

2026

Terrestrial Mammal (Updated) & Bat Survey (Updated): Ducking Stool Jetty, Belturbet, Co. Cavan



Bat Eco Services Limited, Ulex House, Drumheel, Lisduff, Virginia, Co. Cavan. A82 XW62.

Licensed Bat Specialist: Dr Tina Aughney

NPWS licence C047/2026 (Licence to handle bats, expires 31st December 2026);

NPWS licence 014/2026 (Licence to photograph/film bats, expires 31st December 2026);

NPWS licence DER/BAT 2026-119 (Survey licence, expires 31st December 2026).

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 are completed by Dr Tina Aughney. Data collected and surveying is completed with the assistance of trained field assistants. Mr. Shaun Boyle and Ms. Eva Boyle (Field Assistants) survey under NPWS licence DER/BAT 2026-119 (Survey licence, expires 31st December 2026). Both field assistants have received in-house training to undertake all elements of bat surveying according to Collins (2023).

Client: Traynor Environmental & Cavan Co. Co.

Project Name & Location: Ducking Stool Jetty, Belturbet, Co. Cavan

Report Revision History

Date of Issue	Draft Number	Issued To (process of issuing)
17 th May 2026	Draft 1	Traynor Environmental & Cavan Co. Co. (by email)
23 rd August 2026	Draft 2	Traynor Environmental & Cavan Co. Co. (by email)

Purpose

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

Bat Eco Service Ltd. 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

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Record Submission Policy

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

Citation: Bat Eco Services (2026) Terrestrial Mammal & Bat Survey for Ducking Stool Jetty, Belturbet, Co. Cavan. Unpublished report prepared for Cavan Co. Co.

Executive Summary

Project Name & Location: Ducking Stool Jetty, Belturbet, Co. Cavan

Proposed project: Re-development of jetty

Summary of survey results – Terrestrial Mammals 2025 & 2026

Terrestrial Mammal Species	Trail Cameras	Daytime Walkabout
Red fox <i>Vulpes vulpes</i>	✓	
Otter <i>Lutra lutra</i>	✓	✓
Badger <i>Meles meles</i>	✓	
Brown rat <i>Rattus norvegicus</i>	✓	
Irish hare <i>Lepus timidus hibernicus</i>	✓	

2025 Bat Survey Results – Summary

Bat Species	Roosts	Foraging	Commuting
Common pipistrelle <i>Pipistrellus pipistrellus</i>		✓	✓
Soprano pipistrelle <i>Pipistrellus pygmaeus</i>		✓	✓
Nathusius' pipistrelle <i>Pipistrellus nathusii</i>		✓	✓
Leisler's bat <i>Nyctalus leisleri</i>		✓	✓
Brown long-eared bat <i>Plecotus auritus</i>		✓	✓
Daubenton's bat <i>Myotis daubentonii</i>		✓	✓
Natterer's bat <i>Myotis nattereri</i>		✓	✓
Whiskered bat <i>Myotis mystacinus</i>			
Lesser horseshoe bat <i>Rhinolophus hipposideros</i>			

Survey Duties Completed

Bat static surveillance & Dusk Survey 
Trail camera surveillance 
Walkover survey 

Bat Static Surveillance

2025 Autumn Static Surveillance – Full spectrum bat detectors (2 units) were located within vicinity of Ducking Stool. Survey dates: 16th September to 29th September 2025 (one unit recorded for 6 nights, the second unit recorded for 13 nights).

2026 Summer Static Surveillance – Full spectrum bat detectors (2 units) were located within vicinity of Ducking Stool. Survey dates: 15th to 20th August 2026 (5 nights).

2025 Terrestrial Mammal Surveillance Summary

Autumn Survey 1 – Trail cameras (6 Units, 5 of which were retrieved after flood event) were located within vicinity of Ducking Stool. Survey dates: 29th September to 15th October 2025 (15 days).

Autumn Survey 2 – Trail cameras (8 Units) were located within vicinity of Ducking Stool Jetty. Survey dates: 15th October to 12th November 2025 (28 days).

Walkabout Survey – 15th October 2025

2026 Terrestrial Mammal Surveillance Summary

Summer Survey 1 – Trail cameras (6 Units): 25th April to 11th May 2026 (17 days).

Walkabout Survey – 25th April 2026

Contents

1. Introduction	5
1.1 Relevant Legislation & Bat Species Status	5
1.1.1 NPWS Article 17 Reporting	6
1.1.2 Irish Bat Monitoring Programme – Population Trends	7
1.2 Relevant Legislation & Terrestrial Mammals Status in Ireland	8
1.3 Assessment Parameters	10
1.4 Project Location	12
1.4.1 Project Description	16
2. Survey Methodology	18
2.1 Bat Survey	18
2.1.1 Desktop Review	18
2.1.2 Daytime Inspection	18
2.1.3 Static Surveillance	18
2.2 Terrestrial Mammal Survey	21
2.2.1 Desktop Review	21
2.2.2 Surveillance Methods – Literature Review	21
2.2.3 2.2.1 Trail Cameras	21
2.2.4 Trail Camera Survey – Surveillance Methodology	22
2.2.5 Mammal Survey	22
2.3 Daytime Walkover Survey	24
2.4 Survey Limitations	24
3. Survey Results	25
3.1 Desktop Review - Bats	25
3.1.1 Bat Conservation Ireland Database	25
3.1.2 Bat Conservation Ireland Landscape Model	25
3.2 Desktop Review – Terrestrial Mammals	26
3.3 Bat Survey Results	27
3.3.1 Daytime Inspection	27
3.3.2 Static Surveillance 2025	27
3.3.3 Static Surveillance 2026	28
3.4 Terrestrial Mammal Survey Results	30
3.4.1 Trail Camera Survey 2025	30
3.4.2 Walkabout Surveys 2025	31
3.5 Summary 2025	31
3.5.1 Trail Camera Survey 2026	33
4. Ecological Evaluation	35
4.1 Bat Species Recorded & Sensitivity	35
4.2 Mammal Species Recorded & Sensitivity	39
4.2.1 Red fox	39
4.2.2 Otter	39
4.2.3 Badger	42
4.2.4 Flood Conditions - Otters	43
5. Site Evaluation & Potential Impacts	44
5.1 Bats	44
5.2 Terrestrial Mammals	45
6. Conservation & Mitigation Measures	47

6.1	Bats.....	47
6.1.1	Outdoor Lighting.....	47
6.1.2	Vegetation Removal.....	48
6.1.3	Walkway Development.....	48
6.1.4	Construction Environmental Management Plan	48
6.2	Terrestrial Mammals	49
6.2.1	Operational Phase	50
6.2.2	Mammal Friendly Zones.....	51
6.2.3	Lighting.....	51
6.2.4	Vegetation Removal.....	51
6.2.5	Walkway Development.....	52
6.2.6	Pre-Construction Surveillance	52
6.2.7	Access	52
7.	Survey Conclusions	53
8.	Bibliography	54
9.	Appendices.....	60
9.1	Appendix 1 Trail Camera Results.....	60
9.2	Appendix 2 Bat Static Surveillance Results	63

1. Introduction

Bat Eco Services Ltd. was commissioned by Traynor Environmental to undertake a terrestrial mammal and bat survey of the proposed development of Ducking Stool Jetty, Belturbet. Co. Cavan. This is to provide information on terrestrial mammal and bat usage as part of a development proposal.

1.1 Relevant Legislation & Bat Species Status

All Irish bat species are protected under the Wildlife Act (1976) and Wildlife Amendment Acts (2000 and 2010). Also, the EC Directive on The Conservation of Natural habitats and of Wild Fauna and Flora (Habitats Directive 1992), seeks to protect rare species, including bats, and their habitats and requires that appropriate monitoring of populations be undertaken. All Irish bats are listed in Annex IV of the Habitats Directive and the lesser horseshoe bat *Rhinolophus hipposideros* is further listed under Annex II. Across Europe, they are further protected under the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention 1982), which, in relation to bats, exists to conserve all species and their habitats. The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention 1979, enacted 1983) was instigated to protect migrant species across all European boundaries. The Irish government has ratified both these conventions.

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

Regulation 51(2) of the 2011 Regulations provides –

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

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

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

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

There are eleven recorded bat species in Ireland, nine of which are considered resident on the island. Eight resident bat species and one of the vagrant bat species are vesper bats and all vespertilionid bats have a tragus (cartilaginous structure inside the pinna of the ear). Vesper bats are distributed throughout the island. Nathusius’ pipistrelle *Pipistrellus nathusii* is a recent addition while the Brandt’s bat has only been recorded once to-date (Only record confirmed by DNA testing, all other

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

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

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

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

[^] Roche *et al.*, 2014

1.1.1 NPWS Article 17 Reporting

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

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

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

1.1.2 Irish Bat Monitoring Programme – Population Trends

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

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

This provides population trend data for seven bat species: common pipistrelle, soprano pipistrelle, Leisler's bat, Nathusius' pipistrelle, Daubenton's bat, brown long-eared bat and lesser horseshoe bat (some limited data for *Myotis* species). There is a new systematic monitoring surveys for Natterer's bat and whiskered bat (Woodland Monitoring Survey) but there is not enough data to provide population trends. Annual reporting is undertaken and the most recent report (Roche *et al.*, 2026) is referenced for this report. In summary, the population trends for each bat species are as follows:

- Trends of the three common bat species (common pipistrelle, soprano pipistrelle and Leisler's bat) continued to increase in 2025, although the yearly estimates of common pipistrelle levelled out a little. Confidence intervals of these three bat species were all above their baseline indices indicating they each show a significantly increasing trend.

- Nathusius' pipistrelle trends are still unclear due to low encounter rates the trendline has been declining since 2020.
- The yearly estimate for the *Myotis* spp. group declined a little in 2025.
- Daubenton's bat numbers trend line appears to be steady from year to year with error bars consistently encompassing the baseline.
- Brown long-eared bat shows a fluctuating trend around the baseline but due to a decline in 2025 counts has resulted in a downward trend.
- Lesser horseshoe bat continues to remain steady in 2025 for the summer counts and winter counts. Overall, this species has increased over the last 20 years of monitoring.

1.2 Relevant Legislation & Terrestrial Mammals Status in Ireland

There are 27 terrestrial mammals species in Ireland, which includes the nine resident bat species listed above. The terrestrial mammal list for Ireland consists of all terrestrial species native to Ireland or naturalised in Ireland before 1500. The IUCN Red List categories and criteria are used to assess that status of wildlife. This was recently completed for the terrestrial mammals of Ireland. Apart from the two following two mammal species (grey wolf *Canis lupus* (regionally extinct) and black rat *Rattus rattus* (Vulnerable)), the remaining 25 species were assessed as least concern in the most recent IUCN Red List publication by NPWS (Marnell *et al.*, 2019). The terrestrial mammal species, known to be present in Ireland but were excluded from the assessment are listed in Table 1c.

Table 1c: Status of the Irish terrestrial mammal fauna (non-bat) (Marnell *et al.*, 2019).

Species: Common Name	Irish Status	Species: Common Name	Irish Status
Grey Wolf <i>Canis lupus</i>	Regionally extinct	Black rat <i>Rattus rattus</i>	Vulnerable
Hedgehog <i>Erinaceus europaeus</i>	Least Concern	Red fox <i>Vulpes vulpes</i>	Least Concern
Pygmy shrew <i>Sorex minutus</i>	Least Concern	Harbour seal <i>Phoca vitulina</i>	Least Concern
Wood mouse <i>Apodemus sylvaticus</i>	Least Concern	Grey seal <i>Halichoerus grypus</i>	Least Concern
House mouse <i>Mus musculus domesticus</i>	Least Concern	Irish hare <i>Lepus timidus hibernicus</i>	Least Concern
Red squirrel <i>Sciurus vulgaris</i>	Least Concern	Rabbit <i>Oryctolagus cuniculus</i>	Least Concern
Otter <i>Lutra lutra</i>	Least Concern	Red deer <i>Cervus elaphus</i>	Least Concern
Pine marten <i>Martes martes</i>	Least Concern	Fallow deer <i>Dama dama</i>	Least Concern
Irish stoat <i>Mustela ermine hibernica</i>	Least Concern	Badger <i>Meles meles</i>	Least Concern

Table 1d: Additional Irish terrestrial mammal fauna (non-bat) not assessed on the IUCN Red List (Marnell *et al.*, 2019).

Species: Common Name	Species: Common Name
Sika deer <i>Cervus Nippon</i>	American mink <i>Neovison vison</i>
Greater white-toothed shrew <i>Crocidura russula</i>	Brown rat <i>Rattus norvegicus</i>
Brown hare <i>Lepus europaeus</i>	Grey squirrel <i>Sciurus carolinesis</i>
Bank vole <i>Myodes glareolus</i>	Wild boar <i>Sus scrofa</i>
Muntjac deer <i>Muntiacus reevesi</i>	Hazel dormouse <i>Muscardinus avellanarius</i>
Coypu <i>Myocastor coypus</i>	

As stated by Marnell *et al.*, 2019, most terrestrial mammals have some legal protection in Ireland. Excluding bat species, 5 mammal species are listed on the EU Habitats Directive and 12 on Irish legislation. Mammal species with no legal protection are as follows: Wood mouse, House mouse, Black rat, Red fox and Rabbit.

Table 1e: Irish terrestrial mammal fauna (non-bat) protected status (Marnell *et al.*, 2019).

Irish Wildlife Act 1976, Wildlife (Amendment) Act 2000	EU Habitats Directive
Hedgehog <i>Erinaceus europaeus</i>	
Pygmy shrew <i>Sorex minutus</i>	
Red squirrel <i>Sciurus vulgaris</i>	
Otter <i>Lutra lutra</i>	Otter <i>Lutra lutra</i>
Pine marten <i>Martes martes</i>	Pine marten <i>Martes martes</i>
Irish stoat <i>Mustela ermine hibernica</i>	
Harbour seal <i>Phoca vitulina</i>	Harbour seal <i>Phoca vitulina</i>
Grey seal <i>Halichoerus grypus</i>	Grey seal <i>Halichoerus grypus</i>
Irish hare <i>Lepus timidus hibernicus</i>	Irish hare <i>Lepus timidus hibernicus</i>
Red deer <i>Cervus elaphus</i>	
Fallow deer <i>Dama dama</i>	
Badger <i>Meles meles</i>	

1.3 Assessment Parameters

Different parameters are considered for the overall assessment of the potential impact(s) of a proposed development on local bat populations. The overall impacts of the proposed project on local bat populations is assessed using the following criteria:

- Impact Quality using the parameters Positive, Neutral or Negative Impact (based on EPA, 2017)

Table 1f: Criteria for assessing impact quality based on EPA, 2022.

Quality of Effect	Criteria
Positive	A change which improves the quality of the environment (for example, by increasing species diversity; or the improving reproductive capacity of an ecosystem, or by removing nuisances or improving amenities).
Neutral	No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
Negative	A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem; or damaging health or property or by causing nuisance).

- Impact Significance of potential impact parameters on specific bat species in relation to particular elements (e.g. roosting sites, foraging area and commuting routes) are assessed with reference to the following:
 - o Table 4 of Marnell *et al.* (2022) (Figure 1a);
 - o the known ecology and distribution of the bat species in Ireland;
 - o bat survey results including type of roosts (if any recorded), pattern of bat usage of the survey area, level of bat activity recorded etc.
 - o and bat specialist experience.
- Impact Significance of the proposed development on local bat populations maybe determine, where applicable, using the parameters listed in the table below (based on EPA, 2022).

Table 1g: Criteria for assessing significance of effects based on EPA, 2022.

Significance of Effects	Definition
Imperceptible	An effect capable of measurement but without significant consequences.
Not significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.

Significant	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
Profound	An effect which obliterates sensitive characteristics

The following terms will be used, where possible and applicable, when quantifying the duration of the potential effects (selected from EPA, 2022):

- Momentary effects – effects lasting from seconds to minutes
- Brief effects – effects lasting less than a day
- Temporary – effects lasting less than a year
- Short-term – effects lasting 1 to 7 years
- Medium term – effects lasting 7 to 15 years
- Long term – effects lasting 15 to 60 years
- Permanent – effects lasting over 60 years
- Reversible – effects that can be undone, for example through remediation or restoration.

1.4 Project Location

Ducking Stool Jetty is located along the River Erne in Belturbet, Co. Cavan. There is a large hardcore area with boat access to the water. The jetty also includes platforms constructed from timber boards fitted on a steel frame. Vegetation is located along one section of the proposed development area and continues along the river-side boundary of adjacent residence.



Plate 1: Ducking Stool Jetty, Belturbet, Co. Cavan.



Plate 2: Ducking Stool Jetty, Belturbet, Co. Cavan.



Plate 3: Ducking Stool Jetty, Belturbet, Co. Cavan.



Plate 4: Ducking Stool Jetty, Belturbet, Co. Cavan – scrub vegetation.



Plate 5: Ducking Stool Jetty, Belturbet, Co. Cavan – scrub vegetation.



Plate 6: Ducking Stool Jetty, Belturbet, Co. Cavan – view of jetty from river-side.



Plate 7: Ducking Stool Jetty, Belturbet, Co. Cavan – view of jetty from river-side during Summer 2026 survey with water levels much lower compared to October 2025 survey.

1.4.1 Project Description

The following are the proposed works:

The proposal is for the upgrade and realignment of the existing jetty and slipway at the Ducking Stool Jetty and the creation of a carpark on lands at Willow Avenue, with the reinstatement of a walkway connecting both. Details of the works include:

- removal of the existing timber jetties,
- realignment and widening of the slipway providing access to the River Erne,
- reconfiguration and extension of the existing pier, including amended levels,
- installation of floating jetties and jetty access ramp,
- construction of hard landscaped, public recreational open space,
- reinstatement and upgrade of walkway connecting The Ducking Stool Jetty to lands at Willow Avenue,
- reconfiguration and upgrade of existing gravelled area to create new carpark (7no. spaces), including access steps,
- installation of public lighting and refuse storage,
- amendments to site boundaries
- installation of bike stands
- installation of wayfinding signage
- reconfiguration and upgrading of existing drainage and all associated site development works.

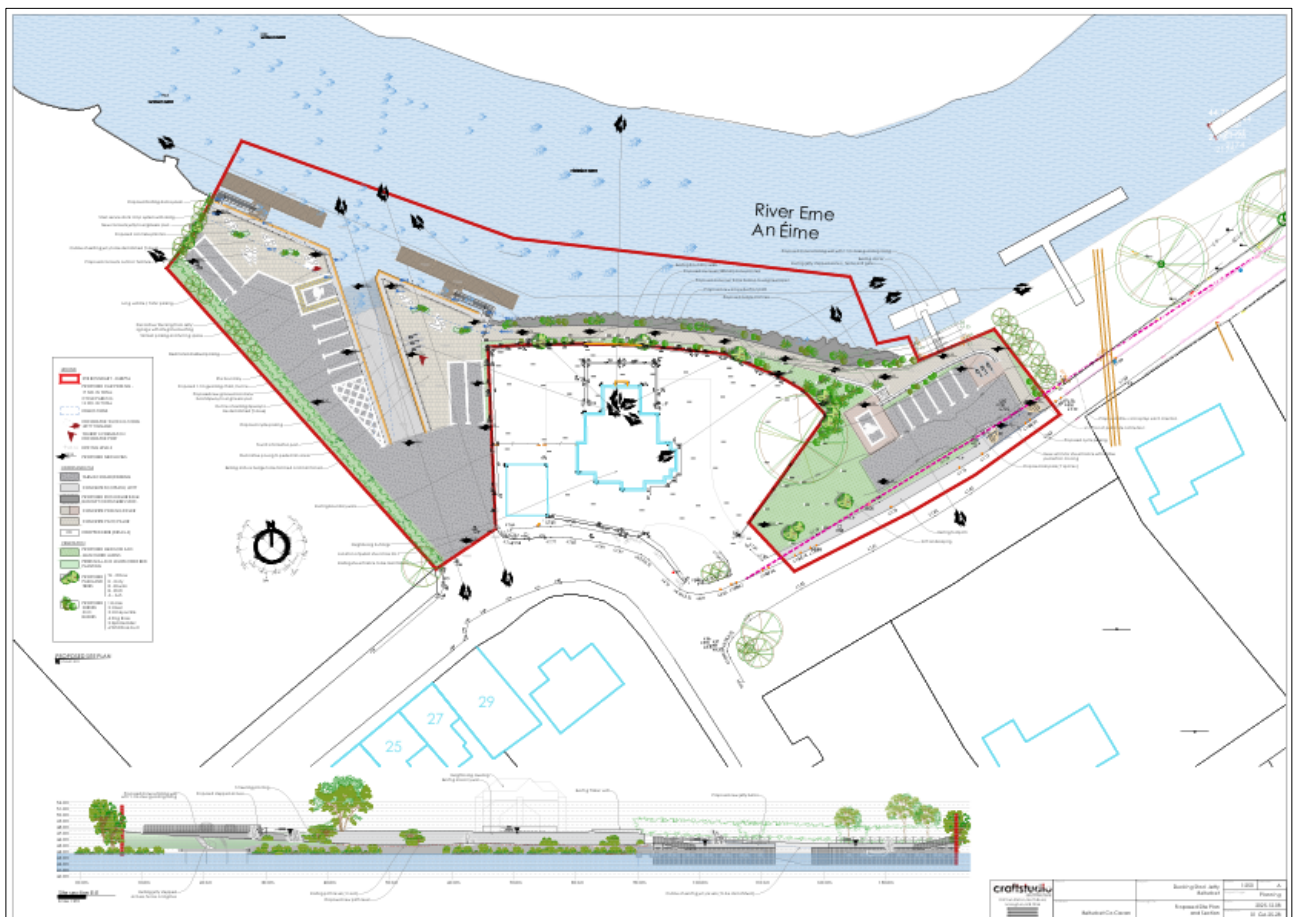


Figure 1: Red line boundary of proposed development at Ducking Stool Jetty, Belturbet, Co. Cavan.

The following information was provided in relation to operational works:

New Jetties: The floating jetties are a purchased unit constructed off site and will have to be anchored using steel piles. The piles will be drilled into the rock bed to a required level to sufficiently anchor the pontoons.

Existing Jetties: The old timer static jetties will be removed and the immediate area around the jetties dredged to a suitable level. The jetties will be replaced with a new steel frame with concrete panels to the face and top. Water will be able to run under this frame/platform. The steel frame will be drilled into the rock bed also, and precast concrete panels will be dropped into the web of the column to act as the jetty wall.

Other Works: All other works will be out of water and will be typically resurfacing and landscaping.

Time Frame: The works would be ideally carried out during the summer months during low water and we estimate the water works could be carried out over 4 weeks and the project over 20 weeks. Works are provisionally planned for 2027.

2. Survey Methodology

2.1 Bat Survey

2.1.1 Desktop Review

2.1.1.1 Bat Conservation Ireland Database

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

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

The Bat Conservation Ireland database was accessed on 21st November 2025 to collated bat records for a 1km radius of the proposed development site (H3637817188).

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

2.1.1.2 Bat Conservation Landscape Favourability

Bat Conservation Ireland (BC Ireland) produced a landscape conservation guide for Irish bat species using their database of species records collated during the 2000 – 2009 survey seasons. An analysis of the habitat and landscape associations of all bat species deemed resident in Ireland was undertaken and reported in Lundy *et al.* (2011). This model was queried on 21st November 2025.

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

2.1.2 Daytime Inspection

A daytime inspection of the proposed development area was undertaken on 16th September 2025 and 15th August 2026 to determine if there are potential roosting sits for bats.

2.1.3 Static Surveillance

Static bat surveys involved leaving a static bat detector unit (with ultrasonic microphone) in a specific location, set to record for a specified period of time (i.e. a bat detector is left in the field, there is no observer present and bats which pass near enough to the monitoring unit are recorded and their calls are stored for analysis post surveying). The bat detector was effectively used as a bat activity data logger. This results in a far greater sampling effort over a shorter period of time and increases the opportunity to record less common bat species as the units are set to continuously record ultrasonic noise, when triggered, from 30 minutes for sunset to 30 minutes after sunrise. Bat

detectors with ultrasonic microphones were used as the ultrasonic calls produced by bats cannot be heard by human hearing.

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

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

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

Each audio file was noted as a bat pass to indicate level of bat activity for each species recorded. This was expressed as the average number of bat passes per survey night (no. of nights was the total number successful nights of deployment). The following static unit model were deployed during this static bat detector survey:

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

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

2025 Static surveillance consisted of two static units deployed within the proposed development area and adjacent treelines.

- Static 1 - 16th September to 22nd September 2025 (6 nights)
- Static 2 - 16th September to 29th September 2025 (13 nights)

This was repeated in 2026 (same locations) from 15th to 20th August 2026 (5 nights).

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

Static Unit Code	Location	Recording Period	ITM Co-ordinates
Static 1 (2025 and 2026)	On fence in adjacent agricultural field facing river surface	16 th to 22 nd September 2025 (6 nights) 15 th to 20 th August 2026 (5 nights)	636261,817261
Static 2 (2025 & 2026)	On fence adjacent to exiting jetty at Ducking Stool	16 th to 29 th September 2025 (13 nights) 15 th to 20 th August 2026 (5 nights)	636326,817205



Figure 2a: Location of Bat Static Surveillance units, Belturbet, Co. Cavan.

2.2 Terrestrial Mammal Survey

2.2.1 Desktop Review

The NBDC database was checked on 21st November 2025 for all terrestrial mammal recorded within the 1km square of H3617.



Figure 2b: Ortho map of the two 1km grids (Source: www.biodiversityireland.ie). Survey area marked in red.

2.2.2 Surveillance Methods – Literature Review

Hardy (2003) considers that track-pads, digital camera traps and infrared (IR) trail monitoring systems are indirect methods especially suitable for monitoring of animal activity of the wildlife. Each monitoring method has advantages and disadvantages in terms of quality and nature of obtained information, as well as cost. Trail cameras were selected for this study.

2.2.3 2.2.1 Trail Cameras

Camera traps or trail cameras offer a non-invasive method of surveillance of terrestrial wildlife usage of such structures as green bridges. Cameras provide proof of species presence in an area; can teach what prints and scats go with which species (especially when coupled with track pads); for some species allow photo-identification of individuals; estimate the abundance, density and relative abundance of animal populations; allow biodiversity estimation and are a cost effective long-term monitoring tool (Sver, 2016; Ford 2009). However, external conditions (such as night-time, heavy rain or fog) often negatively affect the quality of recorded photographs/movies, and recognition of details may not be possible. In addition, fast moving animals can be missed by the trail camera triggering.

They are considered cost effective monitoring tools (Guzvica *et al*, 2014). Burton (2014) investigated the use of trail camera as an alternative to “snow tracking” in Central and Southern Alberta, Canada where 92 camera stations within 9 sites were set up. She reported that trail cameras were a feasible alternative when a minimum of 4-6 cameras should be deployed at each site for a minimum of 2-3 months to ensure that a full suite of likely wildlife activity is recorded.

2.2.4 Trail Camera Survey – Surveillance Methodology

Trail cameras were deployed in survey periods and three camera types used were:

- 2 units of Maginon WK3HD Wildlife Camera with 3-zone motion sensor
- 2 units of Game/Surveillance WK8A1 Camera with 3-zone motion sensor
- 4 units of Bushnell Core DS Camera

The settings for each camera were as follows:

- Medium sensitivity
- Medium setting for IR light intensity
- Triggered by activity to take 3 consecutive photographs
- 1 minute delay post trigger event

Cameras were positioned between 15 and 30 cm off the ground and locked into place using Python Cable locks.

2.2.5 Mammal Survey

Two rounds of trail camera surveillance were undertaken in 2025:

Autumn Survey 1 – Trail cameras (6 Units, 5 of which were retrieved after flood event) were located within vicinity of Ducking Stool Jetty. Survey dates: 29th September to 15th October 2025 (15 days).

(Please note: river flooded and units were collected when water levels receded. Several of the units were under water and therefore the number of days of recording is less than the surveillance period. One unit remains underwater to-date).

Autumn Survey 2 – Trail cameras (8 Units) were located within vicinity of Ducking Stool Jetty. Survey dates: 15th October to 12th November 2025 (28 days).

Due to the flood water level conditions during the 2025 surveys, the trail camera surveillance was repeated in 2026:

Summer Survey 1 – Trail cameras (6 Units) were in vicinity of Ducking Stool Jetty: 25th April to 11th May 2026 (17 days).



Figure 2c: Location of 2025 trail cameras within the survey site, Belturbet, Co. Cavan.



Figure 2c: Location of 2026 trail cameras within the survey site, Belturbet, Co. Cavan.

2.3 Daytime Walkover Survey

A walkover survey of general area was completed on 15th October 2025. This was undertaken by two surveyors, one in a kayak (500m either side of the jetty) and the second walking accessible sections of the riverbanks. Any signs of mammal activity were noted. This element of the survey was concentrated along the River Erne and the 20m zone of the riverbank (where accessible). This is because the proposed development is associated with the River Erne and is a small area adjacent to the river.

This was repeated on the 25th April 2026.

2.4 Survey Limitations

The flooding of the River Erne reduced mammal activity during the surveillance periods. The flood waters would have washed away any mammal signs, if present, prior to the walkabout survey (15th October 2025).

2025 Bat survey was undertaken outside the preferred survey periods. However, as there is no roosting resource associated with the Ducking Stool jetty, static surveillance is appropriate for this small survey site. The static surveillance was repeated in August 2026 during the primary bat activity period and therefore provides an updated bat surveillance information.

3. Survey Results

3.1 Desktop Review - Bats

3.1.1 Bat Conservation Ireland Database

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

Table 3a: Bat Records (Source: Bat Conservation Ireland).

Bat species	No. of records		Bat species	No. of records	
	Roost	Detector		Roost	Detector
Common pipistrelle	0	5	Soprano pipistrelle	0	4
Nathusius' pipistrelle	0	0	Leisler's bat	0	4
Daubenton's bat	0	3	Whiskered bat	0	0
Brown long-eared bat	0	0	Natterer's bat	0	0
Pipistrelle spp	0	0	Myotis spp	0	0
Lesser horseshoe bat	0	0			

3.1.2 Bat Conservation Ireland Landscape Model

The BC Ireland Landscape Favourability Model (Lundy *et al.*, 2011) was investigated as part of this desktop review. The island of Ireland is divided into 5km squares and the darker the shading of the square, the higher favourability of the 5km square for bats. The favourability of the square is represented by a percentage for each bat species, with higher values representing higher level of favourability. The square within which the proposed development site is located has a Moderate to High favourability for bats.

Table 3b: Percentage Landscape Favourability for each 5km for Irish bat species (Lundy *et al.*, 2011).

Square No.	All bat spp.	SP	CP	Nath Pip	Leis	BLE	Daub	Natt	Whis	LHB
1	34.67%	46%	46%	26%	47%	43%	44%	43%	15%	2%

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

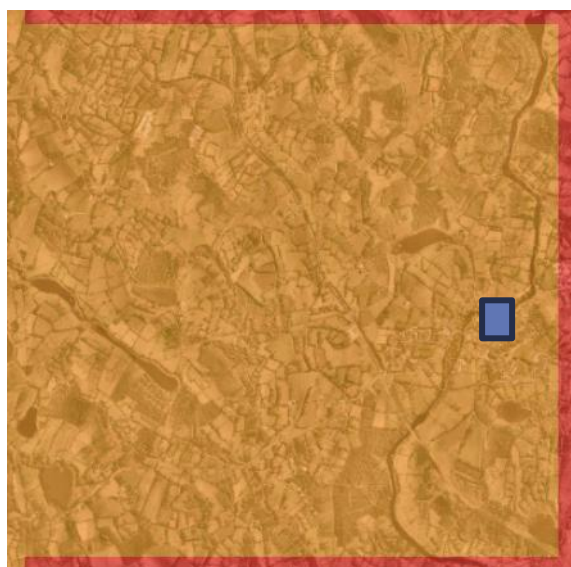


Figure 3a: Bat Conservation Ireland Landscape Favourability Model for 5km square (Source: Bat Conservation Ireland Landscape Model). Survey site is marked by Dark Blue Square.

3.2 Desktop Review – Terrestrial Mammals

A data search was completed for the 1km grid (H3617) which encompasses the survey area. In relation to trail camera records, the trail camera surveys recorded a total of three terrestrial mammals (Red fox, Otter and Badger) while the walkover survey recorded otter signs. The NBDC database searches confirmed the presence of two additional mammal species to those recorded in the 2025 surveys: Pine marten and American mink; while this survey provided new records for two mammal species not currently listed on the NBDC database for the 1km search area (i.e. Otter and Red fox). In relation to the mammal species recorded, the location of the NBDC records is presented in Appendix 9.4. Records for three mammal species are located in the 1km square where the proposed development is: Badger, American mink and Pine marten.

Table 3c: Mammal records on www.biodiveristyireland.ie for H3617.

Mammal Species	1km Grid H3617	Notes
American mink	Yes	One record
Bank Vole	No	
Brown rat	No	
Chinese Muntjac	No	
Grey squirrel	No	
Badger	Yes	Multiple records
Pygmy shrew	No	
Red squirrel	No	
Otter	No	
Rabbit	No	
Fallow deer	No	
Greater white-toothed shrew	No	
Hazel dormouse	No	
Irish hare	No	
Irish stoat	No	
Pine marten	Yes	Multiple records
Red deer	No	
Red fox	No	
Roe deer	No	
Sika deer	No	
Hedgehog	No	
Wood mouse	No	

3.3 Bat Survey Results

3.3.1 Daytime Inspection

There are no bat roosting resources present within the proposed development area.

3.3.2 Static Surveillance 2025

A total of seven bat species were recorded during the bat static surveillance: Common pipistrelle, Soprano pipistrelle, Leisler's bat, Nathusius' pipistrelle, Daubenton's bat, Natterer's bat and Brown long-eared bat. Due to the differences in the number of nights of surveillance (Static 1, located in adjacent agricultural field = 6 nights and Static 2, located on fence at Ducking Stool = 13 nights), the following graph represents the average number of bat passes for each species for each static unit.

Static 1 was located on a timber fence in the adjacent agricultural field, approximately 8m from the riverbank while Static 2 was located steel fence at Ducking Stool Jetty, directly at the water edge. The results show that Static 2 recorded a higher level of Soprano pipistrelle and Daubenton's bat passes and this is reflective of these two species preferences to feed over water. The level of bat activity for both species is considered to be High for Static 2, while the level of Daubenton's bat activity is High at Static 1 and at a Medium activity level for Soprano pipistrelles. Static 1 recorded a higher level of Leisler's bat activity level (Medium Level of Bat Activity) and this is reflective of this species preference to feed over grassland while it is at a Low Level of Bat Activity at Static 2.

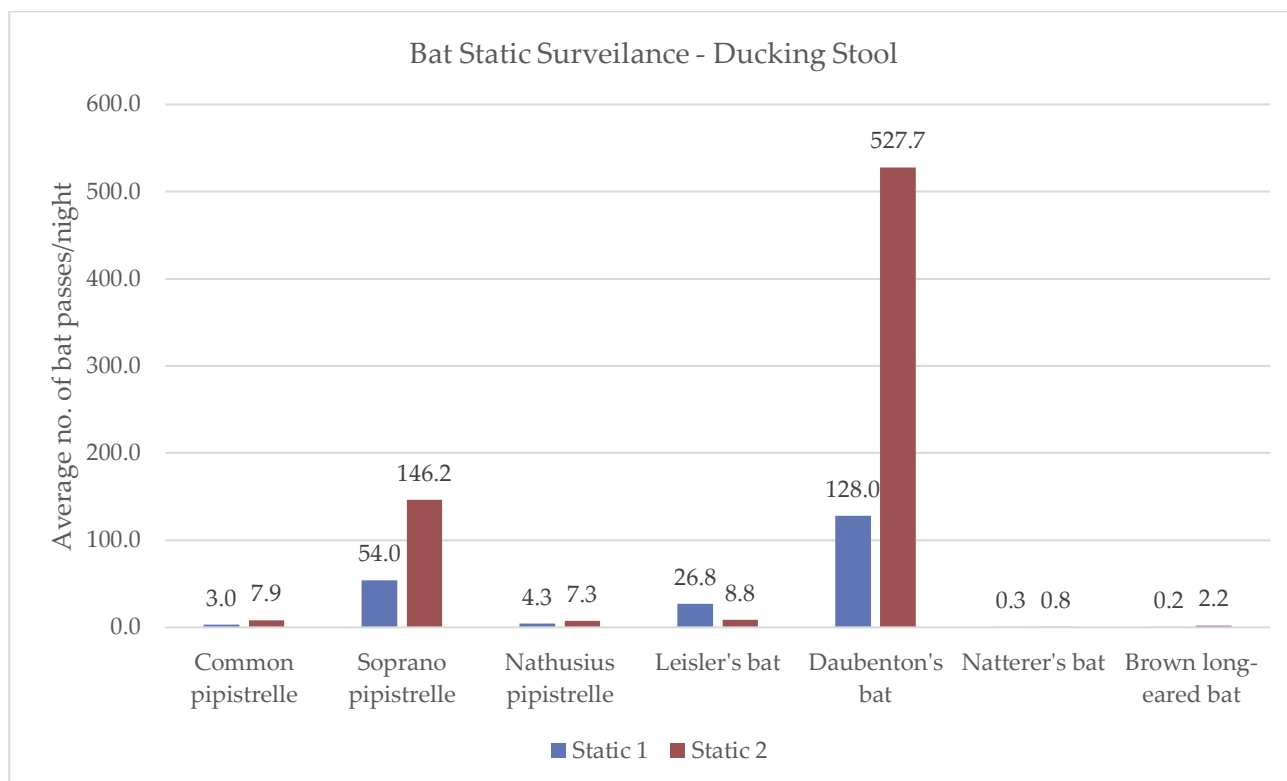


Figure 3b: Average number of bat passes for each species recorded on bat static units deployed in 2025.

Daubenton's bat is a species known as the "Water Bat" due to its preference to feed over water, and because this is a "Light Sensitive" bat species, this species is used to demonstrate the importance of the River Erne for local bat populations. The number of Daubenton's bat passes was extracted for each night of surveillance and is presented on the graph below. The level of Daubenton's bat activity

level was consistently higher on Static 2 located at the water edge of Ducking Stool jetty compared to the static unit located in the adjacent agricultural field.

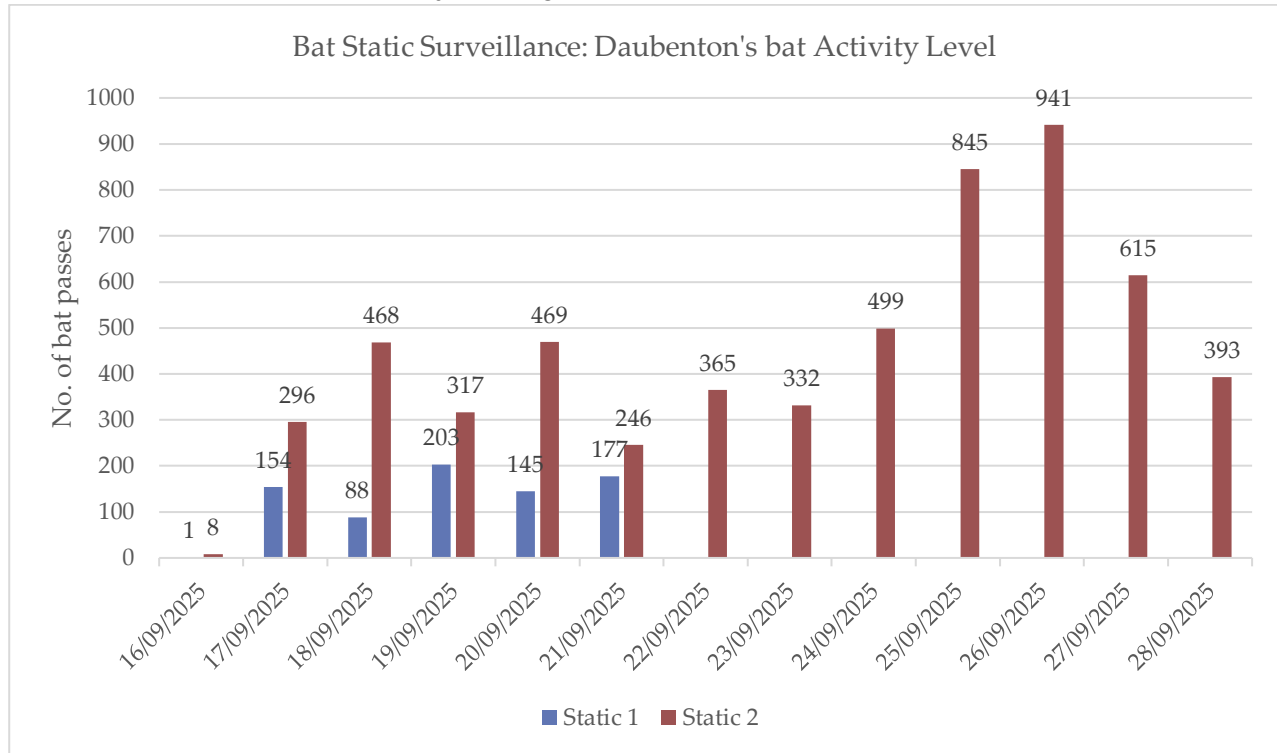


Figure 3c: Total number of Daubenton's bat passes for each night of surveillance recorded on both bat static units deployed in 2025.

The River Erne is an important riverine habitat for local bat populations, and this is reflected in the static surveillance results. There are a greater level of buildings and amenities on the riverbank on the side of the Ducking Stool jetty while the opposite riverbank for the 500m stretch on either side of the jetty is less developed with a greater degree of tall vegetation (i.e. trees) and less outdoor lighting. The river in vicinity of the jetty is approximately 40m wide and wider during flood conditions.

3.3.3 Static Surveillance 2026

A total of seven bat species were recorded during the bat static surveillance in 2026, the same set of species recorded in the 2025 static surveillance: Common pipistrelle, Soprano pipistrelle, Leisler's bat, Nathusius' pipistrelle, Daubenton's bat, Natterer's bat and Brown long-eared bat.

Compared to 2025, a higher level of Soprano pipistrelle, Common pipistrelle and Leisler's bat activity was recorded on both static units deployed in 2026. A lower level of Daubenton's bat activity on Static 2 was recorded in 2026 compared to 2025, but a higher level of Daubenton's bat activity was recorded on Static 1 in 2026 compared to 2025. The level of Nathusius' pipistrelle bat activity is similar for both years. The level of Brown long-eared bat and Natterer's bat is low for both years.

The main result for 2026 is that the same set of bat species were recorded for both static surveillance periods.

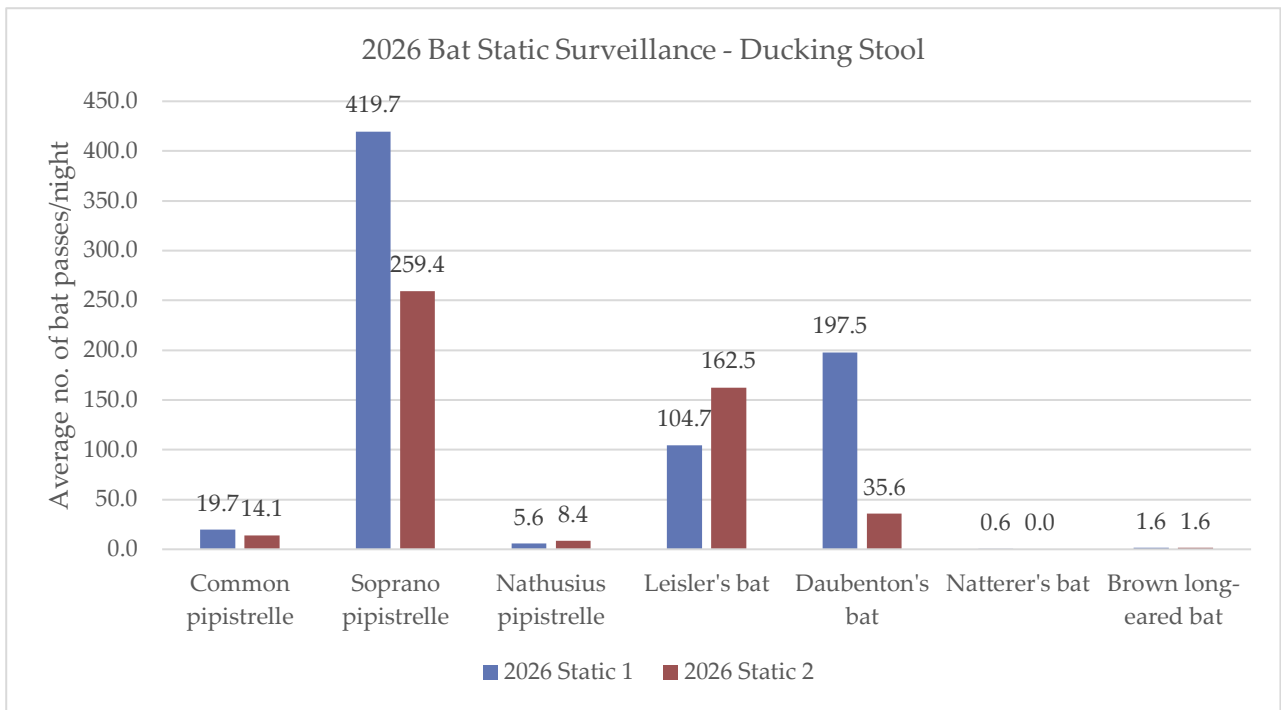


Figure 3b: Average number of bat passes for each species recorded on bat static units deployed in 2026.

3.4 Terrestrial Mammal Survey Results

3.4.1 Trail Camera Survey 2025

A total of 13 locations were surveyed by trail cameras in 2025. However, the flooding of the River Erne in September/October resulted in sporadic results and water damage to many of the trail camera units. New trail cameras were deployed for an additional period but flood waters remained high and fluctuated during the surveillance period. Therefore, this flooding is likely to have impacted on the terrestrial mammal activity (i.e. reduced activity levels) in the agricultural fields along the River Erne.

Table 3d: Habitat description of 2025 trail camera locations.

Code	ITM Easting	ITM Northing	Description of locations
TC 1	636275	817280	Opposite river bank to Ducking Stool jetty, on tree (agri field)
TC 2	636301	817265	Opposite river bank to Ducking Stool jetty, on tree (agri field)
TC 3	636282	817225	On fence in agricultural field adj. to Ducking Stool jetty
TC 4	636317	817212	On fence overlooking river surface, adj. to Ducking Stool jetty
TC 5	636297	817275	On tree in scrub area, opposite river bank to Ducking Stool jetty
TC 6	636439	817276	Opposite river bank to Ducking Stool jetty, on fence in agri field
TC 7	636271	817289	Opposite river bank to Ducking Stool jetty, on tree in wooded area
TC 8	636277	817222	On fence in agricultural field adj. to Ducking Stool jetty
TC 9	636300	817271	Opposite river bank to Ducking Stool jetty, on tree
TC 10	636332	817255	Opposite river bank to Ducking Stool jetty, on tree in wooded area
TC 11	636422	817268	Opposite river bank to Ducking Stool jetty, on tree in agri field
TC 12	636257	817232	On fence overlooking river surface, adj. to Ducking Stool jetty
TC 13	636394	817203	On tree in scrub area, opposite river bank to Ducking Stool jetty

During the first surveillance period, only two mammal species were recorded: Badger (TC 1 – 2 triggered events) and Red fox (TC 5 – 4 triggered events). No mammal activity was recorded on the other three trail cameras (TC2, TC3 and TC4).

During the second surveillance period, only two mammal species were recorded: Otter (TC 6 – 2 triggered events, TC 10 – 2 triggered events and TC 12 – one triggered event) and Red fox (TC 7 – 3 triggered events, TC 9 – one triggered event and TC 11 – 4 triggered event). An unidentified rodent was recorded on one trail camera (TC 7 – one triggered event). No mammal activity was recorded on the other two trail cameras (TC8 and TC13). The level of sightings (or triggered events) per period is low: 0.4/day and 0.5/day for Period 1 and Period 2 respectively.

Table 2b: Total number of terrestrial mammal trigger events recorded during 2025 Trail Camera Surveys.

Mammal Species	Period 1 (15 days)	Period 2 (28 days)
Red Fox	4	9
Badger	2	0
Otter	0	5
Rodent	0	1
TOTAL	6	15
No of sightings/day	0.4/day	0.5/day

3.4.2 Walkabout Surveys 2025

Otter spraints were recorded on a rock in amongst a wooded area on the opposite riverbank to Ducking Stool Jetty. A little further downstream, an area where otters entered the water (i.e. Otter slide) was recorded. A mammal activity hole in amongst scrub was visible from the water during kayaking and this is also attributed to potential access point for otter from adjacent land into the river. These three sightings are mapped below.



Plate 7: Otter spraint on rock (flooded area) - 2025.

3.5 Summary 2025

The following maps depict the location of each of the five mammal species recorded during both trail camera surveillance periods.

- Red fox was only recorded in trail cameras located on the opposite side of the River Erne in relation to Ducking Stool jetty;
- Otter was captured on three trail cameras, one located in the agricultural field adjacent to Ducking Stool jetty and the two located on the opposite side of the River Erne in relation to Ducking Stool jetty. In addition, three additional locations are considered to be due to otter activity, all three located on the opposite side of the River Erne in relation to Ducking Stool jetty;
- Badger only recorded on one trail camera located on the opposite side of the River Erne in relation to Ducking Stool jetty.



Figure 3d: Red foxes captured on trail cameras during trail camera surveillance in 2025.



Figure 3e: Otter captured on trail cameras during trail camera surveillance in 2025.



Figure 3f: Badger captured on trail camera surveillance in 2025.

3.5.1 Trail Camera Survey 2026

A total of 6 locations were surveyed by trail cameras in 2026. The primary purpose of this trail camera survey was to determine if there is Otter usage within the proposed development area. The river water levels were at a more appropriate level to allow two trail cameras to be located on the jetty structures to determine if Otter's use this part of the proposed development area. A third unit was erected on a pole along the river edge in the vegetation proposed to be removed. The remaining three units were located on the opposite side of the river to the jetty.

Table 3d: Habitat description of 2026 trail camera locations.

Code	ITM Easting	ITM Northing	Description of locations
TC 14	636334	817249	Opposite riverbank to Ducking Stool jetty, on tree (agri field)
TC 15	636295	817278	Opposite riverbank to Ducking Stool jetty, on tree (agri field)
TC 16	636317	817207	On upright structure Ducking Stool jetty
TC 17	636292	817217	On upright structure Ducking Stool jetty
TC 18	636354	817206	On pole along river edge in vegetation
TC 19	636419	817274	On fence in agricultural field adj. to Ducking Stool jetty

During the 2026 surveillance period, four mammal species were recorded: Red fox (TC 14 – 3 triggered events; TC 15 – 12 triggered events & TC F – 7 triggered events), Irish hare (TC 15 – 1 triggered event and TC 19 – one triggered event), Brown rat (TC 18 – 2 triggered events) and Otter (TC 17 – 2 triggered events).

The level of sightings (or triggered events) for this trail camera surveillance in 2026 was greater than the two trail camera surveillance periods undertaken in 2025.

Table 2b: Total number of terrestrial mammal trigger events recorded during 2026 Trail Camera Surveys.

Mammal Species	Period 1 (17 days)
Red Fox	22
Irish hare	2
Otter	2
Brown rat	2
Badger	1
Unidentified mammal	1
TOTAL	30
No of sightings/day	1.8/day

The trail camera surveillance provided evidence that Otter does enter the spaces under the jetty, however, these were brief visits and no “Resting” was recorded.



Plate 8: Otter recorded under the Jetty (TC 17).

4. Ecological Evaluation

4.1 Bat Species Recorded & Sensitivity

The BCIreland landscape favourability model indicates that the survey area has a Moderate to High importance for local bat populations.

The static surveillance was completed according to Collins (2023). The 2025 and 2026 static surveillance recorded a total of seven bat species: Daubenton's bat, brown long-eared bat, Leisler's bat, common pipistrelle, Nathusius' pipistrelle and soprano pipistrelle.

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

- Daubenton's bat and Soprano pipistrelles were the most frequently recorded bat species, particularly over the River Erne at the Ducking Stool jetty. Both bat species have a preference to feed over waterbodies.
- Leisler's bat was recorded more frequently foraging over the adjacent agricultural grassland fields. This species of bat feeds frequently over grassland grazed by cattle.
- Nathusius' pipistrelle was recorded during the static surveillance at both locations and was recorded at a higher level than common pipistrelle in 2025 (but not in 2026), the later species considered to be one of Ireland's commonest bat species. The Nathusius' pipistrelle is an uncommon bat species, but due to surveying completed by the Cavan Bat Group it has been recorded extensively in Co. Cavan. This species is associated with large waterbodies. The River Erne is part of the complex of lakes located in the county and therefore is an ideal habitat for this species. The Nathusius' Pipistrelle Working Group and Cavan Bat Group (the author is a member of both groups) have undertaken research on the distribution of this bat species in the county and as result County Cavan is proving to be a stronghold county for Nathusius' pipistrelle in the Republic of Ireland (Aughney *et al.*, 2023). This is reflected in the static surveillance results.
- Common pipistrelle, one of Ireland's commonest bat species, was recorded in low activity levels. This species of bat tends to be associated with lowland agricultural landscapes.
- The remaining two bat species recorded (Natterer's bat and brown long-eared bat) are less common bat species and this is reflected in the activity levels recorded in both static surveillance periods. These two bat species are associated with woodland and are light sensitive bat species.

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

Leisler's bat

- o Leisler's bat is an Annex IV bat species under the EU Habitats Directive. The status of this bat species is listed as Least Concern. The national Leisler's bat population is considered to be significantly increasing (Aughney *et al.*, 2021).
- o The modelled Core Area for Leisler's bats is a relatively large area that covers much of the island of Ireland (52,820km²). The Bat Conservation Ireland Irish Landscape Model indicated that the Leisler's bat habitat preference has been difficult to define in Ireland. Habitat modelling for Ireland shows an association with riparian habitats and woodlands (Roche *et al.*, 2014). The landscape model emphasised that this is a species that cannot be defined by habitats preference at a local scale compared to other Irish bat species but that it is a landscape species and has a habitat preference at a scale of 20.5km.

- The population estimates (2023 figures) indicates that population is between 112,800 and 202,300 individuals and this represents a 49.92% increase compared to 2012 population estimates (Roche & Langton, 2024).

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

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

Common pipistrelle

- Common pipistrelle is an Annex IV bat species under the EU Habitats Directive. The status of this bat species is listed as Least Concern. The national common pipistrelle population is considered to be significantly increasing (Aughney *et al.*, 2021).
- The modelled Core Area for common pipistrelle is a relatively large area that covers much of the island of Ireland (56,485km²). The Bat Conservation Ireland Irish Landscape Model indicated that the common pipistrelle selects areas with broadleaf woodland, riparian habitats and low-density urbanization (<30%) (Roche *et al.*, 2014).
- The population estimates (2023 figures) indicates that population is between 1,074,000 and 2,416,500 individuals and this represents a 75.4% increase compared to 2012 population estimates (Roche & Langton, 2024).

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

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

Soprano pipistrelle

- Soprano pipistrelle is an Annex IV bat species under the EU Habitats Directive. The status of this bat species is listed as Least Concern. The national soprano pipistrelle population is considered to be significantly increasing (Aughney *et al.*, 2021).
- The modelled Core Area for soprano pipistrelle is a relatively large area that covers much of the island of Ireland (62,020km²). The Bat Conservation Ireland Irish Landscape Model indicated that the soprano pipistrelle selects areas with broadleaf woodland, riparian habitats and low-density urbanisation (Roche *et al.*, 2014).
- The population estimates (2023 figures) indicates that population is between 1,204,800 and 2,709,600 individuals and this represents a 140.2% increase compared to 2012 population estimates (Roche & Langton, 2024).

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

- Range = Favourable
- Population = Favourable
- Habitat for species = Favourable

- Overall Assessment of Conservation Status = Favourable
- Overall trend in Conservation Status = Improving

Daubenton's Bat

- Daubenton's bat is an Annex IV bat species under the EU Habitats Directive. The status of this bat species is listed as Least Concern. The national Daubenton's bat population is considered to be stable (Aughney *et al.*, 2021).
- The modelled Core Area for Daubenton's bat is (41,285 km²) reflecting the distribution of sizeable river catchments. The Irish Landscape Model indicated that the Daubenton's bat habitat preference is for areas with broadleaf woodland, riparian habitats and low density urbanisation (Roche *et al.*, 2014).
- The population estimates (2023 figures) indicates that population is between 56,500 and 76,500 individuals and this represents a 1.24% decrease compared to 2012 population estimates (Roche & Langton, 2024).

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

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

Nathusius' pipistrelle

- Nathusius' pipistrelle is an Annex IV bat species under the EU Habitats Directive. The status of this bat species is listed as Least Concern. The national Nathusius' pipistrelle population is unknown due to a paucity of information (Aughney *et al.*, 2021).
- The modelled Core Area for Nathusius' pipistrelle is a relatively restricted area (13,543km²) and these areas are primarily associated with large water bodies such as Lough Neagh and the Lough Erne complex. The Bat Conservation Ireland Irish Landscape Model indicated that the Nathusius' pipistrelle habitat preference is large waterbodies (Roche *et al.*, 2014). But due to the paucity of information on this species, the knowledge of this species preference in Ireland is limited, any records recorded for this species is important.

Brown long-eared bat

- Brown long-eared bat is an Annex IV bat species under the EU Habitats Directive. The status of this bat species is listed as Least Concern. The national brown long-eared bat population is considered to be stable (Aughney *et al.*, 2021).
- The modelled Core Area for brown long-eared bat is a relatively large area that covers much of the island of Ireland (49,929 km²). The Bat Conservation Ireland Irish Landscape Model indicated that the brown long-eared bat habitat preference is for areas with broadleaf woodland and riparian habitats on a small scale of 0.5km emphasising the importance of local landscape features for this species (Roche *et al.*, 2014).

- The population estimates (2023 figures) indicates that population is between 65,200 and 102,000 individuals and this represents a 5.18% increase compared to 2012 population estimates (Roche & Langton, 2024).

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

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

Natterer's bat

- Natterer's bat is an Annex IV bat species under the EU Habitats Directive. The status of this bat species is listed as Least Concern.
- The modelled Core Area for Natterer's bat is a relatively large area that covers much of the island of Ireland (52,864km²). The Bat Conservation Ireland Irish Landscape Model indicated that the Natterer's bat selects areas with broadleaf woodland, riparian habitats and areas with larger scale provision of mixed forest (Roche *et al.*, 2014).

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

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

The results of the survey documents that the proposed development area is a commuting and foraging habitat for seven species of bat. The bat species recorded are all in favourable conservation status.

4.2 Mammal Species Recorded & Sensitivity

Five confirmed terrestrial mammal species were recorded during the trail camera surveys and walkabout survey: Red Fox, Badger, Irish hare, Brown rat and Otter with additional Otter evidence recorded adjacent to the survey area during the walkabout survey. The species recorded are widespread and common. Two additional records from the NBDC database are within the survey area: Pine marten and American mink.

4.2.1 Red fox

This species is common and widespread across Ireland (Looney, 2016). It is considered to be an extremely adaptable species in relation to habitat requirements generalist species and therefore found in a wide array of habitats. The Red fox form monogamous pairs to small family groups (one dog fox and several related vixens, which apart from the dominant female, do not breed). It is an omnivore with a wide-ranging diet. Some foxes are resident in an area while others are highly nomadic. The fox population is considered to be relatively stable in Ireland.

The fox digs an underground home called an earth or den for shelter during poor weather (usually under hedgerows, in rock crevices or drains) but will live above ground in good weather (Browne, 2005). Breeding usually takes place over winter with cubs born in February and April. The vixen has one litter per year and the more successful adults usually live for four years.

Irish Status	Least Concern
European Status	Least Concern
Global Status	Least Concern

Taken from Lysaght & Marnell, 2016

Fox was recorded on 5 trail cameras located. All of the activity was recorded on the opposite riverbank to where the jetty is located and therefore is associated with the agricultural grassland and linear habitats.

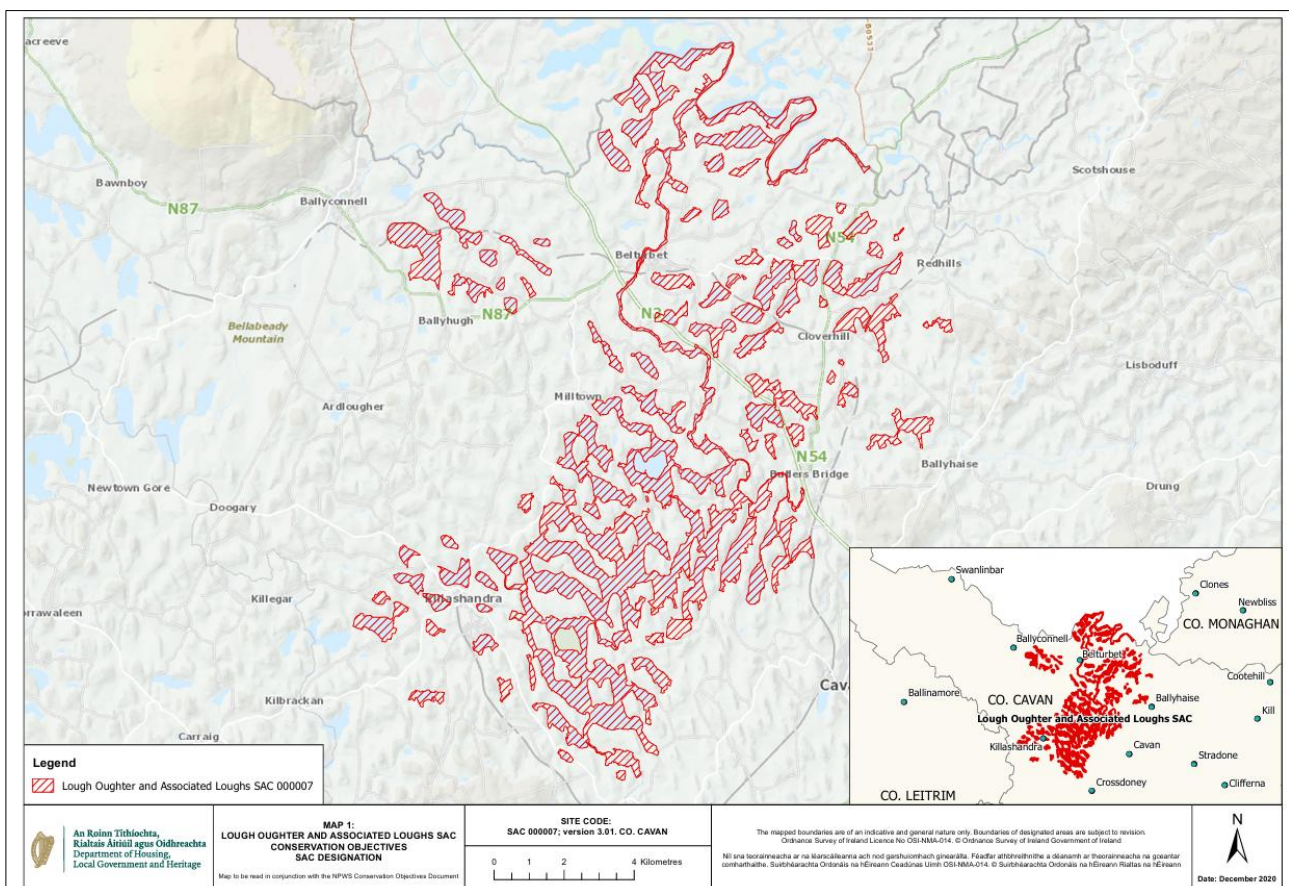
4.2.2 Otter

The Otter is a semi-aquatic carnivore and is widely distributed through Ireland from the coastal uplands and lowland midlands to offshore islands (Marnell, 2016). The population has suffered declines across Europe within some declines noted in Ireland between 1980 to 2006 due to water pollution and the use of organochlorines. But the most recent national survey indicates that a full recovery has occurred in Ireland and Ireland continues to be the stronghold population for Europe. This species is associated habitats where there is suitable aquatic prey and nearby terrestrial cover for resting. It is an opportunistic predator favouring fish and crayfish but will substitute its diet with frogs during the spring. A total of 44 Special Areas of Conservation (SAC) have been designated for this species. The main threats to the species continues to be water pollution, chemical usage and road kill (NPWS, 2019).

Irish Status	Least Concern
European Status	Least Concern
Global Status	Least Concern
Biographical Range	83,600 km ²
Population Trend	Stable
Estimated Population Size	7,218 to 10,186 breeding females

Taken from Lysaght & Marnell, 2016 & NPWS, 2019

The River Erne is part of the Lough Oughter Complex. This habitat is designated as an SAC (Lough Oughter & Associated Loughs, Site Code 000007), SPA (Site Code 004049) and pNHA (Site Code 000007). One of the qualifying interests for the SAC is Otter (Code 1355). Lough Oughter and its associated loughs occupy much of the lowland drumlin belt in north and central Cavan between Upper Lough Erne, Killeshandra and Cavan town. The site is a maze of waterways, islands, small lakes and peninsulas including some 90 inter-drumlin lakes and 14 basins in the course of the Erne River. The area lies on Silurian and Ordovician strata with Carboniferous limestone immediately surrounding.



Citation: NPWS (2021) Conservation Objectives: Lough Oughter and Associated Loughs SAC 000007. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.

The following table details the conservation objectives relating to Otter (extracted from the citation above).

Conservation Objectives for : Lough Oughter and Associated Loughs SAC [000007]

1355 Otter *Lutra lutra*

To maintain the favourable conservation condition of Otter (*Lutra lutra*) in Lough Oughter and Associated Loughs SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Percentage positive survey sites	No significant decline	Measure based on standard otter survey technique. Favourable Conservation Status (FCS) target, based on 1980/81 survey findings, is 88% in SACs. Current range is estimated at 93.6% (Reid et al., 2013)
Extent of terrestrial habitat	Hectares	No significant decline. Area mapped and calculated as 364.4ha along river banks/ lake shoreline/around ponds	No field survey. Areas mapped to include 10m terrestrial buffer, identified as critical for otters (NPWS, 2007), along rivers and around water bodies
Extent of freshwater (river) habitat	Kilometres	No significant decline. Length mapped and calculated as 71.3km	No field survey. River length calculated on the basis that otters will utilise freshwater habitats from estuary to headwaters (Chapman and Chapman, 1982)
Extent of freshwater (lake) habitat	Hectares	No significant decline. Area mapped and calculated as 1,730.6ha	No field survey. Area mapped based on evidence that otters tend to forage within 80m of the shoreline (NPWS, 2007)
Couching sites and holts	Number	No significant decline	Otters need lying up areas throughout their territory where they are secure from disturbance (Kruuk and Moorhouse, 1991; Kruuk, 2006)
Fish biomass available	Kilograms	No significant decline	Broad diet that varies locally and seasonally, but dominated by fish, in particular salmonids, eels and sticklebacks in freshwater (Bailey and Rochford, 2006; Reid et al., 2013)
Barriers to connectivity	Number	No significant increase	Otters will regularly commute across stretches of open water up to 500m e.g. between the mainland and an island; between two islands; across an estuary (De Jongh and O'Neill, 2010). It is important that such commuting routes are not obstructed

Figure 4b: Conservation objectives for Otter – Lough Oughter and Associated Loughs SAC (Site Code 000007).

Citation: Reid, N., Dingerkus, K., Stone, R., Colhoun, K., Maddox, L. & Marnell, F. (2025). Otter Survey of Ireland 2023-24. Irish Wildlife Manuals, No. 161. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland.

The above publication states - during 2023-24 Otter survey for the island of Ireland, “a total of 1,063 sites were surveyed with otters present at 65% [95%CI 62 - 68%] of sites in ROI and 66% [58 - 74%] of sites in NI. The otter remains widespread throughout Ireland yet site occupancy has likely declined since the 1980s. Most change appears to have occurred between the early 1990s and mid-2000s.

Otters were more common at flowing freshwaters than at lakes or the coast and were associated with large, fast flowing rivers, rocky substrates, unmaintained (wild) riverbanks, riparian woodland (trees and shrubs) and areas with evidence of angling (likely reflecting salmonid prey availability) but negatively associated with peatlands.

Eleven candidate pressures were identified with otters negatively associated with disturbance, notably canalisation or re-sectioning. Siltation, pollution both agricultural and domestic, and water abstraction increased in prevalence since the 1980s being more widespread now than ever. While individual pressures were local in extent, and none was judged an existential threat to otters at the national scale, it seems likely the combination of pressures on water quality and freshwater and coastal ecosystems is implicated in population decline.”

Additional points from this report:

Population

- The 2023-24 otter population was estimated at 5,774 [95% 5,005 - 6,560] adult females: 4,949 [4,362 - 5,561] in ROI and 825 [643 - 999] in NI. The population estimate declined by -27% long-term from the 1980s to 2020s (-27% in ROI, -24% in NI), with consistent declines across River Basin Districts.

Habitats

- Otter occurrence increased significantly with river width, rising from ~55% at 1-2m wide rivers to 85% in >40m wide rivers.
- It also varied with water current, being lowest (~32-43%) at static or sluggish sites and highest (~67-70%) in slow, fast, and rapid-flowing waters.
- Otters were more likely to occur at sites with rocky substrates such as boulders, cobbles, gravel but were negatively associated with peat/heathland with no effect of elevation.
- Otters were positively associated with broad-leaved woodland and bank-side trees and shrubs. They prefer wild, unmaintained riverbanks, avoiding sites with bank maintenance including vegetation trimming or cutting.

Pressure & Threats

- Otter occurrence declined significantly with site disturbance score, especially at flowing freshwaters. Occurrence was highest (71%) at undisturbed sites (score = 1) but dropped to 41% at the most disturbed sites (score = 5).
- It seems likely that otter populations have faced pressures from agriculture including habitat loss (riparian corridor loss) as well as development, and water quality degradation from siltation and pollution. Should conservation measures be deemed necessary at the local level, they should focus on protecting semi-natural habitat along riparian corridors while mitigating pollution, disturbance and development.

4.2.3 Badger

The badger is found throughout Ireland (Byrne, 2016). Numbers in the Republic of Ireland have been reduced in recent times due to culling in response to bovine TB. Badger live in setts and tend to dig such on sloping ground in well drained soils usually in woodland areas. Badger will often move between 1-2km per night but longer movements have been recorded by individuals depending on the available habitat in the local area. They live in social groups (between 2-20 animals but usually 4/5 animals) and they are omnivores and consume a wide range of plant and animals food stuffs but especially feed on earthworms and other invertebrates.

Each badger territory usually contains one main sett and a number of smaller setts. The main sett usually has about six entrances (Browne, 2005). Other useful signs of badger presence is latrines which tend to mark the boundary of their territory. In the winter, they become less active, and while they don't hibernate, they will go into torpor. Mating usually occurs in April and May and after delayed gestation, the young tend to be born in February or March. Unlike their mustelid cousins (otters, stoats, pine martens and American minks), the badger is a highly social animal, living in small groups (or clans) in burrow systems known as setts (www.vincentwildlife.ie). Each clan defends a territory, which will include a mosaic of habitat types that provide cover and foraging habitat. The Badger and Habitat Survey of Ireland (1995) found 35% of badger setts in hedgerow, 19% in scrub and 18% in woodland habitats.

Irish Status	Least Concern
European Status	Least Concern
Global Status	Least Concern

Taken from Lysaght & Marnell, 2016

Badger was recorded at one trail camera location during the survey. Two sightings were noted and this was in vicinity of agricultural grassland and linear habitat along the River Erne (opposite riverbank to the location of the jetty).

4.2.4 Flood Conditions - Otters

Holts and resting areas for otters can be difficult to locate as shown by radio tracking studies completed where only six out of 21 holts and three out of 24 couches (resting areas) were recorded by field surveys compared to radio tracking events (Woodroffe, 2007). Holts are often under trees with less developed root systems and with underwater entrances while resting areas can be a pile of sticks, brambles, river debris and depressions in banksides.

In relation to the proposed development area, while this is a small area, when the water level of the River Erne is low, the area under the jetties could provide suitable resting areas for local otter populations. As the surveillance completed for this survey was undertaken during flood water period, this area was not accessible and therefore it was not examined for signs of otter.

In addition, the small area of vegetation on the riverside of the private residence wall boundary is a thick bramble habitat which would be suitable rest refuge for otters. The kayak survey of the riverbank also recorded numerous areas of dense bramble and river debris that may also provide additional resting areas for otters.

The photograph presentation prepared by Traynor Environmental provide visual evidence of the proposed development area at low water levels of the River Erne. Under the existing jetty there are large boulders that may provide dry resting area for otters to consume prey items while the bramble vegetation may provide further resting areas. Therefore, it is important that further information on potential otter usage of the proposed development area is gathered as part of pre-construction surveys.



Plate 8: View under jetty in low water level conditions (Source: Traynor Environmental).

5. Site Evaluation & Potential Impacts

5.1 Bats

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

Construction Phase

- Disturbance due to increased lighting;
- Disturbance due to increased noise;
- Loss of foraging habitat to facilitate construction of proposed development.

Operation Phase

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

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

Daubenton's bat is a "light-sensitive" and this was recorded at a high level of bat activity within the proposed development area. Therefore, this species of bat is used to determine the potential impact of the proposed development.

The potential impact of the proposed development considers the following points:

- Small proposed development area
- No roosting sites located within the proposed development area
- Extent of foraging and commuting habitat associated with the River Erne in the Belturbet area.

The potential impacts of the proposed development, during construction and operation, is deemed to be **Negative, Not Significant** impacts in the **long-term**.

Bat mitigation measures are required to reduce the potential impacts on local bat populations, particularly in relation to proposed outdoor lighting.

5.2 Terrestrial Mammals

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

Construction Phase

- Potential pollution event during the removal of existing jetty;
- Disturbance due to increased lighting;
- Disturbance due to increased noise;
- Loss of riparian habitat to facilitate construction of proposed development (i.e. walkway).

Operation Phase

- Disturbance due to increased lighting;
- Disturbance due to increased noise;
- Potential pollution event due to boating activities.

The degree of potential impact varies depending on the terrestrial mammal species and their location relative to the proposed development. Otter, is an Annex II mammal species and a species listed as a Qualifying Interest for the Lough Oughter & Associated Loughs SAC. Therefore, this species of mammal is used to determine the potential impact of the proposed development.

The potential impact of the proposed development considers the following points:

- Small proposed development area;
- No holt sites located within the proposed development area;
- Extent of foraging and commuting habitat associated with the River Erne in the Belturbet area.

The potential impacts of the proposed development, during construction, is deemed to be **Negative, Slight Significant** impacts in the **short-term (20 weeks of construction, 4 weeks in the watercourse)**. The potential impacts of the operation of proposed development is deemed to be **Negative, Slight Significant** impacts in the **long-term**.

Since Otter sightings were less during the 2023/24 All Ireland survey compared to the previous national survey, it is important that piecemeal loss of riparian vegetation is taken seriously and where possible, not undertaken. There is an existing pathway that connects the existing jetty area to the proposed section of the development on the opposite side of the residence located adjacent to the proposed development. Therefore, it is considered to be unnecessary to construct another walkway that will decrease riparian vegetation and increase human activity along the riverbank. It is evident from the survey results that most of the mammal activity recorded is located on the opposite side of the river and this maybe due to reduced human activity on that side of the river compared to the location of the existing jetty. Therefore, retaining as much riparian vegetation as possible is important to ensure that there are wild areas remaining along the riverbank, especially on the bankside of the proposed development.

With reference to the map prepared by Traynor Environmental present below, the area highlight in green is of concern with respect to otters. It is recommended that this area is not developed as a walkway to retain this small section of riparian vegetation and leave "wild". While the walkway development is proposed, riparian vegetation will be retained.



Figure 5: Area highlighted in green represents an area of riparian vegetation within the proposed development site.

Table 4a: Potential impacts of the proposed development on local Otter populations.

Pressure or Threat	Likely Impact
Removal of riparian vegetation	Destruction and degradation of riparian corridor vegetation (i.e. shrubs) which will result in decrease of wild areas needed as refuges for mammals.
Mixed source pollution to surface waters due removal of existing jetty	Negative impact on water quality.
Mixed source pollution to surface waters due to boating activity	Negative impact on water quality.
Installation of outdoor public lighting	Otters are nocturnal mammals and increase of public lighting has a negative impact and prevent such mammals feeding in lit up areas.

Terrestrial mammal mitigation measures are required to reduce the potential impacts on local populations.

Note: In consultation with Traynor Environmental and Cavan Co. Co., it has been agreed that riparian vegetation along the proposed walkway (highlighted in green in Figure 5) will not be removed. In addition, it has been agreed that no lighting will be erected along this walkway by Cavan Co. Co.

6. Conservation & Mitigation Measures

6.1 Bats

The static surveillance recorded a total of seven bat species: Daubenton's bat, brown long-eared bat, Leisler's bat, common pipistrelle, Nathusius' pipistrelle and soprano pipistrelle. In particular, a high level of Daubenton's bat activity was recorded and this bat species is a water specialist and light sensitive bat species.

6.1.1 Outdoor Lighting

Bats are light sensitive bats species, hence their nocturnal activities and where possible, no lighting is the Best Practice to prevent an impact on nocturnal wildlife as lighting is a barrier to movement and therefore impacts on feeding, commuting and potentially roosting. Therefore, no lighting is permitted within 25m of the River Erne.

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

- No lighting will be erected within 25m of the River Erne.
- Lighting associated with the car park must meet the guidelines below to reduce the impact on local bat populations.
- Consideration of a Smart Lighting System where lighting only comes when human activity is detected in the car park, thereby reducing unnecessary lighting particularly during the later hours of the night when there is little or no human activity.
- Any lighting erected must not be directed towards the Rier Erne but positioned in a manner that the luminaire is directed away from the river (with back shields to prevent lighting spill behind the luminaire).

Where lighting is deemed necessary, the following are required:

- All luminaires should lack UV elements when manufactured. Metal halide, compact fluorescent sources should not be used.
- LED luminaires should be used where possible due to their sharp-cut-off, lower intensity, good colour rendition and dimming capability,
- A warm white light source (2700 Kelvin or lower) should be adopted to reduce blue light component of luminaires. A 2200 - 2700 Kelvin luminaire appears as a warm yellow due to the reduction in the stark blue light associated with higher Kelvin values (e.g. 4000 Kelvins). The "warmer" the light, the less of an impact on nocturnal wildlife. The progression of LED technology means that the majority of luminaires are available at 2700 Kelvins and 2200. Therefore, it is recommended that such luminaires (i.e. 2200 Kelvin) are standard for "biodiversity areas". The lower the Kelvin level the more Yellow the light appears.
- Light sources should feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats.
- Internal luminaires, in relation to buildings within the proposed development area, can be recessed (as opposed to using a pendant fitting) where installed in proximity to windows to reduce glare and light spill.

- Waymarking inground markers (low output with cowls or similar to minimised upward light spill) to delineate path edges, if required, for pedestrian zones within the proposed development area should be used.
- Column heights should be carefully considered to minimise light spill and glare visibility. This should be balanced with the potential for increased numbers of columns and upward light reflectance as with bollards.
- Only luminaires with a negligible or zero Upward Light Ratio, and with good optical control, should be considered.
- Luminaires should always be mounted horizontally, with no light output above 90° and/or no upward tilt.
- Where appropriate, external security light should be set on motion sensors and set to as short a possible a timer as the risk assessment will allow (e.g. 1-2 minute timer).
- Only if all other options have been explored, accessories such as baffles, hoods or louvers can be used to reduce light spill and direct it only to where it is needed.

Any external lighting for the proposed development should strictly follow the above guidelines and these should be strictly implemented during construction and operation phase of the proposed development. It is also recommended that this system is motion sensor to ensure that it is off when there is no human activity in vicinity of the proposed development site.

If lighting is deemed necessary, then the final lighting design is required to be review and signed off by a bat specialist.

6.1.2 Vegetation Removal

It is recommended that vegetation removal is not undertaken along the River Erne. This is primarily a measure required for local Otter populations but will benefit local bat populations too (See Figure 5 for location of riparian vegetation to be retained).

6.1.3 Walkway Development

It is recommended that this element of the proposed development is not undertaken as it will result in the removal of exiting vegetation (Figure 5), increase human activity along the riverbank and may result in the request for public outdoor lighting along the riverbank.

6.1.4 Construction Environmental Management Plan

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

The strict implementation of the mitigation measures will reduce the potential impacts of the proposed development to **Negative, Not Significant** impacts in the **short-term (20 weeks of construction, 4 weeks in the watercourse)**. The potential impacts of the operation of proposed development is deemed to be **Negative, Not Significant** impacts in the **long-term**.

6.2 Terrestrial Mammals

Five confirmed terrestrial mammal species were recorded during the trail camera surveys and walkabout survey: Red Fox, Badger, Irish hare, Brown rat and Otter with additional Otter evidence recorded adjacent to the survey area during the walkabout survey. The species recorded are widespread and common. Two additional records from the NBDC database are within the survey area: Pine marten and American mink.

The following table is the principal likely impacts of the proposed development on local otter populations and the recommended conservation measures.

Table 4b: Potential impacts of the proposed development on local Otter populations and Conservation Measures recommended.

Pressure or Threat	Likely Impact	Conservation Measure
Walkway along river (Green highlighted area in Figure 5)	Potential degradation of riparian corridor vegetation (i.e. shrubs) which will result in decrease of wild areas needed as refuges for mammals.	Protect riparian vegetation during proposed works and retain riparian vegetation post works.
Mixed source pollution to surface waters due removal of existing jetty	Negative impact on water quality.	Reduce the impact of mixed source pollution.
Mixed source pollution to surface waters due to boating activity	Negative impact on water quality.	Reduce the impact of mixed source pollution.
Installation of outdoor public lighting	Otters are nocturnal mammals and increase of public lighting has a negative impact and prevent such mammals feeding in lit up areas.	Do not install lighting within 25m of the River Erne. This provides an additional reason to not create a new walkway along the riverbank and therefore reduce the potential call for public lighting to light up the walkway. Do not install lighting along proposed walkway.

Mitigation measures are required to be put in place to reduce these potential impacts.

6.2.1 Operational Phase

It is deemed that works directly relating to the River Erne will take 4 weeks while the entire project will take 20 weeks to complete. This is provisionally planned for 2027.

6.2.1.1 Working Near Watercourses

To minimise the potential negative impact of the proposed works on the River Erne the following is required:

- It is important to minimise the footprint of the construction activity adjacent to the river.
- The natural path of water flow will not be blocked.
- Works within and adjacent to the waterbody will be undertaken during low flow periods and suspended during periods of heavy rain (i.e. greater than 10mm/hour or greater than 25mm in a 24-hour period)
- In-stream works will not be carried out in water bodies frequented by salmon or trout during the Annual Close Season, or as otherwise agreed with IFI. The duration of the season varies regionally within the period from the beginning of October to the end of February. The timing of works will be considered on a site-specific basis and in agreement with the IFI, because some rivers have late spawning salmonids.
- All construction machinery operating in-stream will be mechanically sound to avoid leaks of oils, hydraulic fluid, etc. Machinery will be cleaned and checked prior to commencement of in-stream works.
- A sediment mat/silt trap or similar will be located immediately downstream of the works. These will be inspected daily, maintained and cleaned regularly during the course of site works. Diversion of water to and from a temporary diversion channel will only take place during the period March to September or as agreed with the IFI.
- Stock piling of waste material (e.g. timber boards of existing jetty) is not permitted within 25m of the river and removal of such should be undertaken as quickly as possible. Any potential run-off from stock piling should be directed to existing drainage system and not permitted to flow into the River Erne. Bunds or another form of diversion will be provided to keep run-off from entering the stockpile area.

6.2.1.2 Pollution Events

Accidental spillages and releases could lead to a serious pollution incident. To reduce the likelihood of occurrence and the likely impact should such an incident occur; the following measures will be implemented:

- A detailed method statement including pollution prevention measures will be prepared prior to commencement of works. All subcontractors and staff will be made aware of its contents and their responsibilities
- Pollution control measures will be included in all method statements, and all staff will be made aware of their contents and their responsibilities
- Staff will be trained in the implementation of the Incident Response Plan and the use of any spill control equipment as necessary. A training log will be maintained and updated regularly
- In the event of an accidental spill, procedures and contingency plans will be in place at each work site to address cleaning up small spillages as well as dealing with an emergency incident
- In the unlikely event of a hydrocarbon spillage, contaminated spill clean-up material will be properly disposed of to an authorised waste contractor
- Spill kits will be provided at high risk and/or sensitive sites

- Safe handling and legal disposal of contaminated materials and wastes resulting from an incident will be clearly defined
- A reporting procedure will be in place for recording pollution incidents for review and future actions for prevention, mitigation and training prior to commencement of construction.

Therefore, a comprehensive Construction Environmental Management Plan (CEMP) is recommended to reduce potential pollution from any proposed work.

6.2.2 Mammal Friendly Zones

The operation of the survey area will increase human activity within the area (e.g. noise and lighting). To reduce impact on local mammal populations the following is recommended:

- Dark zones: areas where there is no lighting especially along the bank of the River Erne within the proposed development area. This zone needs to be continuous so that there is no light within the mammal friendly zones to reduce mammal trespass.
- Physical barriers: fencing is not recommended as it limits mammal movement and cause undue stress if individuals wander into the proposed development area and there is no breaks in barriers for such individuals to leave unharmed. Therefore, any plans for fencing needs to be carefully considered and where there is fencing etc., access points within the boundary fencing is required to be inserted at strategic points (e.g. along known mammal trials) and of a size to permit large mammals such as badgers and foxes to safely traverse through the mammal friendly zones. It is important to ensure that terrestrial mammals can freely move in the landscape without being trapped along barriers/boundary fences.

6.2.3 Lighting

Mammals in Ireland are primarily nocturnal and therefore increasing lighting will reduce the favourability of the survey area for local mammal populations. Therefore, it is recommended that no lighting is installed adjacent to the River Erne (25m buffer).

Any lighting proposed for the car park should be low level LED lighting with directional luminaires to reduce light spillage. The proposed lighting plan should be designed to be wildlife friendly (e.g. 2200 Kelvin) and it should meet the BCT (2023) guidelines in relation to bats. If it does, then it will be suitable for other nocturnal mammals.

Consultation should be undertaken with the lighting design team to ensure that the proposed lighting has a minimum impact on local bat populations which in return will benefit other nocturnal mammals.

6.2.4 Vegetation Removal

It is recommended that vegetation removal is not undertaken along the River Erne. This is primarily a measure required for local Otter populations but will benefit other local mammal populations too. It is recommended that the vegetation existing along the River Erne and boundary with the existing residence is allowed to remain wild. Landscaping on either side of this area could be undertaken to buffer this area from management. Any landscape planting should be native (locally sourced) and deciduous tree (e.g. Rowan, Crab apple and Irish cherry – all small native trees that provide berries for local bird populations) and shrub species (Hawthorn, holly and blackthorn).

6.2.5 Walkway Development

It is recommended that this element of the proposed development is not undertaken as it will result in the removal of existing vegetation (Figure 5), increase human activity along the riverbank and may result in the call for public outdoor lighting along the riverbank.

6.2.6 Pre-Construction Surveillance

The 2026 trail camera surveillance is sufficient as a pre-construction survey. No holts or resting areas were identified. The 2026 trail camera surveillance provided evidence that Otter does enter the spaces under the jetty, however, these were brief visits and no “Resting” was recorded. However, to err on the side of caution, a NPWS Derogation Licence is applied for to permit the proposed works. The mitigation measures in relation to the proposed works described in Section 6.2.1 will be implemented strictly and access will be provided under the jetty post works (Section 6.2.7).

6.2.7 Access Post Works

It is important that once the works are completed that there is access for Otters to use the rock area under the jetties. Therefore, no obstacles should be constructed as part of the proposed development. This is required to retain the area previously used by Otters (2026 trail camera surveillance).

The strict implementation of the mitigation measures will reduce the potential impacts of the proposed development.

7. Survey Conclusions

The static surveillance recorded a total of seven bat species: Daubenton's bat, brown long-eared bat, Leisler's bat, common pipistrelle, Nathusius' pipistrelle and soprano pipistrelle.

Five confirmed terrestrial mammal species were recorded during the trail camera surveys and walkabout survey: Red Fox, Badger, Irish hare, Brown rat and Otter with additional Otter evidence recorded adjacent to the survey area during the walkabout survey. The species recorded are widespread and common. Two additional records from the NBDC database are within the survey area: Pine marten and American mink.

While the proposed development site is a small area, the proposed works include a development of a walkway along the River Erne, which will result in the potential removal of existing riparian vegetation and potential installation of outdoor lighting. As a result, it was recommended that this element is not undertaken, and this has been agreed to. In addition, no lighting is permitted along this walking to reduce impact on nocturnal wildlife. Restriction to lighting is also required in relation to a 25m dark zone along the River Erne and any public lighting outside this dark zone is required to meet the bat friendly lighting specifications.

Additional mitigation and conservation measures are also recommended to reduce potential negative impact of the proposed development on local bat and terrestrial mammal populations. Preconstruction mammal surveys was required to determine mammal activity at a time when the River Erne is not in flood and this was undertaken in 2026. The 2026 trail camera surveillance provided evidence that Otter does enter the spaces under the jetty, however, these were brief visits and no "Resting" was recorded. However, to err on the side of caution, a NPWS Derogation Licence is applied for to permit the proposed works. The mitigation measures in relation to the proposed works described will be implemented strictly and access will be provided under the jetty post works.

8. Bibliography

Bats

Abbott, I. M., Butler, F. And Harrison, S. (2012) When flyways meet highways – the relative permeability of different motorway crossing sites to functionality diverse bat species. *Landscape and Urban Planning* 106 (4): 293-302.

Abbott, I. M., Berthiessen, A., Stone, E., Booman, M., Melber, M. and Altringham, J. (2015) Bats and Roads, Chapter 5, pp/ 290-299. In: *Handbook of Road Ecology*. Editors: R. Van der Ree., D. J. Smidt and C. Grilo. Wiley Blackwell.

Altringham, J. D. (2013) *British Bats*. Collins New Naturalist Library, Volume 93. Haper Collins, London.

Altringham, J. And Kerth, G. (2016) Bats and Roads, Chapter 3. In: *Bats in the Anthropocene: Conservation of Bats in a Changing World*. Editors: C. C. Voigt and T. Kingston. Springer Open.

Aughney, T., Roche, N., & Langton, S (2018) The Irish Bat Monitoring Programme 2015-2017. *Irish Wildlife Manuals*, No. 103. National Parks and Wildlife Service, Department of Cultural heritage and the Gaeltacht, Ireland.

Aughney, T., Roche, N. and Langton, S. (2022) Irish Bat Monitoring Programme 2018-2021. *Irish Wildlife Manuals*, No. 137. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland.

Barratt, E. M., Deauville, R., Burland, T. M., Bruford, M. W., Jones, G., Racey, P. A., & Wayne, R. K. (1997). DNA answers the call of pipistrelle bat species. *Nature* 387: 138 - 139.

Bat Conservation Ireland (2015) BATLAS 2020 Pilot Project 2015: Volunteer Survey Manual. Version 01. www.batconservationireland.org.

Bat Conservation Trust (2018) Bats and artificial lighting in the UK: bats and the built environment series. Guidance Note 08/2019. BCT, London.

Bat Conservation Trust (2023) Bats and artificial lighting at night. Guidance Note GN08/23. BCT, London & Institution of Lighting Professionals (ILP), Warwickshire.

Bharrdwaj, M., Soaner, K., Straka, T., Lahoz-Monfort, J., Lumsden, L. F. and van der Ree, R. (2017) Differential use of highway underpasses by bats. *Biological Conservation* 212: 22-28.

Billington, G. E. & Norman, G. M. (1997). A report on the survey and conservation of bat roosts in bridges in Cumbria, Kendal. *English Nature*.

Bontadina, F., Schofield, H., Naef-Daenzer, B., 2002. Radio-tracking reveals that lesser horseshoe bats (*Rhinolophus hipposideros*) forage in woodland. *J. Zool.* 258, 281–290.

Boughey, K.L., Lake, I.R., Haysom, K.A., Dolman, P.M., 2011. Effects of landscape scale broadleaved woodland configuration and extent on roost location for six bat species across the UK. *Biol. Cons.* 144, 2300–2310.

BTHK (2018) *Bat Roosts in Trees – A Guide to Identification and Assessment for Tree-Care and Ecology Professionals*. Exeter: Pelagic Publishing.

CIEEM (2016) *Guidelines for Ecological impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal (2nd Edition)*. CIEEM, Winchester.

Collins, J. (ed.) (2016) *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd Edition)*. The Bat Conservation Trust, London.

Collins, J.H., Ross, A.J., Ferguson, J.A., Williams, C.D. & Langton, S.D. (2022) The implementation and effectiveness of bat roost mitigation and compensation measures for *Pipistrellus* and *Myotis* spp. and brown long-eared bat (*Plecotus auritus*) included in building development projects completed between 2006 and 2014 in England and Wales. *Conservation Evidence*: 17, 19-26.

Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) 1982.

Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) 1979.

Dietz, C., Helversen, O. and Dietmar, N. (2011) *Bats of Britain, Europe & Northwest Africa*. A&C Black, London.

Downs, N.C., Beaton, V., Guest, J., Polanski, J., Robinson, S.L. and Racey, P.A. (2003) The effects of illuminating the roost entrance on the emergence behaviour of *Pipistrellus pygmaeus*. *Biological Conservation* 111, p. 247-252.

EC Directive on The Conservation of Natural habitats and of Wild Fauna and Flora (Habitats Directive) 1992.

Eisenbeis G and Hassel F. (2000). Zur Anziehung nachtaktiver Insekten durch Straßenlaternen – eine Studie kommunaler Beleuchtungseinrichtungen in der Agrarlandschaft Reinheßens Attraction of nocturnal insects to street lights – a study of municipal lighting systems in a rural area of Rheinhessen (Germany)]. *Natur und Landschaft* 75: 145–56.

EPA (2022) Guidelines on the information to be contained in Environmental Impact Assessment Reports. EPA, Ireland.

Fialas, P. & Roche N. (2025). Using Species Distribution Models to Identify Potential New Roosting Sites of the Lesser Horseshoe Bat in Ireland. *Bat Conservation Ireland*, Dublin, Ireland.

Frank K.D. (1988). Impact of outdoor lighting on moths: an assessment. *J Lepidop Soc* 42: 63–93.

Gunnell, K., Grant, G. and Williams, C (2012) *Landscape and urban design for bats and biodiversity*. The Bat Conservation Trust, London.

Hanski, I. (1998) Metapopulation Dynamics. *Nature*, 396, 41-49.

Holker, F., Wolter, C., Perkin, E.K. & Tockner, K. (2010). Light pollution as a biodiversity threat. *Trends Ecol. Evol.* 25, 681–682. <https://doi.org/10.1016/j.tree.2010.09.007>.

Hundt, L. (2012) *Bat Surveys: Good Practice Guidelines* (2nd Edition). The Bat Conservation Trust, London.

Kelleher, C. & Marnell, F. (2006) *Bat Mitigation Guidelines for Ireland*. Irish Wildlife Manuals, No. 25. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

Kolligs D. 2000. Ökologische Auswirkungen künstlicher Lichtquellen auf nachtaktive Insekten, insbesondere Schmetterlinge (Lepidoptera) [Ecological effects of artificial light sources on nocturnally active insects, in particular on moths (Lepidoptera)]. *Faunistisch-Ökologische Mitteilungen Suppl* 28: 1–136.

Lintott P. & Mathews F. (2018) *Reviewing the evidence on mitigation strategies for bats in buildings: informing best-practice for policy makers and practitioners*. CIEEM Commissioned Report

Longcore T. and Rich C. (2004). Ecological light pollution. *Frontiers in Ecology and Environment*. 2: 191-198.

Lundy, M.G., Montgomery, I.W., Roche, N. & Aughney, T. (2011). *Landscape Conservation for Irish Bats & Species Specific Roosting Characteristics* (Unpublished). Bat Conservation Ireland, Cavan, Ireland.

Lysaght, L. and Marnell, F. (eds) (2016) *Atlas of Mammals in Ireland 2010-2015*, National Biodiversity Data Centre, Waterford.

- Marnell, F., Kingston, N. & Looney, D. (2009) *Ireland Red List No. 3: Terrestrial Mammals*, National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.
- Marnell, F., Looney, D. & Lawton, C. (2019) Ireland Red List No. 12: Terrestrial Mammals. National Parks and Wildlife Service, Department of the Culture, Heritage and the Gaeltacht, Dublin, Ireland.
- 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.
- Martín, B.; Pérez, H.; Ferrer, M. Light-Emitting Diodes (LED): A Promising Street Light System to Reduce the Attraction to Light of Insects. *Diversity* **2021**, *13*, 89. <https://doi.org/10.3390/d13020089>.
- Mathews, F., Roche, N., Aughney, T., Jones, N.M. Day, J., Baker, J. and Langton, S. (2015) Barriers and benefits: implications of artificial night-lighting for the distribution of common bats in Britain and Ireland. *Philosophical Transactions of the Royal Society of London B* 370 (1667), doi: 10.1098/rstb.2014.0124.
- 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. McAney, K. (2014). An overview of *Rhinolophus hipposideros* in Ireland (1994-2014). *Vespertilio* **17**, 115–125.
- McAney, K., O'Mahony, C., Kelleher, C., Taylor, A. & Biggane, S. (2013). *The Lesser Horseshoe Bat in Ireland: Surveys by The Vincent Wildlife Trust*. Belfast, Northern Ireland: Irish Naturalists' Journal.
- McAney, K. (2016) Lesser horseshoe bat (*Rhinolophus hipposideros*). Pp 71-72. In Lysaght, L. & Marnell, F. (Eds) (2016) *Atlas of Mammals in Ireland 2010-2015*, National Biodiversity Data Centre, Waterford.
- Mullen, E. (2007). Brandt's Bat *Myotis brandtii* in Co. Wicklow. Irish Naturalists' Journal 28: 343.
- Norberg U.M. and Rayner J.M.V. (1987). Ecological morphology and flight in bats (Mammalia; Chiroptera): wing adaptations, flight performance, foraging strategy and echolocation. *Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences*. **316**: 335-427.
- NPWS (2018) Conservation objectives supporting document – lesser horseshoe bat (*Rhinolophus hipposideros*) Version 1. Conservation Objectives Supporting Document Series. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland
- O'Sullivan, P. (1994). *Bats in Ireland*. Special supplement to the Irish Naturalists' Journal.
- Rich, C. & Longcore, T. (eds). 2006 Ecological consequences of artificial night lighting. Washington, DC: Island Press
- Richardson, P. (2000). *Distribution atlas of bats in Britain and Ireland 1980 - 1999*. The Bat Conservation Trust, London, UK.
- Roche, N., Aughney, T. & Langton, S. (2015). *Lesser Horseshoe Bat: population trends and status of its roosting resource* (No. 85). , Irish Wildlife Manuals. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.
- Roche, N., Langton, S. & Aughney, T. (2012). *Lesser Horseshoe Bat: Population, Trends and Threats 1986 to 2012* (Unpublished). Bat Conservation Ireland, Cavan, Ireland.
- Roche, N., Aughney, T., Marnell, F. & Lundy, M. (2014). *Irish Bats in the 21st Century*. Bat Conservation Ireland, Cavan, Ireland.
- Roche, N. & Langton, S. (2024) Population estimates, trends and background information for six Irish bat species. Article 17 reporting 2018-2023: Supporting document. Unpublished report to National Parks & Wildlife Service.

- Roche, N. (2024) Lesser horseshoe bat population estimate 2024. Unpublished report to National Parks & Wildlife Service, Dublin.
https://www.npws.ie/sites/default/files/publications/pdf/LHB_PopulationEstimate_2024.pdf
- Roche, N., Clarke, D., Healy, K., & Langton, S. (2026) Irish Bat Monitoring Schemes: Annual Report for 2025.
www.batconservationireland.org.
- Rowse EG, Harris S, Jones G. 2018 Effects of dimming light-emitting diode street lights on light-opportunistic and light-averse bats in suburban habitats. *R.Soc. open sci.* **5**: 180205. <http://dx.doi.org/10.1098/rsos.180205>
- Rush, T., Billington, G. (2014). Galway bat radio-tracking project. Radio tracking studies of lesser horseshoe and vesper bat species, August and September 2014. Greena Ecological Consultancy. Witham Friary, 2014.
- Rush, T., Billington, G. (2015). Galway bat radio-tracking project. Radio tracking studies of lesser horseshoe bat species, May 2015. Greena Ecological Consultancy. Witham Friary, Frome 2015.
- Russ, J. (2012) British Bat Calls: A guide to species identification. Pelagic Publishing, Exeter.
- Russo, D., Cistrone, L., Libralato, N., Korine, C., Jones, G. & Ancillotto, L. (2017). Adverse effects of artificial illumination on bat drinking activity. *Anim. Conserv.* **20**, 492–501. <https://doi.org/10.1111/acv.12340>.
- Rydell J. (1992). Exploitation of insects around streetlamps by bats in Sweden. *Functional Ecology* **6**: 744-750.
- Rydell J. (2006). Bats and their insect prey at streetlights. In C. Rich and T. Longcore (eds.) *Ecological Consequences of Artificial Night Lighting*. 43-60.
- Rydell J. and Racey P.A. (1995). Street lamps and the feeding ecology of insectivorous bats. In P.A. Racey and S.M. Swift (eds.) *Ecology, evolution and behaviour of bats. Symposia of the Zoological Society of London*. **67** pp 291-307. Clarendon Press, Oxford.
- Schofield, H. (2008). *The Lesser Horseshoe Bat Conservation Handbook*. Herefordshire, England: The Vincent Wildlife Trust.
- Speakman, J.R. (1991) Why do insectivorous bats in Britain not fly in daylight more frequently? *Funct. Ecol.* **5**, 518–524.
- Stebbins, R. E. & Walsh, S. T. (1991) *Bat Boxes: A guide to the history, function, construction and use in the conservation of bats*. The Bat Conservation Trust, 1991.
- Stone, E., Jones, G. and Harris, S. (2009). Street lighting disturbs commuting bats. *Current Biology*, **19**: 1123-1127.
- Stone, E. L., Jones, G., and Harris, S. (2012). Conserving energy at a cost to biodiversity? Impacts of LED lighting on bats. *Global Change Biology* **18**, 2458–2465. doi:10.1111/j.1365-2486.2012.02705.x
- Stone EL, Harris S, Jones G. 2015 Impacts of artificial lighting on bats: a review of challenges and solutions. *Mammal. Biol.* **80**, 213–219. (doi:10.1016/j.mambio.2015.02.004)
- Svensson A.M. and Rydell J. (1998). Mercury vapour lamps interfere with bat defence of tympanate moths (*Operophtera* spp.; Geometridae). *Animal Behaviour* **55**: 223-226.
- Voigt C.C., Azam, C., Dekker, J., Feguson, J., Fritze, M., Gazaryan, S., Holker, F., Jones, G., Leader, N., Limpens, H.J.G.A., Mathews, F., Rydell, J., Schofield, H., Spoelstra, K., Zagmajster, M. (2018) Guidelines for consideration of bats in lighting projects. EUORBATS Publication Series No. 8. UNEP/EUROBATS Secretariat, Bonn.

Wakefield, A., Broyles, M., Stone, E.L., Jones, G. & Harris, S. (2016). Experimentally comparing the attractiveness of domestic lights to insects: Do LEDs attract fewer insects than conventional light types? *Ecol. Evol.* 6, 8028–8036. <https://doi.org/10.1002/ece3.2527>.

Whilde, A. (1993). *Threatened mammals, birds, amphibians and fish in Ireland. Irish Red Data Book 2: Vertebrates*. Belfast: HMSO.

Wildlife Act 1976 and Wildlife [Amendment] Act 2000. Government of Ireland.

Wilson, R., Wakefield, A., Roberts, N. and Jones, G. (2021) Artificial light and biting flies: the parallel development of attractive light traps and unattractive domestic lights. *Parasite & Vectors*. <https://doi.org/10.1186/s13071-020-04530-3>.

Zeale, M.R.K., Stone, E.L., Zeale, E., Browne, W.J., Harris, S. & Jones, G. (2018). Experimentally manipulating light spectra reveals the importance of dark corridors for commuting bats. *Glob. Chang. Biol.* 24, 5909–5918. <https://doi.org/10.1111/gcb.14462>.

Mammals

Browne, J. (2005) Ireland's mammals. Browne Books, Co. Kildare.

Butler, F. (2016) Brown rat *Rattus norvegicus*. In Lysaght, L. and Marnell, F. (eds) (2016) *Atlas of Mammals of Ireland 2010-2015*. National Biodiversity Data Centre, Waterford.

Byrne, A. (2016) Badger *Meles meles*. Pp. 95-96. In Lysaght, L. and Marnell, F. (eds) (2016) *Atlas of Mammals of Ireland 2010-2015*. National Biodiversity Data Centre, Waterford.

CIEEM (2016) Guidelines for Ecological impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal (2nd Edition). CIEEM, Winchester.

Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) 1982.

Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) 1979.

Couzens, D., Swash, A., Still, R. and Dunn, J. (2021) Britain's mammals: a field guide to the mammals of Great Britain and Ireland. Princeton Printing Press.

EC Directive on The Conservation of Natural habitats and of Wild Fauna and Flora (Habitats Directive) 1992.

Looney, D. (2016) Red fox *Vulpes vulpes*. Pp. 91-92. In Lysaght, L. and Marnell, F. (eds) (2016) *Atlas of Mammals of Ireland 2010-2015*. National Biodiversity Data Centre, Waterford.

Lysaght, L. and Marnell, F. (eds) (2016) *Atlas of Mammals in Ireland 2010-2015*, National Biodiversity Data Centre, Waterford.

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

Marnell, F., Kingston, N. & Looney, D. (2009) *Ireland Red List No. 3: Terrestrial Mammals*, National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.

Marnell, F. (2016) Otter *Lutra lutra*. Pp. 97-98. In Lysaght, L. and Marnell, F. (eds) (2016) *Atlas of Mammals of Ireland 2010-2015*. National Biodiversity Data Centre, Waterford.

Montgomery, I. (2016) Wood mouse *Apodemus sylvaticus*. Pp. 45-46. In Lysaght, L. and Marnell, F. (eds) (2016) *Atlas of Mammals of Ireland 2010-2015*. National Biodiversity Data Centre, Waterford.

O'Mahony, D. (2016) Pine marten *Maters martes*. Pp. 99-100. In Lysaght, L. and Marnell, F. (eds) (2016) *Atlas of Mammals of Ireland 2010-2015*. National Biodiversity Data Centre, Waterford.

- Sargent, G. and Morris, Pat. (2003) How to find and identify mammals. The Mammal Society, Sommerset.
- Sleeman, P. (2016) Irish Stoat *Mustela erminea hibernica*. Pp. 101-102. In Lysaght, L. and Marnell, F. (eds) (2016) *Atlas of Mammals of Ireland 2010-2015*. National Biodiversity Data Centre, Waterford.
- Smal, C. (1995) *The Badger and Habitat Survey of Ireland*. National Parks and Wildlife Service, Office of Public Works, Dublin.
- Whilde, A. (1993). *Threatened mammals, birds, amphibians and fish in Ireland. Irish Red Data Book 2: Vertebrates*. Belfast: HMSO.

9. Appendices

9.1 Appendix 1 Trail Camera Results

Table 1: 2025 Trail Camera Results

	TC 1 (Camera 3)		ITM 636275,817280
No.	Date	Time	Mammal Species
1	29/09/2005	08:44	Badger
2	30/09/2025	00:46	Badger

	TC 2 (Camera 6)		ITM 636301,817265
No.	Date	Time	Mammal Species
1	No triggered events		
	TC 3 (Camera C)		ITM 636282,817225
No.	Date	Time	Mammal Species
1	No triggered events		
	TC 4 (Camera E)		ITM 636317,817212
No.	Date	Time	Mammal Species
1	No triggered events		

	TC 5 (Camera U)		ITM 636297,817275
No.	Date	Time	Mammal Species
1	02/10/2025	00:42	Red fox
2	02/10/2025	01:22	Red fox
3	02/10/2025	05:06	Red fox
4	06/10/2025	00:59	Red fox

	TC 6 (Camera P)		ITM 636439,817280
No.	Date	Time	Mammal Species
1	28/10/2025	20:59	Otter
2	07/11/2025	21:39	Otter

	TC 7 (Camera N)		ITM 636271,817276
No.	Date	Time	Mammal Species
1	29/10/2025	02:15	Red fox
2	29/10/2025	02:21	Red fox
3	29/10/2025	04:07	Red fox
4	02/11/2025	04:15	Rodent

	TC 8 (Camera G)		ITM 636277,817222
No.	Date	Time	Mammal Species
1	No triggered events		
	TC 9 (Camera H)		ITM 636300,817271
No.	Date	Time	Mammal Species
1	30/10/2025	21:13	Red fox

	TC 10 (Camera I)		ITM 636332,817255
No.	Date	Time	Mammal Species
1	03/11/2025	00:24	Red fox
2	12/11/2025	00:50	Otter
3	12/11/2025	00:52	Otter
	TC 11 (Camera K)		ITM 636422,817268
No.	Date	Time	Mammal Species
1	30/10/2025	18:49	Red fox
2	05/11/2025	03:56	Red fox
3	05/11/2025	03:51	Red fox
4	06/11/2025	00:44	Red fox

	TC 12 (Camera J)		ITM 636257,817231
No.	Date	Time	Mammal Species
1	29/10/2026	18:13	Otter
	TC 13 (Camera L)		ITM 636394,817203
No.	Date	Time	Mammal Species
1	No triggered events		

Table 2: 2026 Trail Camera Results

	TC 14 (Camera A)		ITM 636334,817249
No.	Date	Time	Mammal (& bird) Species
1	26/04/2026	19:58	Grey heron
2	27/04/2026	08:25	Grey heron
3	29/04/2026	21:08	Grey heron
4	06/05/2026	22:06	Red Fox
5	07/05/2026	01:22	Red Fox
6	10/05/2026	04:59	Red Fox
	TC 15 (Camera B)		ITM 636295,817278
No.	Date	Time	Mammal Species
1	27/04/2026	05:40	Irish hare

2	30/04/2026	01:24	Red fox
3	30/04/2026	03:45	Red fox
4	01/05/2026	22:20	Red fox
5	01/05/2026	23:33	Red fox
6	03/05/2026	01:25	Badger
7	04/05/2026	03:05	Red fox
8	06/05/2026	01:55	Red fox
9	06/05/2026	22:21	Red fox
10	06/05/2026	23:59	Red fox
11	08/05/2026	22:44	Red fox
12	09/05/2026	23:45	Red fox
13	10/05/2026	03:15	Red fox
14	11/05/2026	00:03	Red fox
	TC 16 (Camera C)		ITM 636317,817207
No.	Date	Time	Mammal Species
1	06/05/2026	22:41	Unknown mammal
	TC 17 (Camera D)		ITM 636292,8172217
No.	Date	Time	Mammal Species
1	07/05/2026	02:53	Otter
2	09/05/2026	23:28	Otter
	TC 18 (Camera E)		ITM 636354,8172206
No.	Date	Time	Mammal Species
1	30/04/2026	01:46	Brown rat
2	30/04/2026	04:22	Brown rat
	TC 19 (Camera F)		ITM 636419,8172274
No.	Date	Time	Mammal Species
1	26/04/2026	00:21	Red fox
2	26/04/2026	04:41	Red fox
3	26/04/2026	05:50	Irish hare
4	27/04/2026	00:03	Red fox
5	05/05/2026	23:04	Red fox
6	06/05/2026	02:07	Red fox
7	08/05/2026	03:14	Red fox
8	09/05/2026	00:00	Red fox

9.2 Appendix 2 Bat Static Surveillance Results

Total number of bat passes - 2025

Static Code	ITM Easting	ITM Northing	Date Deployed	No. of Nights	Common pipistrelle	Soprano pipistrelle	Nathusius pipistrelle
Static 1	636261	817240	30/04/2025	6	18	324	26
Static 2	636326	817205	30/04/2025	13	103	1900	95

Static Code	ITM Easting	ITM Northing	Date Deployed	No. of Nights	Leisler's bat	Daubenton's bat	Natterer's bat	Brown long-eared bat
Static 1	636261	817240	30/04/2025	6	161	768	2	1
Static 2	636326	817205	30/04/2025	13	114	6860	11	28

Total number of bat passes - 2026

Static Code	ITM Easting	ITM Northing	Date Deployed	No. of Nights	Common pipistrelle	Soprano pipistrelle	Nathusius pipistrelle
Static 1	636261	817240	15/8/2026	5	79	1679	23
Static 2	636326	817205	15/8/2026	5	56	1038	34

Static Code	ITM Easting	ITM Northing	Date Deployed	No. of Nights	Leisler's bat	Daubenton's bat	Natterer's bat	Brown long-eared bat
Static 1	636261	817240	15/8/2026	5	419	790	3	6
Static 2	636326	817205	15/8/2026	5	650	143	0	6