bats will have to external noise sources with responses noted as bat prepare to wake in preparation for foraging prior to dusk.

As a demonstration on how bats can use noise, the following is an example. Poor weather conditions are also known to impact on successful foraging activity particularly rain, as it reduces the bats ability to effectively echolocate (Fenton *et al.,* 1977). A study completed by Geipel *et al.* (2019) investigated if rain noise is used as an emergence cue from a roost by the roosting colony of two bat species (*Micronycteris microtis* and *Molossus molossus*). The experiment had three treatments: no playback (control, baseline), ambient noise and rain noise. Noise was produced, through speakers, (1-120 kHz) of 6dB between 3 and 90 kHz. During rain noise experiments, the bats delayed their emergence times and suggests that bats are flexible in their response to climatic conditions.

MAIN POINTS

1. Noise negatively impact on bats.
2. The degree of impact is species specific with low frequency echolocation bats (e.g. Leisler's bats) and bat species that use a narrow band of frequency for echolocation calls (e.g. Leisler's bats and *Pipistrellus* species) tend to be more negatively impacted on (Hooker *et al.,* 2023).
3. Noise levels that negatively impact tend to be 80-90 dB or greater (Finch *et al.,* 2020).
4. The negative impact is reduced once the noise source is >40m from the bat (Gilmore *at al., (2021)*.
5. Bat activity returns to a habitat when the noise stops (Hooker *et al.,* 2023).

Therefore, it is considered that the potential impacts of noise on the lesser horseshoe colony will be reduced because of the following points:

- Lesser horseshoe bats are a high echolocating bat and therefore less likely to be impacts on by the noise;
- The lesser horseshoe bat colony roost in the basement, during the cooler months of the year at the far end of the basement, furthest from the proposed drilling area.

4.3.2 Conservation Stats

The conservation status of this species is as follows:

It is deemed that the works will not to be detrimental to the maintenance of the local lesser horseshoe bat population. Indeed, the proposed works will ensure the long-term conservation area for this species.

The lesser horseshoe bat is mainly found in counties on Ireland's western seaboard (Mayo, Galway, Clare, Limerick, Kerry and Cork) and its strongholds are found in County Kerry, west Cork and County Clare. The lesser horseshoe bat is Ireland's only Annex II listed bat species (EU Habitats Directive [92/43/EU]). There are a total of 41 SACs designated for this species and these are distributed in the six primary counties of its distribution.

Co. Clare is one of the primary stronghold counties for the Irish lesser horseshoe bat population. The principal location of lesser horseshoe bat records in Co. Clare are distributed through the centre of the county from north to south. However, with the increasing use of bat static recording units, records are increasing being documented in other parts of the county (e.g. south-west along the coast). There are 17 SACs designated for lesser horseshoe bats in the county and this represents 41% of all SACs designed for this species in Ireland. This emphasizes the importance of the county for this species of bat.

The most recent population estimates for this species of bat is 14,975 individuals (2023), a cumulative increase of 17.09% from 2017 to 2023. In the long-term, Roche (2024) reports an annual increase of 2.36% from 1999 to 2023 or cumulative growth of 74.93% over the time period (based on the summer trend).

Works will be undertaken outside the main maternity and hibernation periods to reduce disturbance. Works will be undertaken at a time when bat numbers are fluctuating and generally less compared to the maternity season and more active compared to the hibernation period. This will reduce the potential disturbance factor.

4.3.3 Bat Mitigation Measures

It is considered that the proposed works, coupled with proposed mitigation monitoring and supervision will ensure that there minimal disturbance of the bat colony will occur and that such disturbance will be temporary and outside the man maternity and hibernation period.

The following measures will be implemented:

1. Static surveillance

Three static units will be erected to record bat activity in the Substation loft, Transition Room and Basement during works (24 hour recording) to determine if bats are active during the hours of investigative works (i.e. drilling).

2. Supervision

During the drilling process, Bat Eco Services Ltd. will be present and will undertake the following:

- Daytime count of the Substation loft, Transition Room and Basement to record the number of bats present.
- Surveying to determine if bats are disturb by the drilling noise and vibration. Where disturbance is recorded, works will be stopped.

3. Soundproofing

Prior to proposed drilling works, a sound proof “room” will be constructed in the Transition Room around the area of operation. This temporary room (i.e. Work Room) will be construction using a timber frame lined with sheets of plywood. An acoustic barrier (Noise Defender Acoustic Barrier (from www.hermeq.ie – this is a high-grade lightweight noise absorption panel that can be attached to the inner walls and ceiling of the “Work Room”) will be attached to the sheets of plywood to reduce noise and vibration within the Transition Room. Typically, a drill emits 80 dB of noise but the specifications of this barrier states that it absorbs up to 361 dB.

Plate 16: Noise defender acoustic barrier Source: www.hermeq.ie.

Plate 17: Room A of Transition Room.
Red Arrows – bats will continue to enter Room A and be able to fly to Room B, into the Substation Loft and/or to the Basement. This gap is approximately 50cm high and the width of the entrance into Room B (see next photograph). The “Work Room” will be constructed at the height of the Blue Lines which will provide enough work space for drilling investigation.

Plate 18: Room B of Transition Room.
Red Arrows – bats will continue to enter Room A and be able to fly to Room B, into the Substation Loft and/or to the Basement. This gap is approximately 50cm high and the width of the entrance into Room B (see next photograph). The “Work Room” will be constructed at the height of the Blue Lines which will provide enough work space for drilling investigation.

As investigation works are proposed for Room A of the Transition Room, the following photographs are used to demonstrate where this “Work Room” will be constructed.

Similarly, a sound barrier will also be temporarily constructed in the basement at the approximate location of the drill operations to reduce noise and vibration in the basement.

4. Drilling Operation

Drilling operation will be undertaken only during the daytime. The drilling operation will require the following steps:

- 3 inch core sample to be collected and to determine the depth of the concrete and if it possible to drill through to the basement from the Transition Room;
- Core analysis of sample;
- Engineers report to determine the structural integrity of the existing;
- Drilling of “Bat Access Tunnel” at a diameter of 60cm (to replicate the post box entrance of 50cm x 50cm recommended for maternity roosts). The length of the tunnel will be determined by the depth of the core sample in Step 1.
- Drilling of the tunnel would typically involve drilling a series of 3 inch cores around the 60cm diameter of the proposed tunnel until the internal concrete can be removed.

The duration of the proposed works will be kept to a minimum and will be undertaken outside the main maternity season and will be undertaken in the Autumn and/or Spring months. During this period, a reduced number of lesser horseshoe bats was recorded and it was noted by NPWS that there is additional wintering roosts located within a 2.5km radius of the transformer building. Therefore, undertaking works outside the main maternity season will reduce the number of bats likely to be impacted on, compared to undertaking the works during the maternity season.

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