Planning and Environmental Consultants

Bat Report

Galway Harbour Extension

DOCUMENT DETAILS

Client:	**Galway Harbour Company**
Project Title:	**Galway Harbour Extension**
Project Number:	**210130**
Document Title:	**Bat Report**
Document File Name:	**BR F - 210130 – 2023.07.13**
Prepared By:	**MKO** **Tuam Road** **Galway** **Ireland** **H91 VW84**

Planning and Environmental Consultants

Rev	Status	Date	Author(s)	Approved By
01	Draft	05/07/2023	KC	AJ
02	Final	13/07/2023	KC	AJ

Table of Contents

Table of Tables

Table of Plates

Table of Figures

1. INTRODUCTION

MKO was commissioned to undertake terrestrial bat surveys to provide an updated baseline of bat activity for a proposed extension development within the Galway Harbour Enterprise Park area, Galway (Grid Ref: M 30641 24794).

Bat surveys employed a combination of methods, including desktop study, habitat and landscape assessment and manual activity surveys. Surveys were undertaken by two licenced ecologists during suitable weather for bats.

MKO completed a dusk and dawn bat activity survey on the 8th August 2022, during the main bat maternity season (May-August). The main objective of the surveys was to gather information on roosting, commuting, and foraging bats using the site and to identify any important features for bats. Two Full spectrum bat detectors, Song Meter Mini Bat Song Meter SM4BAT (Wildlife Acoustics, Maynard, MA, USA), were deployed for 15 nights to record bat activity at two fixed locations.

The bat survey and assessment were informed by a desk study and with reference to the following guidelines:

- *Bat Surveys for Professional Ecologists – Good Practice Guidelines (3rd edn.) (Collins, 2016)*
- *Bat Roosts in Trees (Andrews, 2018)*
- *Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes (NRA, 2006a)*
- *Guidelines for the Treatment of Bats during the Construction of National Road Schemes (NRA, 2006b)*
- *British Bat Calls: A Guide to Species Identification (Russ, 2012)*
- *Bat Mitigation Guidelines for Ireland -V2. Irish Wildlife Manuals, No. 134. (Kelleher, Mullen & Marnell, 2022)*
- *Guidance Note 08/18: Bats and Artificial Lighting in the UK (ILP, 2018)*

1.1 Policy and Legislation

All Irish bats are protected under European legislation, namely the Habitats Directive (92/43/EEC). All Irish species are listed under Annex IV of the Directive, requiring strict protection for individuals, their breeding sites and resting places. The Lesser horseshoe bat (*Rhinolophus hipposideros*) is further listed under Annex II of the Directive, requiring the designation of conservation areas for the species. Under this Directive, Ireland is obliged to maintain the favourable conservation status of Annex-listed species. This Directive has been transposed into Irish law through the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011).

In addition, Irish species are further protected by national legislation (Wildlife Acts 1976-2022). Under this legislation, it is an offence to intentionally disturb, injure or kill a bat or disturb its roost. Any work at a roost site must be carried out with the agreement of the National Parks and Wildlife Service (NPWS) and a derogation licence must be granted before works commence.

1.2 Statement of Authority

The bat surveys were undertaken by MKO ecologists Laura Gránicz (BSc.) and Viorel Anitei (BSc.). All staff have relevant academic qualifications to complete the necessary surveys and assessments. This report was prepared by Keith Costello (BSc.) and was reviewed by Aoife Joyce (BSc., MSc.,) who has over 4 years' experience in ecological impact assessment.

2. CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development relates to the extension of the existing Galway Harbour. The site is located in the Galway Harbour Enterprise Park and is accessed from the New Docks Road, adjacent to the Port of Galway. The lands are surrounded by the Galway Harbour docks, industrial areas and residential developments. The proposed development extends partially into Galway Bay. A site location map is provided in Figure 2-1 (IG Ref: M 30641 24794).

Map Legend

Survey Area

Microsoft product screen shots reprinted with permission from Microsoft Corporation

© Ordnance Survey Ireland. All rights reserved. Licence number CYAL50267517

Drawing Title

Site Location

Project Title

Galway Harbour Extension

Drawn By	Checked By
KC	AJ
Project No.	**Drawing No.**
210130	2.1
Scale	**Date**
1:63,000	14.07.2023

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

3. METHODS

3.1 Desktop Study

A desktop review of published material was undertaken to inform all subsequent field studies and assessments. The aim of the desktop review was to identify the presence of species of interest within the site and surrounding region.

3.1.1 National Bat Database of Ireland

The National Bat Database of Ireland holds records of bat observations received and maintained by Bat Conservation Ireland. These records include results of national monitoring schemes, roost records as well as ad-hoc observations. A search was undertaken, on 5th July 2023, for bat presence within a 10km radius of the proposed development site.

In addition, information on species' range and distribution, available in the 2019 Article 17 Reports (NPWS, 2019), was reviewed in relation to the location of the development. The NPWS monitors the conservation status of European protected habitats and species and reports their findings to the European Commission every 6 years in the form of an Article 17 Report. The most recent report for the Republic of Ireland was submitted in 2019.

3.1.2 Designated Sites

Special Areas of Conservation (SACs) are designated under EU Habitats Directive. The potential for effects on European Sites has been considered. The European Sites that are within the Zone of Likely Impact, with bats identified as Qualifying Interests, are listed below.

Natural Heritage Areas (NHAs) are designated under the Wildlife (Amendment) Act 2000 and their management and protection is provided for by this legislation and planning policy. NHAs and Proposed Natural Heritage Areas (pNHAs) designated for bats are listed below. Proposed Natural Heritage Areas were designated on a non-statutory basis in 1995 but have not since been statutorily proposed or designated.

3.1.3 Galway City Transport Project (2015) and Galway City Ring Road EIAR (2018)

The "Route Selection Report: Chapter 4" of the N6 Galway City Transport Project Environmental Impact Statement and the N6 Galway City Ring Road Environmental Impact Assessment Report (2018) were consulted as part of the desk study for the purposes of the bat assessment. Details of review, specifically related to bats, are provided in Section 4.1.3 below.

3.2 Field Surveys

3.2.1 Habitat Suitability Assessment

A walkover survey of the study area was carried out during daylight hours on the 8th of August 2022. During the walkover, habitat types were recorded and assessed for their suitability to support bats. The landscape features on the site were visually assessed for potential use as bat roosting habitats and commuting/foraging habitats using a protocol set out in BCT *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd edn.) (Collins, 2016). Table 4.1 of the 2016 BCT Guidelines identifies a

grading protocol for assessing structures, trees and commuting/foraging habitat for bats. Suitability categories are divided into *High, Moderate, Low* and *Negligible.*

3.2.2 Dusk and Dawn Activity Surveys

A dusk and dawn transect survey were carried out on the evening of the 8th and morning of the 9th August 2022. The aim of the survey was to identify if there were bats present within the survey area, what bat species were present and to gather any information on bat roosting, foraging and commuting behaviour. The activity surveys included walked transects across the extent of the survey area. All bat activity was recorded for subsequent analysis to confirm species identifications.

Two surveyors were equipped with an active full spectrum bat detector, a Batlogger M (Elekon, Lucerne, Switzerland). Where possible, species identification was made in the field and any other relevant information was also noted, e.g. numbers, behaviour, features used, etc. All bat echolocation was recorded for subsequent analysis to confirm species identifications.

The dusk survey commenced 30 minutes before sunset and was completed for 2 hours after sunset. The dawn survey commenced 2 hours before sunrise and concluded 30 mins after sunrise. Conditions were suitable for bat survey, table 3-1 shows dusk and dawn survey effort.

Table 3-1 Bat Activity Survey Effort

Date	*Surveyor*	*Type*	*Sunrise/Sunset*	*Weather*
08th August 2022	Viorel Anitei and Laura Gránicz	Dusk	21:28	15-18^{0}C, Dry, Calm, 65%-20% Cloud
9th August 2022	Viorel Anitei and Laura Gránicz	Dawn	05:25	10-13^{0}C, Dry, Calm, 70%-20% Cloud

3.2.3 Static Detector Surveys

Full spectrum bat detectors, Song Meter Minis (Wildlife Acoustics, Maynard, MA, USA), were deployed during static surveys to record bat activity at two fixed locations over a 2-week period in August 2022. The two locations of static detectors were selected to monitor bat activity within the site at potential activity hotspots. The detectors were deployed on site on the 8th August 2022 and were collected on the 22nd August 2022. Static detector locations can be found in Figure 3-1.

Settings used were those recommended by the manufacturer for bats, with minor adjustments in gain settings and band pass filters to reduce background noise when recording. Detectors were set to record from 30 minutes before sunset until 30 minutes after sunrise. The Song Meter automatically adjusts sunset and sunrise times using the Solar Calculation Method when provided with GPS coordinates.

Analysis of Detector Results

Echolocation signal characteristics (including signal shape, peak frequency of maximum energy, signal slope, pulse duration, start frequency, end frequency, pulse bandwidth, inter-pulse interval and power spectra) were compared to published signal characteristics for local bat species (Russ, 1999). Myotis species (potentially *M. daubentonii*, *M. mystacinus*, *M. natterer*i) were considered as a single group, due to the difficulty in distinguishing them based on echolocation parameters alone (Russ, 1999). The echolocation of *P. pygmaeus* and *P. pipistrellus* are distinguished by having distinct frequencies (peak frequency of maximum energy in search flight) of ~55 kHz and ~46 kHz respectively (Jones & van Parijs, 1993).

Plate 3-1 below shows a typical sonogram of echolocation pulses for Common pipistrelle recorded with a SM4BAT bioacoustic static bat recording device. The recorded file is illustrated using Wildlife Acoustics Kaleidoscope software.

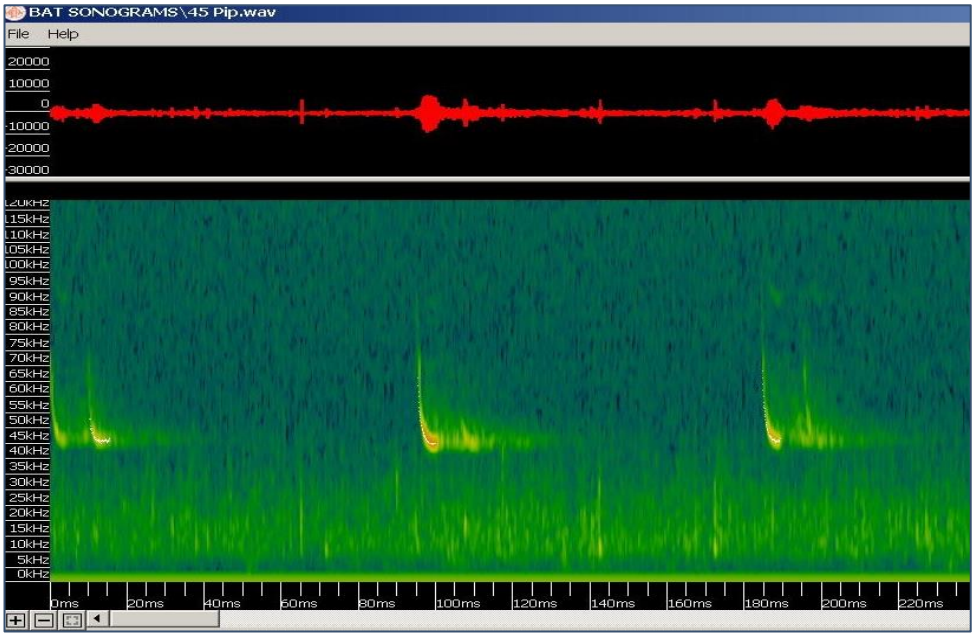

Plate 3-1 Sonogram of echolocation pulses of Common pipistrelle (Peak Frequency 45kHz)

Individual bats of the same species cannot be distinguished by their echolocation alone. Thus, 'bat passes' was used as a measure of activity (Collins, 2016). For the purposes of this survey, a bat pass was defined as a recording of an individual species/species group's echolocation containing at least two echolocation pulses and of maximum 15 seconds length.

3.3 Survey Limitations

Survey design and effort was created in accordance with the most current best practice guidelines for surveying bats (Collins, 2016).

August is within the optimal survey period for bat activity surveys, (Collins, 2016). In addition, there were no limitations associated with weather conditions. Therefore, a full and comprehensive survey was achieved.

No limitations in the scope, scale or context of the assessment have been identified.

Map Legend

- Static Locations
- Survey Area

Microsoft product screen shots reprinted with permission from Microsoft Corporation
© Ordnance Survey Ireland. All rights reserved. Licence number CYAL50267517

N

Drawing Title
Static Detector Locations

Project Title
Galway Harbour Extension

Drawn By	Checked By
KC	AJ
Project No.	Drawing No.
210130	3.1
Scale	Date
1:3,950	14.07.2023

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

4. RESULTS

4.1 Desktop Study

4.1.1 National Bat Database of Ireland

A review of the National Bat Database of Ireland on the 5th July 2023 yielded results of bats within a 10km radius of the proposed development site. The search yielded 5 bat species within 10km. Table 4-1 lists the bat species recorded within the hectad which pertains to the current study area (M32).

Table 4-1 NBDC Bat Records

Hectad	Species	Date	Database	Status
M32	Brown Long-eared Bat (*Plecotus auritus*)	15/04/2008	National Bat Database of Ireland	Annex IV
M32	Lesser Horseshoe Bat (*Rhinolophus hipposideros*)	05/02/2015	National Lesser Horseshoe Bat Database	Annex II, IV
M32	Leisler's bat (*Nyctalus leisleri*)	14/07/1999	National Bat Database of Ireland	Annex IV
M32	Common Pipistrelle (*Pipistrellus pipistrellus*)	14/08/2009	National Bat Database of Ireland	Annex IV
M32	Soprano Pipistrelle (*Pipistrellus pygmaeus*)	14/08/2009	National Bat Database of Ireland	Annex IV

Bat Species Range

The potential for negative impacts is likely to increase where there are high risk species at the edge of their range (NatureScot, 2021). Therefore, range maps presented in the 2019 Article 17 Reports (NWPS, 2019) were reviewed in relation to the location of the proposed development.

The proposed development site is located within range for all bat species, as mapped in the Article 17 reporting.

4.1.2 Designated Sites

The following Designated Sites have been identified as having Lesser horseshoe bat as a Qualifying Interest within 15km of the proposed development.

Lough Corrib SAC (000297)

The SAC site boundary is located 0.8km from the proposed development. The Lesser horseshoe bat roost for which the SAC has been designated (roost id. 217 in NPWS database) is located approximately 37km to the north-west of the site of proposed development. This is significantly outside the foraging range (2.5km) of Lesser horseshoe bat (NPWS, 2013). There is no potential for significant effect on the Lesser horseshoe bat population or the QI habitats either in the form of disturbance, loss or deterioration of habitat quality.

Lough Fingall SAC (000606)

The SAC site boundary is located approximately 12.7km from the proposed development. The Lesser horseshoe bat roost for which the SAC has been designated (roost id. 244 in NPWS database) is located approximately 13km to the south-west of the site of proposed development. This is significantly outside

the foraging range (2.5km) of Lesser horseshoe bat (NPWS, 2013). There is no potential for significant effect on the Lesser horseshoe bat population or the QI habitats either in the form of disturbance, loss or deterioration of habitat quality.

East Burren Complex SAC (001926)

The SAC site boundary is located approximately 13.1km from the proposed development. The Lesser horseshoe bat roost for which the SAC has been designated (roost id. 126 and 144 in NPWS database) is located more than 20km to the south of the site of proposed development. This is significantly outside the foraging range (2.5km) of Lesser horseshoe bat (NPWS, 2013). There is no potential for significant effect on the Lesser horseshoe bat population or the QI habitats either in the form of disturbance, loss or deterioration of habitat quality.

Ross Lake and Woods SAC (001312)

The SAC site boundary is located approximately 14.9km from the proposed development. The Lesser horseshoe bat roost for which the SAC has been designated (roost id. 212 in NPWS database) is located more than 10km to the north-west of the site of proposed development. This is significantly outside the foraging range (2.5km) of Lesser horseshoe bat (NPWS, 2013). There is no potential for significant effect on the Lesser horseshoe bat population or the QI habitats either in the form of disturbance, loss or deterioration of habitat quality.

4.1.3 Galway City Transport Project (2015) and Galway City Ring Road EIAR (2018)

Galway City Transport Project (2015)

A review of publicly available information, on studies undertaken as part of the Galway City Transport Project (GCTP), was carried out. As part of this project, detailed bat surveys were undertaken in the area surrounding Galway City and this publicly available information was consulted.
Extensive bat survey work carried out as part of the Galway City Transport Project included surveys within the vicinity of the Galway Harbour Project. Chapter 4 of the Route Selection Report identifies bats and bat roosts throughout Galway city (Table 4-2).

Table 4-2 Roost Species identified during the project (2015)

Species
Common pipistrelle *(Pipistrellus pipistrellus)*
Leisler's bat *(Nyctalus leisleri)*
Soprano pipistrelle (*Pipistrellus pygmaeus)*
Lesser horseshoe bat *(Rhinolophus hipposideros)*
Whiskered bat *(Myotis mystacinus)*
Brown long-eared bat *(Plecotus auritus)*

Galway City Ring Road EIAR (2018)

The N6 Environmental Impact Assessment Report for the Galway City Ring Road (GCRR) was consulted. Surveys carried out between 2014 and 2018 as part of the GCRR project identified bat roosts within the vicinity of the Galway Harbour Project. Figures 8.18.1 - 8.21.1 of the EIAR shows identified bat roosts in Galway City (Table 4-3).

Table 4-3 Roost species identified during the project *(2018).*

Species
Soprano pipistrelle (*Pipistrellus pygmaeus*)

Brown long-eared bat (*Plecotus auritus*)
Lesser horseshoe bat *(Rhinolophus hipposideros*)
Daubenton's bat (*Myotis daubentonii*)
Common pipistrelle (*Pipistrellus pipistrellus*)

4.2 Field Surveys

4.2.1 Ecological Habitat Appraisal

The proposed development area is located at the Galway Harbour Enterprise Park, which contains numerous industrial units. The wider area contains an Oil Holding Depot, the Bus Eireann Depot Buildings is categorized as buildings and artificial surfaces **(BL3)** (Plate 4-1). The site itself will extend into Galway Bay. Vegetation on the north and east of the existing harbour site contains recolonising bare ground **(ED3)** and Scrub **(WS1)** habitat**.**

With regard to foraging and commuting bats, buildings and artificial surfaces **(BL3)** and recolonising bare ground **(ED3)** (Plate 4-2) habitats were considered *Low* suitability, i.e. habitat that could be used by small numbers of commuting or foraging bats (Collins, 2016).

With regard to roosting bats, no mature trees with potential for roosting were identified within the site. **Scrub (WS1)** habitats were considered *Negligible* suitability, i.e. negligible habitat features on site likely to be used by roosting bats. (Collins, 2016).

Plate 4-1 Buildings and Artificial Surfaces (BL3)

Plate 4-2 Scrub (WS1) and Recolonising bare ground (ED3) along pathway to northeast of site.

Plate 4-3 Scrub habitat along northeast of site.

4.2.2 Dusk and Dawn Activity Surveys

Numerous foraging and commuting bats were recorded during the dusk and dawn bat activity survey. In total, 84 bat passes were recorded. Activity was dominated by soprano pipistrelle (*Pipistrellus pygmaeus*) n=58. This was followed by common pipistrelle (*Pipistrellus pipistrellus*) n=19 and Leisler's bat (*Nyctalus leisleri*) n=7. These species are common and widespread across Ireland. No lesser horseshoe bats were recorded during the surveys.

Overall, activity levels were assessed as *Low*. Bat activity was concentrated along the west, south and east perimeters of the proposed development site with no bats recorded in the centre or north of the proposed development site. Plate 4-4 shows total bat species composition. Table 4-4 presents the results per survey.

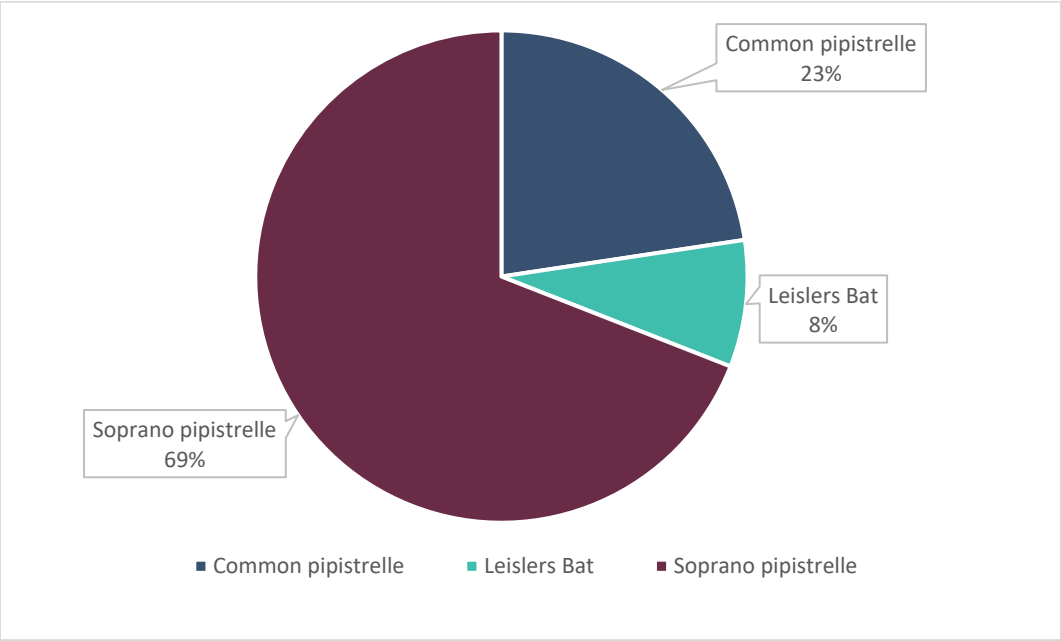

Plate 4-4 Total Species Composition

Table 4-4 Dusk and Dawn Survey Results

Species	Dusk	Dawn	Total
Common pipistrelle	17	2	19
Soprano pipistrelle	57	1	58
Leisler's bat	6	1	7
Total	**80**	**4**	**84**

Map Legend

- Survey Area
- Dusk Transect 08.08.2022
- Dawn Transect 09.08.2022

Galway Harbour Species Results

- Leisler's bat
- Common pipistrelle
- Soprano pipistrelle

Microsoft product screen shots reprinted with permission from Microsoft Corporation
© Ordnance Survey Ireland. All rights reserved. Licence number CYAL50267517

N

Drawing Title: Dusk & Dawn Survey Results

Project Title: Galway Harbour Extension

Drawn By	Checked By
KC	AJ
Project No.	Drawing No.
210130	4.1
Scale	Date
1:3,950	14.07.2023

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

4.2.3 Ground Level Static Surveys

Two static detectors were deployed on the site for 15 nights in August 2022. One detector was deployed west of the proposed development site (IG REF: M 30352 24753) along a linear feature of scrub habitat. The second detector was deployed to the east of the site (IG REF: M 30929 24864) and was positioned along a linear feature of scrub habitat adjacent to an industrial building. Detectors were positioned at these locations in order to gain an understanding of the commuting and foraging bat activity around the site.

All recordings were later analysed using bat call analysis software Kaleidoscope Pro v.5.4.9 (Wildlife Acoustics, MA, USA). Bat species were identified using established call parameters, to create site-specific custom classifiers. All identified calls were also manually verified. In total, 1,798 bat passes were recorded. The bat species recorded during the survey are consistent with the species that are listed to be found within the hectad M32.

Analysis of the detector recordings positively identified six bat species, with the *Myotis* genus also present. Bat species included: Soprano pipistrelle *(Pipistrellus pygmaeus)* (n=1,048), Common pipistrelle *(Pipistrellus pipistrellus)* (n=440), Leisler's bat *(Nyctalus leisleri)* (n=294) and less commonly occurring species include *Myotis* spp. (n=10), Nathusius' pipistrelle (*Pipistrellus nathusii*) (n=3) and Brown long-eared bat (*Plecotus auritus*) (n=3). The species composition recorded is shown in Plate 4-5. Activity varied across each of the nights. No lesser horseshoe bats were recorded across the entirety of the surveys. Plate 4-6 shows the site activity as total bat passes per night.

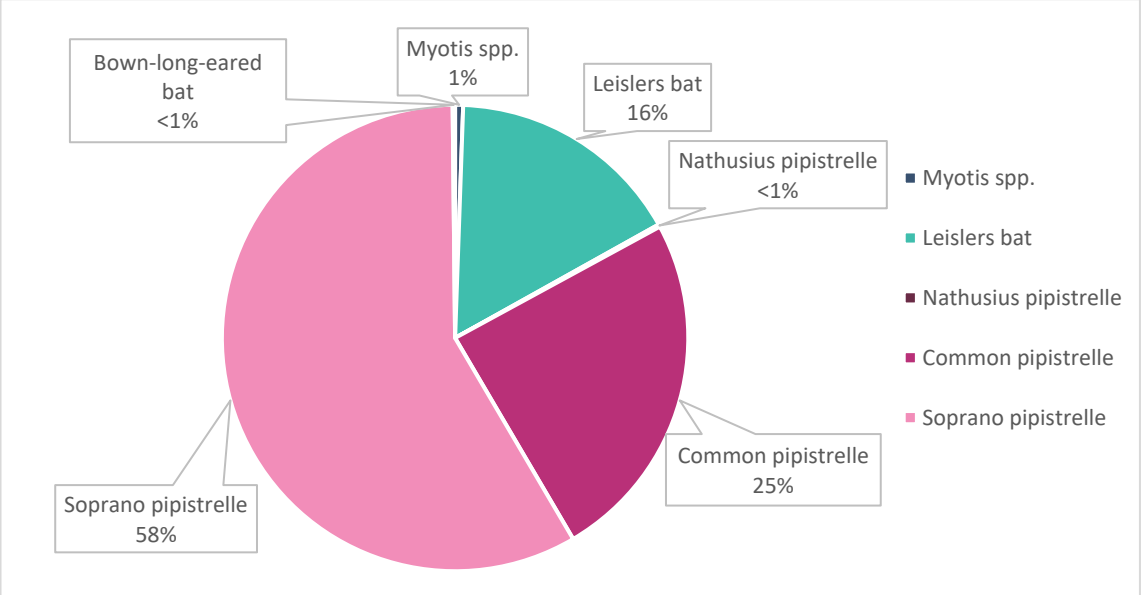

Plate 4-5 Species Composition of Ground Level Statics Surveys

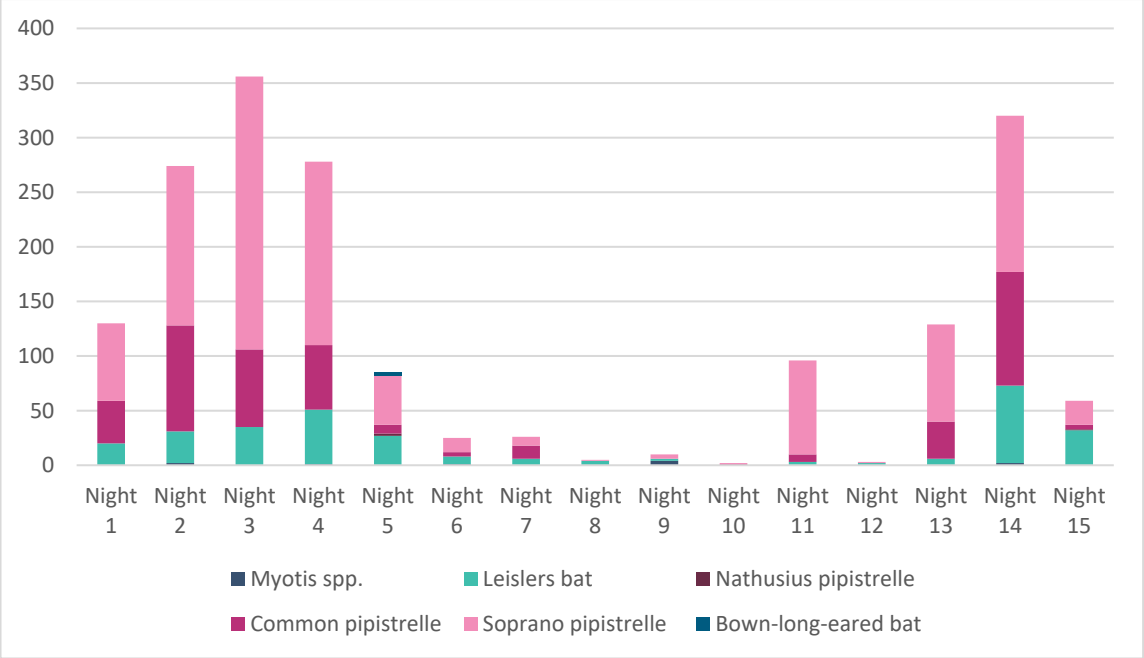

Plate 4-6 Total Bat Passes Per Night

4.3 Importance of Bat Population Recorded at the Site

Ecological evaluation within this section follows a methodology that is set out in Chapter three of the '*Guidelines for Assessment of Ecological Impacts of National Roads Schemes'* (NRA, 2009).

All bat species in Ireland are protected under the Bonn Convention (1992), Bern Convention (1982) and the EU Habitats Directive (92/43/EEC). Additionally, in Ireland bat species are afforded further protection under the Birds and Natural Habitats Regulations (2011) and the Wildlife Acts 1976-2022.

Bats as an Ecological Receptor have been assigned *Local Importance (Higher value)* on the basis that the habitats within the proposed development site are utilized by a regularly occurring bat population of Local Importance.

No evidence of roosting bats was identified within the proposed development site. No roosting site of National Importance (i.e. site greater than 100 individuals) was recorded within the site.

The results of the bat survey, carried out in August 2022, indicates that the proposed site development does not provide significant suitable habitat for a roosting bat population of ecological significance.

5. OVERALL FINDINGS

The information provided below is based on visits carried out on 8th and 9th August 2022. The surveys were carried out during suitable weather conditions for bats.

During the dusk survey, 80 bat passes were recorded, while 4 bat passes were recorded during the dawn survey. Species recorded during these surveys were Soprano pipistrelle, Common pipistrelle and Leisler's bat. Overall activity within the site was low. Bat activity during the dusk and dawn surveys was localised along the south, west and eastern boundaries primarily around scrub habitats. Scrub and individual immature trees lacked features that would support roosting bats including cracks, hazard beams, cankers, rot holes, and fissures in the bark, ivy cover etc. and no evidence of bats or bat use were identified during the inspection. No evidence of roosting bats and no high potential roost features were identified during the walkover and activity surveys. Habitats identified during the walkover were assigned a Low value for commuting and foraging bats with little connectivity to a wider landscape.

The static detectors recorded six species within the vicinity of the site. These included Soprano pipistrelle, Common pipistrelle, Leisler's bat, *Myotis spp.,* Nathusius' pipistrelle and Brown long-eared bat. Overall activity was relatively low.

As the site provides some suitable commuting and foraging habitat, the below is recommended to safeguard bats:

Lighting recommendations

Where lighting is unavoidable during construction, low-intensity lighting and motion sensors will be used to limit illumination. Exterior lighting, during construction, will be designed to minimize light spillage, thus reducing the effect on areas outside the proposed development, and consequently on bats i.e., Lighting will be directed away from habitat features around the periphery of the site boundary to minimize disturbance to bats. Directional accessories will be used to direct light away from these features, e.g., through the use of light shields (Stone, 2013). The luminaries will be of the type that prevent upward spillage of light and minimize horizontal spillage away from the intended lands.

Any lighting plan should be designed with consideration of the following guidelines: *Bat Conservation Ireland (Bats and Lighting: Guidance Notes for Planners, Engineers, Architects and Developers, BCI, 2010), the Bat Conservation Trust (Guidance Note 08/18 Bats and Artificial Lighting in the UK (BCT, 2018)* and Dark Sky Ireland to minimise light spillage, thus reducing any potential disturbance to bats.

Lighting recommendations include:

- Lamps shall have a lamp flux/colour of Warm White LED light source (2700K) in areas of linear habitat features – less attractive to insects thus bats.
- Directional accessories such as internal louvres/cowls/hoods/baffles etc. should be incorporated to direct light away from treelines and linear habitat features – to reduce horizontal light spill and eliminate upward light.
- Lamps should also be specified with 0 Degree tilt (where possible) to ensure limited unwanted light spill.
- Lighting control regime – consider controlled lighting scheme during peak bat activity (i.e. 30min after sunset and 40 min before sunrise), as well as reduced illuminance during hours of lower human activity (i.e. 12:30am – 5:30am).
- Lighting to be used only where necessary (needs to be justifiable).
- Light spillage from internal artificial lighting to external habitat features should be considered and the effects minimised to prevent disturbance to wildlife.
- Height of lighting columns to be considered i.e. <8m.

Bat Habitat Enhancement

The project presents an opportunity to enhance roosting habitats through the installing of bat boxes. Bat boxes should be considered within the proposed development area. These can include wall mounted boxes or integrated boxes and should follow best practice guidelines for installation (Kelleher & Marnell 2006, National Roads Authority 2006).

Bat boxes should have a southerly orientation and be positioned at least 2m from the ground (ideally higher), and away from artificial lighting. They should be placed adjacent to vegetation features such as treelines and hedgerows to ensure they are close to existing flight paths and can avoid wide open spaces (Collins, 2016). Where trees or vegetation are unsuitable to support bat boxes, they could be integrated into walls or placed on poles, at least 2m from the ground, in areas that are to be planted as part of any potential landscaping plan. The addition of bat boxes would present a net gain in habitat for roosting bats.

6. CONCLUSION

In total, six species of bat were recorded across the survey area during the dusk, dawn and ground level static activity surveys. No bat roosts were identified during the surveys, and the site does not provide significant suitable habitat to support any bat roosts.

The proposed works relate to the extension of the existing Galway Harbour. The surveys and recommendations provided in this report are in accordance with the relevant industry guidance.

7. BIBLIOGRAPHY

Andrews, H. (2018) *Bat Roosts in Trees*. AEcol, Bridgewater.

Aughney, T., Kelleher, C. & Mullen, D. (2008) *Bat Survey Guidelines: Traditional Farm Buildings Scheme*. The Heritage Council, Áras na hOidhreachta, Church Lane, Kilkenny.

Aughney, T., Langton, S. & Roche, N. (2011) *Brown long - eared bat roost monitoring scheme for the Republic of Ireland: synthesis report 2007 - 2010. Irish Wildlife Manual s, No. 56*. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

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

ILP (2018) Guidance Note 08/18: Bats and Artificial Lighting in the UK. *Bats and the Built Environment Series.* Institute of Lighting Professionals, Warwickshire, UK.

Boye, P., & Dietz, M. (2005). *Development of good practice guidelines for woodland management for bats.* English Nature.

CIEEM (2013) *Competencies for Species Surveys: Bats.* Chartered Institute of Ecology and Environmental Management, Winchester.

Collins, J. (ed) (2016) *Bat Surveys for Professional Ecologists – Good Practice Guidelines (3rd edn).* The Bat Conservation Trust, England.

Fossitt, J. A. (2000) *A Guide to Habitats in Ireland*. The Heritage Council Dublin Ireland.

Kelleher, C. & Marnell, F. (2022) *Bat Mitigation Guidelines for Ireland. Irish Wildlife Manuals, V2 No. 134.* National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

Mitchell-Jones, A.J. & McLeish, A.P. (eds) (2004) *'Bat Workers' Manual' (3rd edn).* JNCC, Peterborough.

Mitchell-Jones, A.J. (2004) *Bat Mitigation Guidelines.* English Nature, Peterborough.

National Roads Authority (2006) *Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes.* National Roads Authority, Dublin Ireland.

National Roads Authority (2006b) *Guidelines for the Treatment of Bats during the Construction of National Road Schemes.* National Roads Authority, Dublin, Ireland.

Russ, J.M. (2012) *British Bat Calls: A Guide to Species Identification.* Pelagic Publishing, Exeter.

Stone, E. L., Jones, G., & Harris, S. (2009). *Street lighting disturbs commuting bats.* Current biology, 19(13), 1123-1127.

Stone, E.L. (2013) *Bats and lighting: Overview of current evidence and mitigation*. The Bat Conservation Trust, England.