

2019

# Bat Assessment



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NPWS licence C30/2017 (Licence to handle bats, expires 31<sup>st</sup> December 2019)

NPWS licence 33/2017 (Licence to photograph/film bats, expires 31<sup>st</sup> December 2019)

NPWS licence DER/BAT 2017-09 (Licence to disturb a roost, expires 29<sup>th</sup> March 2020)

**Client:** John Spain Associates

**Project Name & Location:** Limekiln, Navan, Co. Meath

### Report Revision History

Date of Issue	Draft Number	Issued To
12 <sup>th</sup> October 2019	Draft 1	By email to John Spain Associates
8 <sup>th</sup> November 2019	Draft 2	By email to John Spain Associates
18 <sup>th</sup> November 2019	Final (PBR corrections)	By email to John Spain Associates

### Purpose

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

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

### Carbon Footprint Policy

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

### Bat Record Submission Policy

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

## Executive Summary

**Project Name & Location:** Limekiln, Navan, Co. Meath

**Proposed work:** Mixed-use development

### 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>			

\* In buildings outside the proposed development site.

### Bat Survey Duties Completed (Indicated by red shading)

Tree PBR Survey	<input checked="" type="checkbox"/>	Daytime Building Inspection	<input checked="" type="checkbox"/>
Static Detector Survey	<input checked="" type="checkbox"/>	Daytime Bridge Inspection	<input type="checkbox"/>
Dusk Bat Survey	<input checked="" type="checkbox"/>	Dawn Bat Survey	<input checked="" type="checkbox"/>
Walking Transect	<input checked="" type="checkbox"/>	Driving Transect	<input type="checkbox"/>
Trapping / Mist Netting	<input type="checkbox"/>	IR Camcorder filming	<input type="checkbox"/>
Endoscope Inspection	<input type="checkbox"/>	Other	<input type="checkbox"/>

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## 1. Introduction

Bat Eco Services was commissioned by Coindale Ltd. to survey lands proposed to be developed in Limekiln, Navan, Co. Meath.

### 1.1 Relevant Legislation & Bat Species Status in Ireland

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 a notifiable action and a derogation licence has to be obtained from the *National Parks and Wildlife Service* before works can commence. Any works interfering with bats and especially their roosts, may only be carried out under a licence to derogate from Regulation 23 of the Habitats Regulations 1997 and Regulation 54 of the European Communities (Birds and Natural Habitats) Regulations 2011 (which transposed the EU Habitats Directive into Irish law). The details with regards to appropriate assessments, the strict parameters within which derogation licences may be issued and the procedures by which and the order in relation to the planning and development regulations such licences should be obtained, are set out in Circular Letter NPWS 2/07 "*Guidance on Compliance with Regulation 23 of the Habitats Regulations 1997 - strict protection of certain species/applications for derogation licences*" issued on behalf of the Minister of the Environment, Heritage and Local Government on the 16<sup>th</sup> of May 2007.

There are eleven recorded bat species in Ireland, nine of which are considered resident. 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.

Irish bat species list (please see Appendices for more information in individual bat species) is presented in Table 1. The current status of the known bat species occurring in Ireland is given in the Table 1 below.

Table 1: Status of the Irish bat fauna (Marnell *et al.*, 2009).

Species: Common Name			Irish Status	European Status	Global Status
<b>Resident Bat Species ^</b>					
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>			Near threatened	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>	Least Concern	Near threatened	Least Concern
<b>Possible Vagrants ^</b>					
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

## 1.2 Relevant Guidance Documents

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

- National Roads Authority (2006) Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes
- Collins, J. (Editor) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3<sup>rd</sup> edition). Bat Conservation Trust, London
- 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.
- 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.
- The status of EU protected habitats and species in Ireland: Conservation status in Ireland of habitats and species listed in the European Council Directive on the Conservation of

Based on the information collected during the desktop studies and bat surveys, the bat ecologist assigns an ecological value to each bat species recorded based on its conservation status at different geographical scales (Table 2). For example, a site may be of national ecological value for a given species if it supports a significant proportion (e.g. 5%) of the total national population of that species.

**Table 2: The six-level ecological valuation scheme used in the CIEM Guidelines (2016) Ecological Value**

<b>Ecological Value</b>	<b>Geographical Scale of Importance</b>
<b>International</b>	International or European scale
<b>National</b>	The Republic of Ireland or the island of Ireland scale (depending on the bat species)
<b>Regional</b>	Province scale: Leinster
<b>County</b>	County scale: Co. Meath
<b>Local</b>	Proposed development site and environs.
<b>Negligible</b>	None, the feature is common and widespread

Impacts on bats can arise from activities that may result in:

- Physical disturbance of bat roosts e.g. destruction or renovation of buildings
- Noise disturbance e.g. increase human presence, use of machinery etc.
- Lighting disturbance
- Loss of roosts e.g. destruction or renovation of buildings
- Modifications of commuting or foraging habitats
- Severance or fragmentation of commuting routes
- Loss of foraging habitats.

It is recognised that any development will have an impact on the receiving environment, but the significance of the impact will depend on the value of the ecological features that would be affected. Such ecological features will be those that are considered to be important and potentially affected by the proposed development.

The guidelines consulted recommend that the potential impacts of a proposed development on bats are assessed as early as possible in the design stage to determine any areas of conflict.



## 1.3 Project Description

### 1.3.1 Site Location

The site of the proposed development lies along the west of Academy Street and to the Dublin Road. The site is bounded to the west and south by existing dwellings; to the east by existing dwellings and Academy Street and to the north by agricultural lands and Belmont House located in proximity to the centre of the subject site.

This is comprised of seven fields with mature treeline and/or native hedgerow boundaries. The proposed development site is also adjacent to mature woodland associated with a private residence (Belmont House and numerous associated buildings). The River Boyne is located approximately 100m from the survey area to the east.



Figure 1: Aerial photograph with survey boundary mapped (Google Earth).

### 1.3.2 Proposed Project

The proposal relates to a residential development of 544 no. dwellings on a site of c. 15.1 hectares comprising 260 no. houses (18 no. 2 bed, 207 no. 3 bed & 35 no. 4 bed) and 198 no. apartments (46 no. 1 bed, 152 no 2 bed), 30 no. duplex apartments (15 no. 2 bed & 15 no. 3 bed), and 56 no. dwellings in corner blocks (16 no. 1 bed, 24 no. 2 bed & 16 no. 3 bed) as well as the provision of two crèches (ground floor of apartment building [c. 195 sq. m] and a two storey crèche in housing area [c. 443 sq. m]), Open Space of c. 2.63 hectares including playground areas; all ancillary landscape works with public lighting, planting and boundary treatments including regrading/re-profiling of site where required as well as provision of cycle paths; Provision of vehicular and pedestrian looped access through the site from 3 no. junctions located on Academy Street as well as pedestrian connection in south east of site to Dublin Road and upgrade works to junction onto the Dublin Road; along with 875 no. car parking spaces (including 4 no. car sharing spaces) and 581 cycle spaces; Surface water attenuation measures and underground attenuation systems as well as all ancillary site development works (reprofiling of site as required) as well as connection to existing public water supply and drainage services. All site development and landscape works.





Figure 2: Proposed layout of proposed development at Limekiln, Navan, Co. Meath (Source: John Spain Associates).

### 1.3.3 Bat Survey Aims

The aims of the bat survey at the proposed project site are as follows:

- Collect robust data following good practice guidelines to allow an assessment of the potential impacts of the proposed project on local bat populations, both on and off-site (i.e. accumulative impacts);
- Facilitate the design of mitigation, enhancement and monitoring strategies for local bat populations recorded;
- Provide baseline information with which the results of post-construction monitoring surveys can be compared to, where appropriate;
- Provide clear information to enable NPWS and planning authorities to reach robust decisions with definitive required outcomes;
- Assist clients in meeting their statutory obligations;
- Facilitate the conservation of local bat populations.

**Surveys are comprised of many different types and may differ from site to site depending on the goals of the survey. The following is a brief description of main types of surveys completed.**

- Emergence (dusk) surveys: surveying of buildings or structures to determine whether such building/structure is a bat roost. Undertaken from 10 minutes prior to sunset to 90 minutes after sunset.
- Walking transect: bat surveys completed on-foot where the surveyor(s) walk the survey site from 10 minutes prior to sunset to at least 110 minutes after sunset. Often this survey is completed post an emergence survey and therefore may be undertaken for a longer period of time after sunset.
- Driving transect: bat survey completed in a car and undertaken according to a strict survey protocol. Surveying is completed from 40 minutes after sunset till the end of the planned survey route. This is only undertaken for large survey area with a well-defined public road structure. Routes are planned and mapped prior to surveying.
- Dawn surveys: surveying of buildings or structures to determine whether such building/structure is a bat roost. Undertaken from 90 minutes prior to sunrise to 10 minutes after sunrise.
- Static surveys: placement of automated recording devices within the survey area. The units are set up during the daylight hours and left in place to record during the hours of darkness.
- Additional surveys required may include trapping / netting of bats. But this type of surveying is only undertaken where specific information is required (e.g. to determine if a roost is a maternity colony).

### 1.3.4 Bat Surveys - Historical

A bat survey was undertaken in 2017 and re-surveying was completed in 2019. Therefore this report presents the survey results from all surveys completed in 2017 and 2019. The bat surveys were completed in the appropriate summer months. The exact survey dates are as follows:

Dusk surveys: 27/9/2017, 2/5/2019, 6/5/2019

Internal inspection of Belmont House: 8/5/2019

Tree inspection: 8/5/2019

Static surveys: 27<sup>th</sup> September to 1<sup>st</sup> October 2017 (4 nights, 4 units) & 1<sup>st</sup> May to 5<sup>th</sup> May 2019 (4 units, 4 nights)

## 2. Bat Survey Methodology

### 2.1 Daytime Inspections

One purpose of daytime inspections is to determine the potential of bat roosts within the survey area. For this development proposal there are no buildings within the proposed development boundary and therefore this section refers to buildings adjacent to the proposed development site. Due to the transient nature of bats and their seasonal life cycle, there are a number of different types of bat roosts. Where possible, one of the objectives of the surveys is to be able to identify the types of roosts present, if any. However, the determination of the type of roost present depends on the timing of the survey and the number of bat surveys completed. Consequently, the definition of roost types, in this report, will be based on the following:

**Table 3: Bat Roost Types (Collins 2016).**

Roost Type	Definition	Time of Survey
<b>Day Roost</b>	A place where individual bats or small groups of males, rest or shelter in the daytime but are rarely found by night in the summer.	Anytime of the year
<b>Night Roost</b>	A place where bats rest or shelter in the night but are rarely found in the day. May be used by a single bat on occasion or it could be used regularly by the whole colony.	Anytime of the year
<b>Feeding Roost</b>	A place where individual bats or a few bats rest or feed during the night but are rarely present by day.	Anytime of the year
<b>Transitional Roost</b>	A place used by a few individuals or occasionally small groups for generally short periods of time on waking from hibernation or in the period prior to hibernation.	Outside the main maternity and hibernation periods.
<b>Swarming Site</b>	Where large numbers of males and females gather. Appear to be important mating sites.	Late summer and autumn
<b>Mating Site</b>	Where mating takes place.	Late summer and autumn
<b>Maternity Site</b>	Where female bats give birth and raise their young to independence.	Summer months
<b>Hibernation Site</b>	Where bats are found, either individually or in groups in the winter months. They have a constant cool temperature and humidity.	Winter months in cold weather conditions
<b>Satellite Roost</b>	An alternative roost found in close proximity to the main nursery colony and is used by a few individuals throughout the breeding season.	Summer months

#### 2.1.1 Building & Structure Inspection

Structures, buildings and other likely places that may provide a roosting space for bats are inspected during the daytime for evidence of bat usage. Evidence of bat usage is in the form of actual bats (visible or audible), bat droppings, urine staining, grease marks (oily secretions from glands present on stonework) and claw marks. In addition, the presence of bat fly pupae (bat



parasite) also indicated that bat usage of a crevice, for example, has occurred in the past. Inspections are undertaken visually with the aid of a strong torch beam (LED Lenser P14.2) and endoscope (General DC5660A Wet / Dry Scope).

### 2.1.2 Tree Potential Bat Roost (PBRs) Inspection

Trees that may provide a roosting space for bats are classified using the Bat Tree Habitat Key (BTHK, 2018) and the classification system used is from Collins (2016). The Potential Roost Features (PRFs) listed in this guide are used to determine the PBR value of trees.

Trees identified as PBRs are inspected during the daytime, where possible, for evidence of bat usage. Evidence of bat usage is in the form of actual bats (visible or audible), bat droppings, urine staining, grease marks (oily secretions from glands present on stonework) and claw marks. In addition, the presence of bat fly pupae (bat parasite) also indicated that bat usage of a crevice, for example, has occurred in the past.

A series of inspections are undertaken. Phase 1 inspections aims to make a list of trees within the proposed development site that may be suitable as roosting sites for bats. Inspections are undertaken visually with the aid of a strong torch beam (LED Lenser P14.2) during the daytime searching for PRFs, if visible. To aid this Phase 1 inspection, tree reports, if available, are consulted to supplement that data collected.

Phase 2 inspections are, generally, recommended once a complete list of trees that have been identified as PBRs, and are marked for felling in order for the proposed development to be undertaken. The Phase 2 inspection will generally involve a closer examination of individual trees using a strong torch beam (LED Lenser P14.2) and endoscope (General DC5660A Wet / Dry Scope) and where required (and/or possible), height surveys are completed using a ladder. If a tree is deemed to be a roost site then further surveying involving dusk and dawn surveys of the actual trees may be recommended to determine what bat species are present etc.

**Table 4: Tree Bat Roost Category Classification System (Collins, 2016).**

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

### 2.1.3 Bat Habitat & Commuting Routes Mapping

The survey site is assessed during daytime walkabout surveys, in relation to potential bat foraging habitat and potential bat commuting routes. Such habitats are classified according to Fossit, 2000 (Appendix 1, Table 1.B) while hedgerows are classified according to BATLAS 2020 classification (Bat Conservation Ireland, 2015) (Appendix 1, Table 1.A). Bat habitats and commuting routes identified are considered in relation to the wider landscape to determine landscape connectivity for local bat populations through the examination of aerial photographs.

## 2.2 Night-time Bat Detector Surveys

### 2.2.1 Dusk & Dawn Bat Surveys

Dusk surveys are generally completed from 10 minutes before sunset to at least 120 minutes post sunset (extended survey period times occur if walking transects and driving transects are included). Dawn surveys are generally completed from 90 minutes before sunrise to 10 minutes after sunrise. If the focus of this survey is to determine whether a structure is a bat roost (i.e. An Emergence Survey is deemed necessary), the surveyors then position themselves adjacent to the building / structure to be surveyed to determine if bats are roosting within, location of roost, number of bats, bat species etc. Surveying is generally completed for 100 mins, starting 10 mins before sunset.

Surveys are generally completed during mild and dry weather conditions with air temperature 8°C or greater, where possible. All bat encounters are noted during surveys.

The following equipment was used for the 2017 and 2019 dusk surveys:

Surveyor 1 (Principal surveyor): Wildlife Acoustics Echo Meter Touch (Generation 1, Apple IOS) connected to iPad 2 (32 GB storage) and Petersson D200 Heterodyne Bat Detector.

Surveyor 2: Wildlife Acoustics Echo Meter Touch2 Pro (Android) connected to Samsung Galaxy Tab S3 and Petersson D200 Heterodyne Bat Detector.

Walking transects involve the surveyor(s) walking the survey area, noting the time, location and bat species encountered. If the mapping facility is used on the Wildlife Acoustics Echo Meter Touch2 Pro (Android) connected to Samsung Galaxy Tab S3, this is mapped using Google Earth with a KLM file produced for mapping purposes. Validation of bat records is completed by the principal bat surveyor prior to mapping. Otherwise, Irish Grid references are recorded and an excel file of bat record locations is produced for mapping.

### 2.2.2 Passive Static Bat Detector Survey

A Passive Static Bat Surveys involves leaving a static bat detector unit (with ultrasonic microphone) in a specific location and set to record for a specified period of time (i.e. a bat detector is left in the field, there is no observer present and bats which pass near enough to the monitoring unit are recorded and their calls are stored for analysis post surveying). The bat detector is effectively used as a bat activity data logger. This results in a far greater sampling effort over a shorter period of time. Bat detectors with ultrasonic microphones are used as the ultrasonic calls produced by bats cannot be heard by human hearing.

The microphone of the unit was position horizontally to reduce potential damage from rain. Bat Logger A+ units and Wildlife Acoustics Song Meter SM2, SM2 BAT+ SM4 Bat FS and SM3 BAT Platform Units 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 hour/night. Each bat pass does not correlate to an individual bat but is representative of bat activity levels. Some species such as the pipistrelles will continuously fly around a habitat and therefore it is likely that a series of bat passes within a similar time frame is one individual bat. On the other hand, Leisler's bats tend to travel through an area quickly and therefore an individual sequence or bat pass is more likely to be indicative of individual bats



The recordings are analysed using various software. Recordings made by SongMeter SM2 (Unit 2) is analysed using SongScope, SongMeter SM2Bat+ (Unit 4, 5), Song Meter Bat FS (Units 1-5) and SongMeter 3 recordings are analysed using BatClassifyIreland and Wildlife Acoustics Kaleidoscope Pro. Elekon BatLogger A+ units are analysed using BatExplorer. Each sequence of bat pulses are noted as a bat pass to indicate level of bat activity for each species recorded. This is either expressed as the number of bat passes per hour or per survey night.

The following static units were deployed during the 2017 and 2019 static bat detector surveys:

**Table 5: Static Bat Detectors deployed during Static Bat Detector Surveys.**

<b>Static Unit Code</b>	<b>Bat Detector Type</b>	<b>Recording Function</b>	<b>Microphone</b>
<b>SM2 Unit 4 – 2017 &amp; 2019</b>	Wildlife Acoustics SongMeter 2 Bat+	Passive Full Spectrum	SMX-US (connected directly to unit)
<b>SM2 Unit 2 – 2017 &amp; 2019</b>			
<b>SM2 – Unit 5 2019</b>			
<b>BL Unit A – 2017 &amp; 2019</b>	Elekon BatLogger A+ bat detector	Passive Full Spectrum	FG Black microphone, 2m cable
<b>BL Unit B – 2017</b>			

## 2.3 Survey Constraints

It is important to note that bat surveys are comprised of a number of surveys designed to provide as much information on the bat usage of a survey area. Each survey method has its pros and cons. Therefore, a combination of surveys is recommended to determine the importance of a survey area for local bat populations. Bat surveys are also a snap shot of the bat activity at the time of surveying. Bat activity varies greatly from season to season and in relation to weather conditions. A list of bat survey methods are ticked at the start of the report to provide an overview for the reader. Weather data is presented, within the main body of text, to provide context to the suitability of survey dates to recorded bat activity.

The following assessment has been completed in relation to Survey Constraints:

**Table 6: Survey Constraint Assessment Results.**

<b>Category</b>	<b>Discussion</b>
<b>Timing of surveys</b>	May 2019 supplemented with data from September 2017. These surveys have been completed during the recommended survey period to record bat activity and to record potential summer roosts.
<b>Weather conditions</b>	May 2019 – good weather conditions  September 2017 – good weather conditions
<b>Survey effort</b>	Dusk surveys: 27/9/2017, 2/5/2019, 6/5/2019  Internal inspection of Belmont House: 8/5/2019  Tree inspection: 8/5/2019  Static surveys: 27 <sup>th</sup> September to 1 <sup>st</sup> October 2017 (4 nights, 4 units) 1 <sup>st</sup> May to 5 <sup>th</sup> May 2019 (4 units, 4 nights)
<b>Equipment</b>	All in good working order apart from SM2 Unit 4. During the 2019 static surveys this unit failed to record.

The number of surveys complies with best practice as per bat guidelines and therefore it is deemed that the survey work completed is appropriate in order to complete the aims of the bat survey and that no particular survey constraints were encountered.

### 3. Bat Survey Results

#### 3.1 Daytime Inspections

##### 3.1.1 Building & Structure Inspection

While there are an array of buildings within the wider survey area these buildings is not part of the proposed development (i.e. buildings associated with Belmont House). However, surveying was undertaken to determine if there were any roosts within the buildings to provide an accumulative assessment of the wider area during a general walkabout of the buildings and inspection of external walls and surfaces for evidence of bats (e.g. bat droppings on windows).

**Table 7: Buildings / Structures inspection results.**

Building Code	Description	Grid Reference	Roost Type / Suitability	Bat Species
<b>Belmont House</b>	Slate roof, multistorey building with attic space compartments.	N8751666975	High	Leisler's bat – droppings on front walls  Brown long-eared bat droppings – scatter on windows  <i>Pipistrellus</i> spp. bat droppings – scatter on windows
<b>Stone building</b>	Slate roof, natural stone	N8750766983	High	Brown long-eared bat droppings  <i>Pipistrellus</i> spp. bat droppings
<b>Modern single storey building</b>	Tile roof, concrete walls	N8750366960	Medium	<i>Pipistrellus</i> spp. bat droppings on external wall surfaces. No accumulations noted.
<b>Barn</b>	Corrugate steel barn, low concrete walls	N8744167025	Low-medium	No evidence
<b>Stone shed</b>	Natural stone walls, slate roof (derelict condition)	N8745567017	Medium	Brown long-eared bat droppings – scatter  <i>Pipistrellus</i> spp. bat droppings – scatter

### 3.1.2 Tree Potential Bat Roost (PBRs) Inspection

This section is completed with reference to the Tree Survey report (dated January 2019 and October 2019). The following is a brief summary of the results extracted from this report:

- A total of one hundred and five individual trees and six tree groups were recorded as part of the survey.
- The trees on the site represent a range of primarily deciduous native and non-native species with a small number of coniferous species also present within both field boundary hedgerows and a section of woodland.
- A substantial area of mature ornamental woodland exists on the site which contains many high value deciduous and coniferous trees of both native and non-native species. The woodland has a significant value, both in terms of visual and amenity value it adds to the landscape and ecological and habitat value.
- A significant number of trees of exceptional maturity and size are present, particularly within the woodland where the age profile of trees varies from young to mature.
- Some management or maintenance of trees appears to have been undertaken in the past, particularly within the woodland. There is scope for selective management works to improve the quality of existing trees, such as the removal of; ivy, weak tree growth, overcrowding regenerative growth, rubbing limbs, deadwood etc. However, on the whole the trees appear to be in reasonable health.
- The following trees are in direct conflict or their RPA's are significantly compromised with the proposed development, and are therefore proposed for removal; T291 / T297/ T304 / T305 / T311 / T313 / T314 / T315 / T316 / T393 / T395 / T399 / T400 / T416 / T590 / T591 / T592 / T593 / T594 / T600 / T603 / T605 / T606 / T607 / T608 / T609 / T610 / T611 / T615 / T616 / T623 / T624. This is a total of 32 trees. These 32 trees are classed as 5 x high quality (A), 15 x moderate quality (B), 7 x low quality (C) and 4 x dead / dangerous (U).
- It is proposed to develop pedestrian pathways through the existing woodland, assuming the philosophy of aligning the route to avoid direct conflict and the use of a 'no-dig' permeable pathway (e.g. gravel) material there should be no additional loss of significant trees. (It is accepted that some scrub and saplings / young trees may be selectively removed both to facilitate alignment and as part of a woodland management thinning exercise).

Trees were inspected within the proposed survey. In relation to the list of trees above that are marked to be felled to make way for the proposed development, 21 were identified as having Potential Bat Roost features. These trees were surveyed as part of a Phase 1 survey and are listed in Table 8.

The Draft Landscape Report stated that of the 32 trees to be felled, 19 of these trees are located in Belmont Woodland. These trees are as follows; T393, T395, T399, T400, T590, T591, T592, T593, T594, T600, T605, T606, T607, T609, T610, T611, T615 and T616. The trees within this list considered to be PBR are highlighted in Orange on Table 8. Of the 19 proposed to be felled, 10 are considered to be of PBR value. This report states that "...the woodland will substantially remain and provide an ongoing presence in the landscape when viewed from the south west and key trees of quality within the wood will be retained".

There is one additional tree, due to poor condition, proposed to be removed. This is Tree Tag number 603 which is considered to be a PBR. This brings the total number of PBRs proposed to be felled to 11.

**Table 8: Tree PBR inspection results.**

Tree No.	Tree Species	PRFs	Value
T291	Ash	Tree holes, spilt limbs, ivy	Category 2
T304	Sycamore	Monolith - cavities	Category 1
T305	Sycamore	Ivy, dead wood	Category 2
T311	Ash	Tree holes, spilt limbs, ivy	Category 2
T314	Ash	Tree holes, spilt limbs, ivy	Category 2
T315	Ash	Tree holes, spilt limbs, ivy	Category 2
T316	Ash	Tree holes, spilt limbs, ivy	Category 2
T393	Beech	Ivy, dead wood	Category 2
T400	Cypress	Ivy, loose bark	Category 2
T416	Hawthorn	Cavities	Category 2
T590	Cypress	Ivy, loose bark	Category 2
T591	Cypress	Ivy, loose bark	Category 2
T592	Prunus	Cavities	Category 2
T603	Ash	Monolith - cavities	Category 1
T605	Ash	Compression fork	Category 2
T609	Beech	Tree holes	Category 2
T610	Beech	Tree holes	Category 2
T611	Prunus	Tree holes	Category 2
T615	Ash	Tree holes	Category 2
T623	Ash	Monolith - cavities	Category 1
T624	Cypress	Dead wood	Category 1

As part of the PBR assessment, a 2<sup>nd</sup> phase tree survey will be undertaken prior to tree removal and tree construction.

### *3.1.3 Bat Habitat & Commuting Routes Mapping*

The survey site is characterised by woodland, hedgerows, mature treelines, small hedgerows (particularly internal linear features due to management) and sparse treeline hedges in a well-connected landscape. This is particularly important in relation the connectivity to the River Boyne which provides a suitable landscape for commuting and foraging bat populations.



## 3.2 Night-time Bat Detector Surveys

### 3.2.1 Dusk & Dawn Bat Survey

During the general walkabout surveys it was noted that bats were emerging from Belmont House. A dusk emergence survey was completed of Belmont House (outside the proposed application area) on 6<sup>th</sup> May 2019. This was early in the season but four species of bat was recorded roosting in the structures and it is likely that a larger number of bats are using the building later in the summer season.

**Table 9: Buildings / Structures survey results.**

Building Code	Roost Type & Location	Bat Species (No. of bats)	Access Points	Vegetation / Lighting arrangement
<b>Belmont House</b>	Maternity roosts: Leisler's bat and soprano pipistrelles  Satellite roost: brown long-eared bat	Leisler's bat: 12 individuals  Brown long-eared bat: >5 individuals  Soprano pipistrelle: 23 individuals	Leisler's bat: front left-hand corner of main part of house  Brown long-eared: rear roof apex (RHS)  Soprano pipistrelle: rear gable (LHS)	Security spot lighting associate with house – on a motion sensor
<b>Stone building</b>	Satellite roost: common pipistrelles	Common pipistrelle: 2 individuals	Ridge tiles	Security spot lighting associate with house – on a motion sensor
<b>Modern single storey building</b>	None recorded	None recorded	Nat applicable	Security spot lighting associate with house – on a motion sensor
<b>Barn</b>	Night roost: soprano pipistrelles, Natterer's bat	Flying within space of barn	Open structure	None
<b>Stone shed</b>	Night roost: brown long-eared bat	Feeding perch	Open doorway	None

A number of walking transect bat surveys were completed in both 2017 (27<sup>th</sup> September 2017) and 2019 (2<sup>nd</sup> May 2019 and 5<sup>th</sup> May 2019).

The following is the details from the 2017 survey completed by Surveyor 1:

Weather Conditions	Cloudy, dry, calm and 11 <sup>0</sup> C.	27 <sup>th</sup> September 2017
Sunset	19:52 hours	27 <sup>th</sup> September 2017

The survey site consists of 7 large fields surrounded on mature treelines, hedgerows and woodland. Surveying was then undertaken along the field boundaries to determine what species of bat foraging within the survey area.

### **Dusk Survey Results**

- Leisler's bats were the first recorded bat species and this individual was recorded at 19:58 hrs foraging over the tree tops of the woodland.
- Soprano pipistrelles were recorded from 20:07 hrs and these were recorded commuting on-site from adjacent buildings in SE corner of the survey area.
- Common pipistrelles were recorded from 20:12 hrs with a high level of activity along the northern boundary of the site.
- Individual bats of common pipistrelle and soprano pipistrelle were recorded commuting through the proposed development site along the internal field boundary.
- Brown long-eared bats were recorded foraging around the hay barn and along the woodland edges adjacent to the private residence. Individuals of this species were also recorded along the treeline along the southern boundary of the survey area.
- Natterer's bats were also recorded along the southern boundary and along the woodland edge.
- The bat encounters are presented on Figure 3.

In summary, common pipistrelles were recorded throughout the site, while brown long-eared bats and Natterer's bats were recorded along the woodland edge associated with Belmont House. Soprano pipistrelle was also more frequently recorded along the woodland edge and teelines/hedgerows located to the south of the proposed survey area. Leisler's bat activity was concentrated over the tree canopy of the woodland associated with Belmont House.



Figure 3: Bat encounters during Dusk Survey. Circles indicate the location of bat encounters and these are colour coded for each of the bat species recorded. Arrows indicate principal commuting routes with colours corresponding to bat species.

- Green = common pipistrelles
- Red = soprano pipistrelles
- Blue = Leisler's bats
- Orange = brown long-eared bats
- Purple = Natterer's bats

Two walking transects were completed in 2019 (Completed by Surveyor 2) and on both nights, three species of bat were recorded as shown below: Common pipistrelle, soprano pipistrelle and Leisler's bat. A similar pattern of results was recorded to the 2017 survey.

Common pipistrelle was the most frequently encountered bat species. The species was recorded along the boundary of the proposed development site, along the internal linear habitat network and



within the woodlands while the remaining two species were primarily recorded close to Belmont House and associated woodland, where roosts were recorded for both soprano pipistrelles and Leisler's bats. While a small common pipistrelle roosts was recorded within the array of buildings associated with Belmont House (outside the proposed application area), the level of activity potentially indicate that there is a larger roost located off-site and individuals of this roost foraging and commute through the survey area.

Figure 4: Walking transect results – 2/5/2019

a) All bat encounters (Yellow line = walking route)



b) Common pipistrelle bat encounters (Yellow line = walking route)





c) Soprano pipistrelle bat encounters (Yellow line = walking route)



d) Leisler's bat encounters (Yellow line = walking route)





Figure 5: Walking transect results – 6/5/2019

a) All bat encounters (Yellow line = walking route)



b) Common pipistrelle bat encounters (Yellow line = walking route)





c) Soprano pipistrelle bat encounters (Yellow line = walking route)



d) Leisler's bat encounters (Yellow line = walking route)



On the 6/5/2019, post dusk emergence survey, Surveyor 1 concentrated on the woodland driveway and woodlands of Belmont House while Surveyor 2 completed the walking transects of the fields. During this survey the following bat species were recorded: brown long-eared bat, Natterer's bat, soprano pipistrelle, common pipistrelle and Leisler's bat. Leisler's bats were recorded foraging over the tree canopy, soprano and common pipistrelles were concentrated along the tree-lined drive way while both brown long-eared bats and Natterer's bats were foraging within the woodland.



In summary, a high level of common pipistrelle activity was recorded throughout the survey site. A medium-high level of soprano pipistrelle and Leisler's bat activity was recorded but concentrated along the woodland for soprano pipistrelles, along the treelines / hedgerows locate to the south of the proposed development site. Natterer's bats and brown long-eared bat activity was associated with the woodland.

### 3.2.2 Passive Static Bat Detector Survey

The following tables summarises the results recorded on the static units deployed in 2017 and the figure below show the location of the statics deployed during the 2017 survey.



Figure 6: Map of survey area (www.biology.ie). Circles indicate the location of the Static recorders.

- Orange circle – SongMeter2 Unit 2
- Green circle – BatLogger A Unit A
- Blue circle – BatLogger A Unit B
- Red circle – SongMeter2 Unit 4

Details of the number of bat passes recorded on the static recorders during 2017 survey are listed in the tables below. A total of five bat species were recorded within the proposed development site: common pipistrelle, soprano pipistrelle, brown long-eared bat, *Myotis* species and Leisler's bat. Three of these bat species are common Irish bats while brown long-eared bats are a woodland bat species and *Myotis* species consists of 3 potential species: Daubenton's bat, whiskered bat and Natterer's bat. During the dusk survey, Natterer's bats were identified so it is likely that the *Myotis* species recorded are this bat species.

*NOTE: The behaviour of bats during commuting and foraging greatly influences the level of bat passes recorded on static units. The number of bat passes do not equate to the number of bats flying past the static unit. Pipistrellus species tended to foraging as they commute and therefore are regularly observed flying up and down a treeline or hedgerow before moving on in the landscape. Leisler's bats fly high in the sky and therefore can be observed flying fast through the landscape, occasionally foraging over treetops as they commute. As a consequence, Pipistrellus species bat activity tends to result in a higher number of bat passes recorded on static units compared to Leisler's bats. In relation to other bat species recorded, as they tend to be less common in the landscape compared to common pipistrelles, soprano pipistrelles and Leisler's bats, their recorded presence is notable. Exceptions to this would include Daubenton's bats on a waterway or a static located adjacent to a known bat roost.*

As a general guide bat activity level is determined as follows: Low = <10 bat passes/hr; Medium = >10 - <50 bat passes/hr; High = >50 bat passes/hr).

The first unit was located along a hedgerow between to cereal fields. There was a medium to high level of soprano pipistrelle bat passes recorded along this field boundary. As the level of activity was primarily during the night, it is likely to be foraging individuals. Common pipistrelles were occasionally recorded. There were low levels of the remaining three species recorded during surveillance on this static unit.

Table 10a: Songmeter SM2 Bat+ Unit 2

Time (hrs)	Leis	SP	CP	BLE	Myotis
<b>27<sup>th</sup> September to 28<sup>th</sup> September 2017</b>					
20:00-21:00	0 passes	2 passes	2 passes	0 passes	0 passes
21:00-22:00	0 passes	6 passes	2 passes	2 passes	0 passes
22:00-23:00	0 passes	0 passes	0 passes	0 passes	0 passes
23:00-00:00	0 passes	0 passes	0 passes	0 passes	0 passes
00:00-01:00	0 passes	0 passes	0 passes	0 passes	0 passes
01:00-02:00	0 passes	25 passes	0 passes	0 passes	0 passes
02:00-03:00	0 passes	16 passes	0 passes	0 passes	0 passes
03:00-04:00	0 passes	19 passes	8 passes	0 passes	0 passes
04:00-05:00	0 passes	36 passes	2 passes	0 passes	0 passes
05:00-06:00	0 passes	48 passes	1 pass	0 passes	0 passes
06:00-07:00	0 passes	0 passes	0 passes	0 passes	0 passes
<b>28<sup>th</sup> September to 29<sup>th</sup> September 2017</b>					
20:00-21:00	0 passes	1 passes	6 passes	0 passes	0 passes
21:00-22:00	0 passes	3 passes	3 passes	0 passes	0 passes
22:00-23:00	0 passes	0 passes	3 passes	0 passes	0 passes
23:00-00:00	0 passes	2 passes	0 passes	0 passes	0 passes
00:00-01:00	0 passes	6 passes	3 passes	1 pass	0 passes
01:00-02:00	0 passes	6 passes	0 passes	0 passes	0 passes
02:00-03:00	0 passes	0 passes	0 passes	0 passes	0 passes
03:00-04:00	0 passes	0 passes	11 passes	0 passes	0 passes
04:00-05:00	1 pass	50 passes	23 passes	0 passes	0 passes

05:00-06:00	0 passes	63 passes	4 passes	0 passes	0 passes
06:00-07:00	0 passes	2 passes	3 passes	0 passes	0 passes
<b>29<sup>th</sup> September to 30<sup>th</sup> September 2017</b>					
20:00-21:00	1 pass	2 passes	2 passes	0 passes	0 passes
21:00-22:00	0 passes	0 passes	2 passes	0 passes	0 passes
22:00-23:00	0 passes	2 passes	0 passes	0 passes	0 passes
23:00-00:00	1 pass	0 passes	1 pass	0 passes	0 passes
00:00-01:00	1 pass	0 passes	7 passes	0 passes	0 passes
01:00-02:00	0 passes	0 passes	0 passes	0 passes	0 passes
02:00-03:00	0 passes	0 passes	0 passes	0 passes	0 passes
03:00-04:00	2 passes	2 passes	4 passes	0 passes	0 passes
04:00-05:00	0 passes	0 passes	1 pass	0 passes	0 passes
05:00-06:00	0 passes	3 passes	5 passes	0 passes	0 passes
06:00-07:00	0 passes	2 passes	2 passes	0 passes	0 passes
<b>30<sup>th</sup> September to 1<sup>st</sup> October 2017</b>					
20:00-21:00	1 pass	1 pass	1 pass	0 passes	0 passes
21:00-22:00	0 passes	2 passes	5 passes	0 passes	0 passes
22:00-23:00	2 passes	2 passes	3 passes	0 passes	2 passes
23:00-00:00	0 passes	19 passes	5 passes	0 passes	1 pass
00:00-01:00	0 passes	0 passes	1 pass	0 passes	0 passes
01:00-02:00	0 passes	2 passes	0 passes	0 passes	0 passes
02:00-03:00	0 passes	3 passes	11 passes	1 pass	0 passes
03:00-04:00	0 passes	13 passes	17 passes	0 passes	0 passes
04:00-05:00	0 passes	9 pass	4 passes	0 passes	0 passes
05:00-06:00	0 passes	4 passes	3 passes	1 pass	0 passes
06:00-07:00	0 passes	0 passes	5 passes	0 passes	0 passes

The second unit was located along a treeline of the boundary of the proposed development site. This was a dense treeline and while the number of bat passes recorded for all five bat species are lower compared with the first unit, there was a consistent level of bat activity, especially for common pipistrelles.

Table 10b: Songmeter SM2 Bat+ Unit 4

Time (hrs)	Leis	SP	CP	BLE	Myotis
<b>27<sup>th</sup> September to 28<sup>th</sup> September 2017</b>					
20:00-21:00	0 passes	2 passes	2 passes	0 passes	0 passes
21:00-22:00	0 passes	2 passes	2 passes	0 passes	0 passes
22:00-23:00	2 passes	0 passes	1 pass	2 passes	0 passes
23:00-00:00	0 passes	3 passes	0 passes	0 passes	0 passes
00:00-01:00	1 pass	1 pass	2 passes	0 passes	0 passes
01:00-02:00	1 pass	3 passes	2 passes	0 passes	0 passes
02:00-03:00	0 passes	2 passes	1 pass	3 passes	0 passes
03:00-04:00	0 passes	0 passes	0 pass	0 passes	0 passes
04:00-05:00	0 passes	2 passes	3 passes	0 passes	0 passes
05:00-06:00	0 passes	2 passes	3 passes	0 passes	0 passes
06:00-07:00	0 passes	2 passes	3 passes	0 passes	0 passes
<b>28<sup>th</sup> September to 29<sup>th</sup> September 2017</b>					
20:00-21:00	0 passes	2 passes	2 passes	0 passes	0 passes
21:00-22:00	0 passes	2 passes	2 passes	0 passes	0 passes
22:00-23:00	0 passes	1 pass	3 passes	0 passes	0 passes
23:00-00:00	1 pass	0 passes	8 passes	0 passes	0 passes



00:00-01:00	1 pass	0 passes	8 passes	0 passes	0 passes
01:00-02:00	0 passes	2 passes	2 passes	2 passes	0 passes
02:00-03:00	0 passes	0 passes	3 passes	0 passes	0 passes
03:00-04:00	2 passes	0 passes	4 passes	0 passes	0 passes
04:00-05:00	0 passes	0 passes	1 pass	0 passes	0 passes
05:00-06:00	0 passes	2 passes	3 passes	0 passes	0 passes
06:00-07:00	0 passes	2 passes	3 passes	0 passes	0 passes
<b>29<sup>th</sup> September to 30<sup>th</sup> September 2017</b>					
20:00-21:00	0 passes	2 passes	2 passes	0 passes	0 passes
21:00-22:00	0 passes	2 passes	2 passes	0 passes	0 passes
22:00-23:00	0 passes	1 pass	3 passes	3 passes	0 passes
23:00-00:00	1 pass	0 passes	8 passes	0 passes	0 passes
00:00-01:00	1 pass	0 passes	7 passes	0 passes	0 passes
01:00-02:00	0 passes	2 passes	2 passes	0 passes	0 passes
02:00-03:00	0 passes	0 passes	3 passes	1 pass	0 passes
03:00-04:00	2 passes	0 passes	4 passes	0 passes	0 passes
04:00-05:00	0 passes	0 passes	1 pass	0 passes	0 passes
05:00-06:00	0 passes	2 passes	3 passes	0 passes	0 passes
06:00-07:00	0 passes	2 passes	3 passes	0 passes	0 passes
<b>30<sup>th</sup> September to 1<sup>st</sup> October 2017</b>					
20:00-21:00	0 passes	2 passes	2 passes	0 passes	0 passes
21:00-22:00	0 passes	2 passes	2 passes	0 passes	0 passes
22:00-23:00	2 passes	13 passes	23 passes	0 passes	2 passes
23:00-00:00	0 passes	19 passes	5 passes	0 passes	1 pass
00:00-01:00	0 passes	1 pass	0 passes	0 passes	0 passes
01:00-02:00	0 passes	2 passes	0 passes	0 passes	0 passes
02:00-03:00	0 passes	0 passes	0 passes	0 passes	0 passes
03:00-04:00	0 passes	1 pass	0 passes	0 passes	0 passes
04:00-05:00	0 passes	1 pass	0 passes	0 passes	0 passes
05:00-06:00	0 passes	2 passes	3 passes	0 passes	0 passes
06:00-07:00	0 passes	2 passes	3 passes	0 passes	0 passes

The third unit was located within a small farm yard adjacent to woodland and the private residence. The most significant result from this static recorder is the consistent recording of brown long-eared bats confirming that there is a brown long-eared roost in adjacent buildings. There was also a consistent recording of Leisler's bats which may be due to the large number of mature trees located within this area.

Table 10c: BatLogger A Unit A

Time (hrs)	Leis	SP	CP	BLE	Myotis
<b>27<sup>th</sup> September to 28<sup>th</sup> September 2017</b>					
20:00-21:00	2 passes	8 passes	0 passes	1 pass	1 pass
21:00-22:00	2 passes	2 passes	0 passes	1 pass	0 passes
22:00-23:00	2 passes	0 passes	1 pass	2 passes	0 passes
23:00-00:00	0 passes	1 pass	1 pass	4 passes	0 passes
00:00-01:00	0 passes	0 passes	2 passes	2 passes	0 passes
01:00-02:00	1 pass	2 passes	2 passes	0 passes	0 passes
02:00-03:00	0 passes	2 passes	2 passes	3 passes	0 passes
03:00-04:00	2 passes	0 passes	0 pass	2 passes	0 passes
04:00-05:00	1 pass	2 passes	3 passes	0 passes	0 passes
05:00-06:00	0 passes	7 passes	3 passes	0 passes	0 passes

06:00-07:00	0 passes	7 passes	3 passes	0 passes	0 passes
<b>28<sup>th</sup> September to 29<sup>th</sup> September 2017</b>					
20:00-21:00	0 passes	2 passes	2 passes	2 passes	0 passes
21:00-22:00	0 passes	2 passes	2 passes	3 passes	0 passes
22:00-23:00	0 passes	1 pass	3 passes	5 passes	0 passes
23:00-00:00	1 pass	0 passes	8 passes	0 passes	0 passes
00:00-01:00	1 pass	0 passes	8 passes	0 passes	0 passes
01:00-02:00	0 passes	2 passes	2 passes	2 passes	0 passes
02:00-03:00	0 passes	0 passes	3 passes	0 passes	0 passes
03:00-04:00	2 passes	0 passes	4 passes	0 passes	0 passes
04:00-05:00	0 passes	0 passes	1 pass	0 passes	0 passes
05:00-06:00	0 passes	2 passes	3 passes	2 passes	0 passes
06:00-07:00	0 passes	2 passes	3 passes	0 passes	0 passes
<b>29<sup>th</sup> September to 30<sup>th</sup> September 2017</b>					
20:00-21:00	2 passes	2 passes	2 passes	2 passes	0 passes
21:00-22:00	0 passes	2 passes	2 passes	2 passes	0 passes
22:00-23:00	2 passes	1 pass	3 passes	3 passes	1 pass
23:00-00:00	1 pass	0 passes	18 passes	0 passes	0 passes
00:00-01:00	1 pass	3 passes	2 passes	0 passes	0 passes
01:00-02:00	0 passes	2 passes	2 passes	0 passes	0 passes
02:00-03:00	0 passes	0 passes	3 passes	1 pass	0 passes
03:00-04:00	2 passes	10 passes	4 passes	0 passes	0 passes
04:00-05:00	0 passes	0 passes	1 pass	0 passes	0 passes
05:00-06:00	0 passes	2 passes	3 passes	0 passes	0 passes
06:00-07:00	0 passes	2 passes	3 passes	0 passes	0 passes
<b>30<sup>th</sup> September to 1<sup>st</sup> October 2017</b>					
20:00-21:00	3 passes	2 passes	2 passes	3 passes	0 passes
21:00-22:00	0 passes	2 passes	2 passes	5 passes	0 passes
22:00-23:00	2 passes	3 passes	3 passes	4 passes	2 passes
23:00-00:00	2 passes	9 passes	5 passes	0 passes	1 pass
00:00-01:00	0 passes	1 pass	9 passes	2 passes	0 passes
01:00-02:00	0 passes	2 passes	0 passes	0 passes	0 passes
02:00-03:00	0 passes	0 passes	3 passes	0 passes	0 passes
03:00-04:00	0 passes	1 pass	2 passes	0 passes	0 passes
04:00-05:00	3 passes	1 pass	0 passes	0 passes	0 passes
05:00-06:00	0 passes	2 passes	3 passes	0 passes	0 passes
06:00-07:00	0 passes	2 passes	3 passes	0 passes	0 passes

The final static was located on the edge of the woodland. All five species were recorded in vicinity of the static.

Table 10d: BatLogger A Unit B

Time (hrs)	Leis	SP	CP	BLE	Myotis
<b>27<sup>th</sup> September to 28<sup>th</sup> September 2017</b>					
20:00-21:00	2 passes	9 passes	10 passes	1 pass	1 pass
21:00-22:00	2 passes	2 passes	0 passes	1 pass	0 passes
22:00-23:00	2 passes	7 passes	1 pass	2 passes	0 passes
23:00-00:00	0 passes	1 pass	1 pass	0 passes	0 passes
00:00-01:00	0 passes	0 passes	2 passes	2 passes	0 passes
01:00-02:00	1 pass	2 passes	2 passes	0 passes	0 passes
02:00-03:00	0 passes	2 passes	2 passes	0 passes	1 pass

03:00-04:00	2 passes	0 passes	0 pass	2 passes	0 passes
04:00-05:00	1 pass	2 passes	3 passes	0 passes	0 passes
05:00-06:00	0 passes	7 passes	3 passes	0 passes	0 passes
06:00-07:00	0 passes	4 passes	8 passes	0 passes	0 passes
<b>28<sup>th</sup> September to 29<sup>th</sup> September 2017</b>					
20:00-21:00	0 passes	2 passes	2 passes	0 passes	0 passes
21:00-22:00	0 passes	9 passes	4 passes	0 passes	0 passes
22:00-23:00	0 passes	1 pass	3 passes	3 passes	0 passes
23:00-00:00	1 pass	0 passes	8 passes	0 passes	0 passes
00:00-01:00	2 passes	0 passes	8 passes	0 passes	0 passes
01:00-02:00	0 passes	11 passes	2 passes	2 passes	0 passes
02:00-03:00	0 passes	0 passes	3 passes	0 passes	0 passes
03:00-04:00	2 passes	3 passes	14 passes	0 passes	0 passes
04:00-05:00	0 passes	0 passes	1 pass	0 passes	0 passes
05:00-06:00	0 passes	2 passes	3 passes	0 passes	0 passes
06:00-07:00	0 passes	2 passes	3 passes	0 passes	0 passes
<b>29<sup>th</sup> September to 30<sup>th</sup> September 2017</b>					
20:00-21:00	2 passes	3 passes	5 passes	0 passes	0 passes
21:00-22:00	0 passes	9 passes	3 passes	2 passes	0 passes
22:00-23:00	2 passes	1 pass	3 passes	1 pass	1 pass
23:00-00:00	1 pass	0 passes	18 passes	0 passes	0 passes
00:00-01:00	0 passes	3 passes	2 passes	0 passes	0 passes
01:00-02:00	3 passes	12 passes	2 passes	0 passes	0 passes
02:00-03:00	0 passes	0 passes	3 passes	1 pass	0 passes
03:00-04:00	2 passes	10 passes	4 passes	0 passes	0 passes
04:00-05:00	0 passes	0 passes	1 pass	0 passes	0 passes
05:00-06:00	0 passes	2 passes	3 passes	0 passes	0 passes
06:00-07:00	0 passes	2 passes	3 passes	0 passes	0 passes
<b>30<sup>th</sup> September to 1<sup>st</sup> October 2017</b>					
20:00-21:00	2 passes	5 passes	2 passes	3 passes	0 passes
21:00-22:00	0 passes	2 passes	12 passes	5 passes	0 passes
22:00-23:00	2 passes	3 passes	3 passes	4 passes	2 passes
23:00-00:00	2 passes	9 passes	5 passes	0 passes	1 pass
00:00-01:00	0 passes	11 passes	9 passes	2 passes	0 passes
01:00-02:00	0 passes	2 passes	0 passes	0 passes	0 passes
02:00-03:00	0 passes	0 passes	3 passes	0 passes	0 passes
03:00-04:00	0 passes	1 pass	12 passes	0 passes	0 passes
04:00-05:00	2 passes	11 pass	0 passes	0 passes	0 passes
05:00-06:00	0 passes	2 passes	3 passes	0 passes	0 passes
06:00-07:00	0 passes	2 passes	13 passes	0 passes	0 passes

The following tables summarises the results recorded on the static units deployed in 2019 and the figure below show the location of the statics deployed during the 2019 survey. The location of static units was similar to locations in 2017.

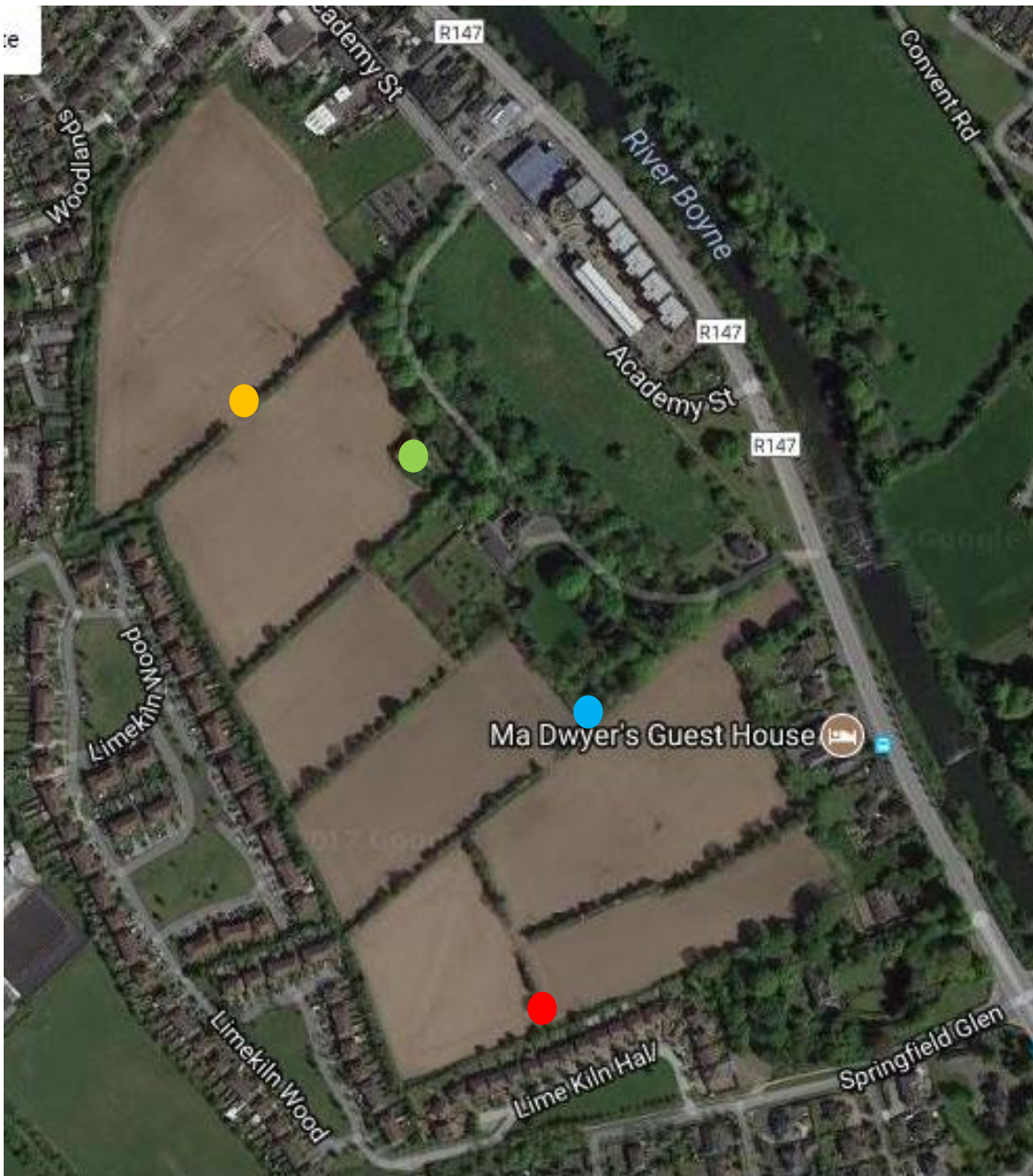


Figure 7: Map of survey area (www.biology.ie). Circles indicate the location of the Static recorders.

- Orange circle – SongMeter2 Unit 5
- Green circle – SongMeter2 Unit 4 (failed to record)
- Blue circle – SongMeter2 Unit 2
- Red circle – BatLogger A Unit A



A similar result in relation to the 2019 static results was recorded. The static unit (SM2 Unit 2) located adjacent to Belmont woodlands recorded 5 species of bat. The static unit (SM2 Unit 5) located on the northern linear habitat recorded three species of bat with a higher level of common pipistrelle bat activity compared to soprano pipistrelle and Leisler's bat activity. Unit A, located on the southern linear habitat, recorded three species of bat.

**Table 11: Results of Static Bat Detectors deployed during Static Bat Detector Surveys.**

Note: SM2 Unit 4 failed to record during surveillance period.

Static Code	Details	Leis	CP	SP	BLE	Myotis
<b>2019 SM2 Unit 2</b>	Location: treeline (blue triangle)	Night 1 – Low Night 2 – Low Night 3 – Low Night 4 – Low	Night 1 – Low Night 2 – Low Night 3 – Low Night 4 – Med	Night 1 – Low Night 2 – Low Night 3 – Low Night 4 – Low	Night 1 – Low Night 2 – Low Night 3 – Low Night 4 – Low	Night 1 – Low Night 2 – No Night 3 – Low Night 4 – No
Survey Period - 1/5/2019 to 5/5/2019						
<b>2019 SM4 Unit 5</b>	Location; on treeline (orange circle)	Night 1 – Low Night 2 – Low Night 3 – Low Night 4 – Low	Night 1 – Low Night 2 – Low Night 3 – Med Night 4 – Low	Night 1 – Low Night 2 – Low Night 3 – Low Night 4 – Low	None	None
Survey Period - 1/5/2019 to 5/5/2019						
<b>2019 Unit A</b>	Location: treeline (red triangle)	Night 1 – Low Night 2 – Low Night 3 – Low Night 4 – Low	Night 1 – Low Night 2 – Low Night 3 – Med Night 4 – Low	Night 1 – Low Night 2 – Low Night 3 – Low Night 4 – Low	None	None
Survey Period - 1/5/2019 to 5/5/2019						
<b>2019 SM2 Unit 4</b>	Barn (green circle)	No recordings	No recordings	No recordings	No recordings	No recordings
Survey Period - 1/5/2019 to 5/5/2019						

## 4. Bat Ecological Evaluation

### 4.1 Bat Species Recorded & Sensitivity

Three bat species were frequently recorded during these bat surveys: common pipistrelle, Leisler's bat and soprano pipistrelle. These three species are the three most common bat species recorded in Ireland. The additional two bat species recorded were Natterer's bat and brown long-eared bat and these were recorded in lower numbers and recorded woodland and treelines associated with the woodland.

The widespread encounters of common pipistrelles indicate that the survey area is widely used by this species while there was a concentration of the remaining four species around the treelines and woodlands associated (both within the proposed development site and adjacent) with Belmont House. The latter may be a reflection of the roosts recorded in the buildings in this area while the presence of Natterer's bat may be associated with the numerous mature trees with Potential Bat Roosting features within the proposed development site.

Roosts were recorded for the following bat species: Leisler's bat, brown long-eared bats, common pipistrelles and soprano pipistrelles. These were recorded in buildings adjacent to the proposed development site. There are no buildings within the proposed development site.

Overall a medium level of bat activity was recorded for the proposed development site and in relation to Table 2, it is considered that the local bat populations is of local importance due to the presence of numerous roosts within the Belmont House area and associated woodland.

### 4.2 Bat Foraging Habitat & Commuting Routes

A number of locations within the survey area have been identified as important foraging habitats and commuting routes for bats. Due to the close location of Belmont and associate woodland, the bat activity of this area, while outside the proposed development site, is represented in order to get a full picture of the local bat populations. These are represented on Figure 8 below.

Yellow circled locations represent HIGH importance (due to high level of bat activity and/or high number of bat species recorded within this area) and blue represent MEDIUM importance (due to medium level of bat activity and/or medium number of bat species recorded within this area).

Yellow arrows represent HIGH important commuting routes (due to high level of bat activity and/or high number of bat species recorded within this area) and blue represent MEDIUM importance (due to medium level of bat activity and/or medium number of bat species recorded within this area). The internal hedgerows/treelines are proposed to be removed to make way for the proposed development. Therefore, ensuring that there is good commuting linear habitat around the boundary of the proposed development site and linking it with the treelines and woodland of Belmont House is important.

### 4.3 Zone of Influence – Bat Landscape Connectivity

The survey area is located south of the town of Navan, Co. Meath. This town has increased in size with numerous residential developments proposed for the town environs. The proposed development site is currently surrounded by housing while there are agricultural fields to the south-west and the River Boyne valley is located to the east of the proposed development site.

As a consequence, it is important to ensure that for the long-term presence of local bat populations that there is an overall plan to ensure landscape connectivity especially along such linear habitats as the river valley of the River Boyne. It is particularly important that the dark zone of the River

Valley is retained and that minimum lighting is present to allow bats to commute safely to the River Boyne and associated habitats.

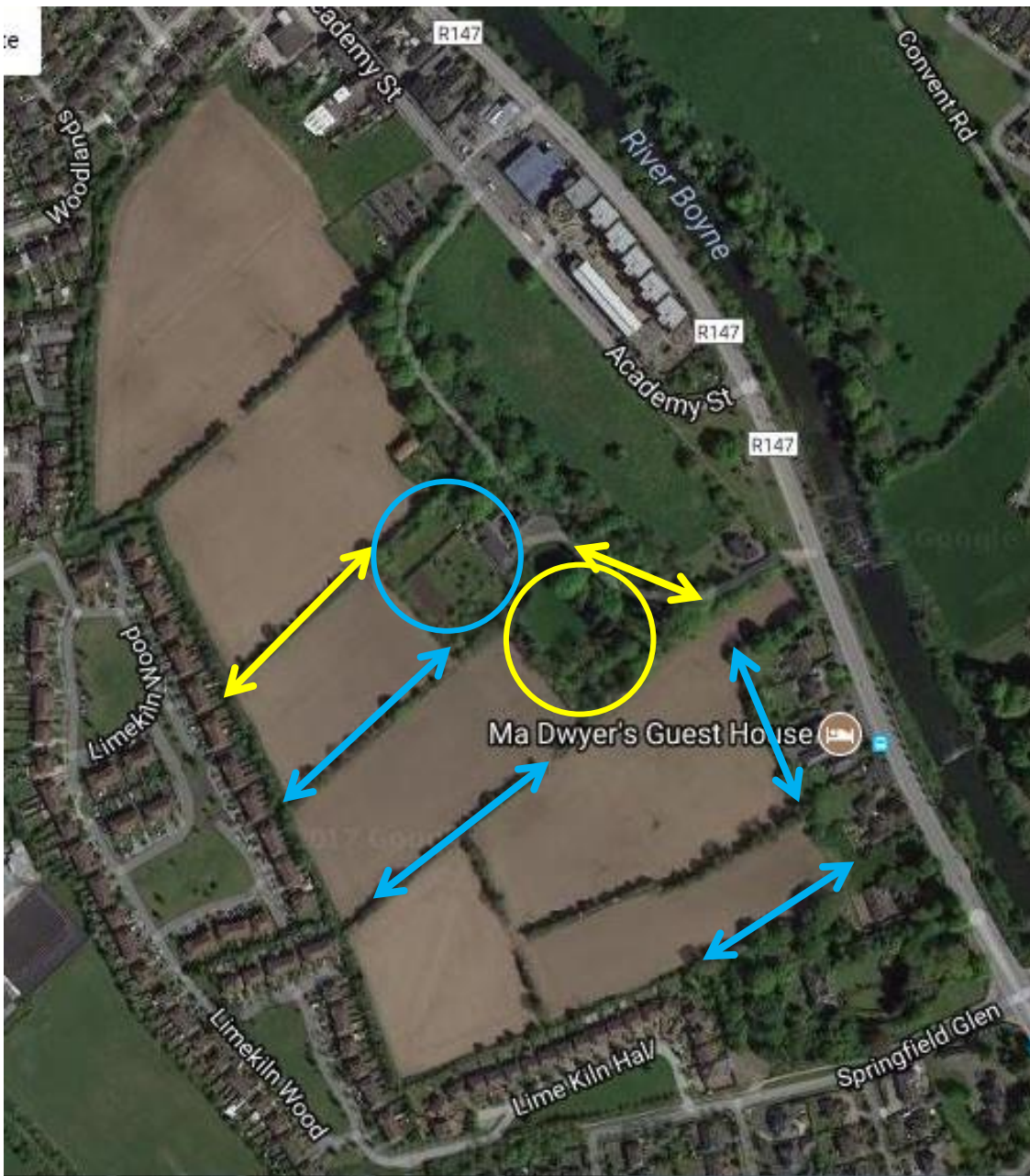


Figure 8: Important bat foraging habitats and commuting habitats.



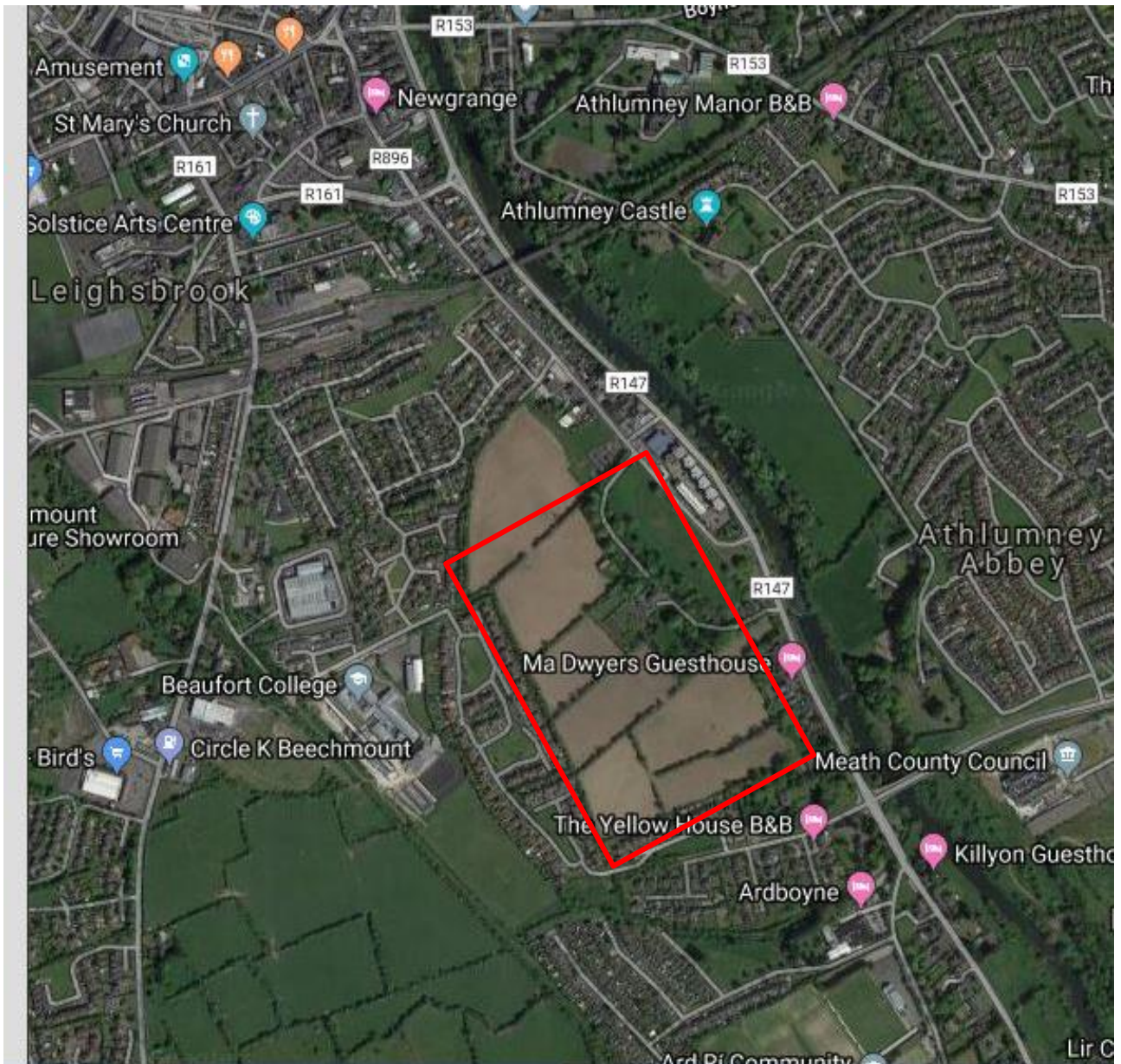


Figure 9: Aerial map of the environs of the proposed development area – Red Square = approximate location of proposed survey area (Source: Google Maps).



## 4.4 Development Proposals

### 4.4.1 Landscape Plan

The Landscape Plan for the proposed development site is presented below. An array of additional planting is proposed. This includes retaining existing woodland, where possible and planting “Parkland Trees”, “Street Trees”, “Small to Medium Trees” and “Native Mixed Woodland Areas”. Planting of a “Network of garden trees” to proposed as a replacement of the internal hedgerows to be removed to make way for the proposed development.

It is important that as much of the current external boundary treelines / hedgerows and existing woodland is retained. In addition, it is important to ensure that there is a continuous commuting route around the entire perimeter of the proposed development site with dark zones leading towards the River Boyne. Additional landscape measures are recommended and are detailed in the mitigation section.



Figure 10a: Landscape Plan for proposed development – Area 1 (Source: John Spain Associates).



Figure 10b: Landscape Plan for proposed development – Area 2 (Source: John Spain Associates).

The proposed planting material is as follows (Source: John Spain Architects) and is a mixture of native and non-native tree and shrub species:



**Proposed Street Trees**

Planted in same species group or lines on individual streets

- Acer campestre* 'Streetwise' 16-18 cm gth, 4-6m ht
- Acer campestre* 'Elsrijk' 16-18cm gth, 4-6m ht
- Betula pubescens* 14-16cm, 3-4m ht
- Corylus colurna* 14-16cm gth, 5-6m ht
- Pyrus* 'Chanticleer'\* 14-16cm, 3-4m ht
- Quercus robur* 'Fastigiata' 16-18cm gth, 4-6m ht
- Tilia cordata* 'Greenspire'\* 16-18cm, 5-6m ht
- Ulmus* 'Lobel' 16-18cm, 5-6m ht



**Proposed Parkland, Open Spaces and Feature Trees**

To include species from the above list and selected species from the following:

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li><i>Aesculus hippocastanum</i>* 14-16cm, 4.25-6m ht</li> <li><i>Alnus glutinosa</i> 14-16cm, 3-4m ht</li> <li><i>Castanea sativa</i>* 14-16cm, 4.25-6m ht</li> <li><i>Fagus sylvatica</i> 14-16cm, 4.25-6m ht</li> <li><i>Pinus sylvestris</i> 120-150cm, RB</li> <li><i>Populus tremula</i> 14-16cm, 4.25-6m ht</li> <li><i>Quercus petraea</i> 14-16cm, 4.25-6m ht</li> </ul> | <p><u>Specimens:</u></p> <ul style="list-style-type: none"> <li><i>Carpinus betulus</i> 20-25cm, 6m ht</li> <li><i>Cedrus atlantica</i> 'Glauca' 20-25cm, 6m ht</li> <li><i>Pinus radiata</i> 1.9m-2m ht, RB</li> <li><i>Quercus pallustis</i> 20-25cm, 6m ht</li> </ul> |
|---|--|





Small to Medium Trees	
To open spaces and public realm	To private gardens
<i>Betula pubescens</i> 14-16cm, 3-4m ht <i>Prunus padus</i> * 14-16cm, 3-4m ht <i>Pyrus 'Chanticleer'</i> * 14-16cm, 3-4m ht <i>Sorbus aria 'Lutescens'</i> * 14-16cm, 3-4m ht <i>Sorbus aucuparia</i> * 12-14cm, 2.5-3.5m ht	<i>Arbutus unedo</i> * 12-14cm, 2.5-3.5m ht <i>Betula pendula</i> 14-16cm, 3-4m ht <i>Malus floribunda</i> 12-14cm, 2.5-3.5m ht <i>Malus sylvestris</i> * 14-16cm, 3-4m ht <i>Prunus 'Kanzan'</i> 12-14cm, 2.5-3.5m ht <i>Prunus padus 'Fastigiata'</i> * 2-14cm, 2.5-3.5m ht <i>Pyrus 'Chanticleer'</i> * 14-16cm, 3-4m ht <i>Sorbus aria 'Lutescens'</i> * 14-16cm, 3-4m ht <i>Sorbus aucuparia</i> * 12-14cm, 2.5-3.5m ht
Tall shrubs	
<i>Acer palmatum</i> 150-175cm ht <i>Amelanchier Canadensis</i> * 150-175cm ht <i>Lavatera olbia</i> * 50-175cm ht <i>Ptelea trifoliata</i> * 50-175cm ht <i>Syringa vulgaris</i> * 150-175cm ht	



Orchard Trees
<i>Malus 'Irish Peach'</i> * (33%) <i>Prunus domestica 'Victoria'</i> * (33%) <i>Pyrus communis 'Conference'</i> * (33%)



Proposed Mixed Native Woodland Planting	
Trees - fthd trees 2.1 - 2.5m ht. - min 3m. ctrs	Shrubs - 60-90cm ht., in random groups of 5-15 no at 2-4m/sq.m
<i>Alnus incana</i> - 20% <i>Betula pendula</i> - 20% <i>Fagus sylvatica</i> - 10% <i>Fraxinus excelsior</i> (if permitted) - 20% <i>Quercus petraea</i> - 20% <i>Sorbus aria</i> * - 10%	<i>Cornus sanguinea</i> * - 10% <i>Crataegus europaeus</i> * - 20% <i>Ilex aquifolium</i> - 10% <i>Ligustrum vulgare</i> * - 10% <i>Prunus spinosa</i> * 20% <i>Rosa canina</i> * - 20% <i>Viburnum opulus</i> * - 10%
Underplanted with selected wildflower mix: <i>Hyacinthoides non-scripta</i> , <i>Arctium minus</i> , <i>Viola riviniana</i> , <i>Primula vulgaris</i> , <i>Succisa pratensis</i> , <i>Digitalis purpurea</i> , <i>Alliaria petiolata</i> , <i>Centaurea nigra</i> , <i>Filipendula ulmaria</i> , <i>Allium ursinum</i> , <i>Silene dioica</i> , <i>Plantago lanceolata</i> , <i>Rumex acetosa</i> , <i>Torilis japonica</i> , <i>Angelica sylvestris</i> , <i>Geum urbanum</i> , <i>Eupatorium cannabinum</i> , <i>Plantago media</i> , <i>Viola odorata</i> , <i>Teucrium scorodonia</i> .	

\* Species selected for their pollinating qualities.



Shrub planting Indicative species list	
Low height ornamental shrubs/plants - max. ht. 40-150cm, 2L min. pot size and planted at 5/m2	Medium height ornamental shrub / plants - max ht. 1m, 45-60cm, 3L pot at 3/m2 unless specified
<i>Ajuga reptans</i> va * <i>Carex</i> sp. <i>Centaurea montana</i> <i>Erica</i> spp.* <i>Geranium m. 'Czako'</i> * <i>Hedera helix 'Hibernica'</i> <i>Helleborus niger</i> * <i>Iberis sempervirens</i> * <i>Pachysandra terminalis</i> <i>Rosa 'Tananastrua'</i> * <i>Rosa 'Noaschnee'</i> * <i>Santolina cham. 'Nana'</i> * <i>Teucrium chamaedrys</i> *	<i>Calamagrostis x acutiflora 'Karl Foerster'</i> , <i>Choisya temata</i> <i>Cornus sanguinea</i> <i>Corylus avellana</i> <i>Cytissus 'All Gold'</i> <i>Hypericum 'Hidcote'</i> <i>Lavandula angustifolia 'Blue Cushion'</i> <i>Lonicera pileata</i> <i>Miscanthus</i> spp. <i>Philadelphus coronarius</i> * <i>Rudbeckia 'Goldstrum'</i> <i>Sarcococca</i> spp. <i>Spiraea japonica 'Firelight'</i> <i>Stipa</i> spp <i>Viburnum davidii</i> Specimen: <i>Amelanchier Canadensis</i> 90-120cm <i>Cotinus coggygria</i> (90-120cm) <i>Rhus thypina</i> (90-120cm)



Hedge planting
Planted in single species in different lengths across the site. 60-90Ccm at 3/m
<i>Fagus sylvatica</i> , <i>Prunus lusitanica</i> *, <i>Taxus baccata</i> , <i>Lonicera nitida</i> , <i>Griselinia littoralis</i>

The Draft Landscape Plan (consulted 8/11/2019) stated the following:

#### TREE RETENTION

- 133 existing trees will be retained within the site area of Belmont Woodland including all the largest specimen trees.
- Retains the protected stand of trees as a landscape feature.
- Retains the rectilinear shape and edges of the woodland.

#### TREE LOSS

19 trees will be lost in the existing woodland to provide access to the Belmont Development.  
1 tree will be removed overall in the woodland due to ill-health.

#### TREE PLANTING & MITIGATION

- 14 trees are proposed within the woodland. These will grow to re-create the closed canopy edge of the existing woodland.
- 4 woodland blocks are proposed in close proximity to the woodland (also see the Landscape Masterplan presented on page 16 of the Landscape Design Report).
- 281 parkland trees are proposed across the development
- 218 street trees are proposed across the development
- 64 orchard trees are proposed across the development
- 360 garden trees are proposed across the development

#### RESULTANT TREE COVER

There will be some minor tree loss required in order to develop this site. However, the overall result;

- Retains the vast majority of the individual trees within the protected stand.
- Retains the overall woodland shape of the protected stand of trees.
- Retains the rectilinear woodland edges
- Extends connecting woodland blocks
- Includes a significant network of street, parkland and gardens trees throughout.”



#### 4.4.2 Lighting Plan

The Lighting Plans for the proposed development site is presented below. The proposed development site is divided into three grids. The lighting plan is primarily street lighting for the road infrastructure. The back gardens of individual houses are primarily located adjacent to the external boundaries which act as a buffer zone from the street lighting.

In relation to Grid 1, street lighting is close to the external boundaries and horizontal illuminance ranges from 1.04 to 32.91 Lux with an average of 5.71. It is recommended that level of 1 lux or less is achieved adjacent to external linear habitats in order to reduce impacts on commuting and foraging bats.

In relation to Grid 2, street lighting is close to the external boundaries of Belmont House and woodlands and horizontal illuminance ranges from 1.11 to 34.30 Lux with an average of 5.57. It is recommended that level of 1 lux or less is achieved adjacent to external linear habitats in order to reduce impacts on foraging and commuting bats.

In relation to Grid 3, street lighting is close to the external boundaries of Belmont House and woodlands and horizontal illuminance ranges from 1.07 to 13.81 Lux with an average of 5.44. It is recommended that a level of 1 lux or less adjacent to external linear habitats is achieved in order to reduce impacts on commuting and foraging bats.

In relation to Grid 4, horizontal illuminance ranges from 5.99 to 32.76 Lux with an average of 5.99. It is recommended that a level of 1 lux or less adjacent to external linear habitats is achieved in order to reduce impacts on commuting and foraging bats.

In relation to Grid 5, horizontal illuminance ranges from 7.34 to 31.29 Lux with an average of 15.16. It is recommended that a level of 1 lux or less adjacent to external linear habitats is achieved in order to reduce impacts on commuting and foraging bats.

In relation to Grid 6, horizontal illuminance ranges from 6.17 to 33.04 Lux with an average of 15.02. It is recommended that a level of 1 lux or less adjacent to external linear habitats is achieved in order to reduce impacts on commuting and foraging bats.



Figure 11a: Horizontal Illuminance levels for Grid 1.

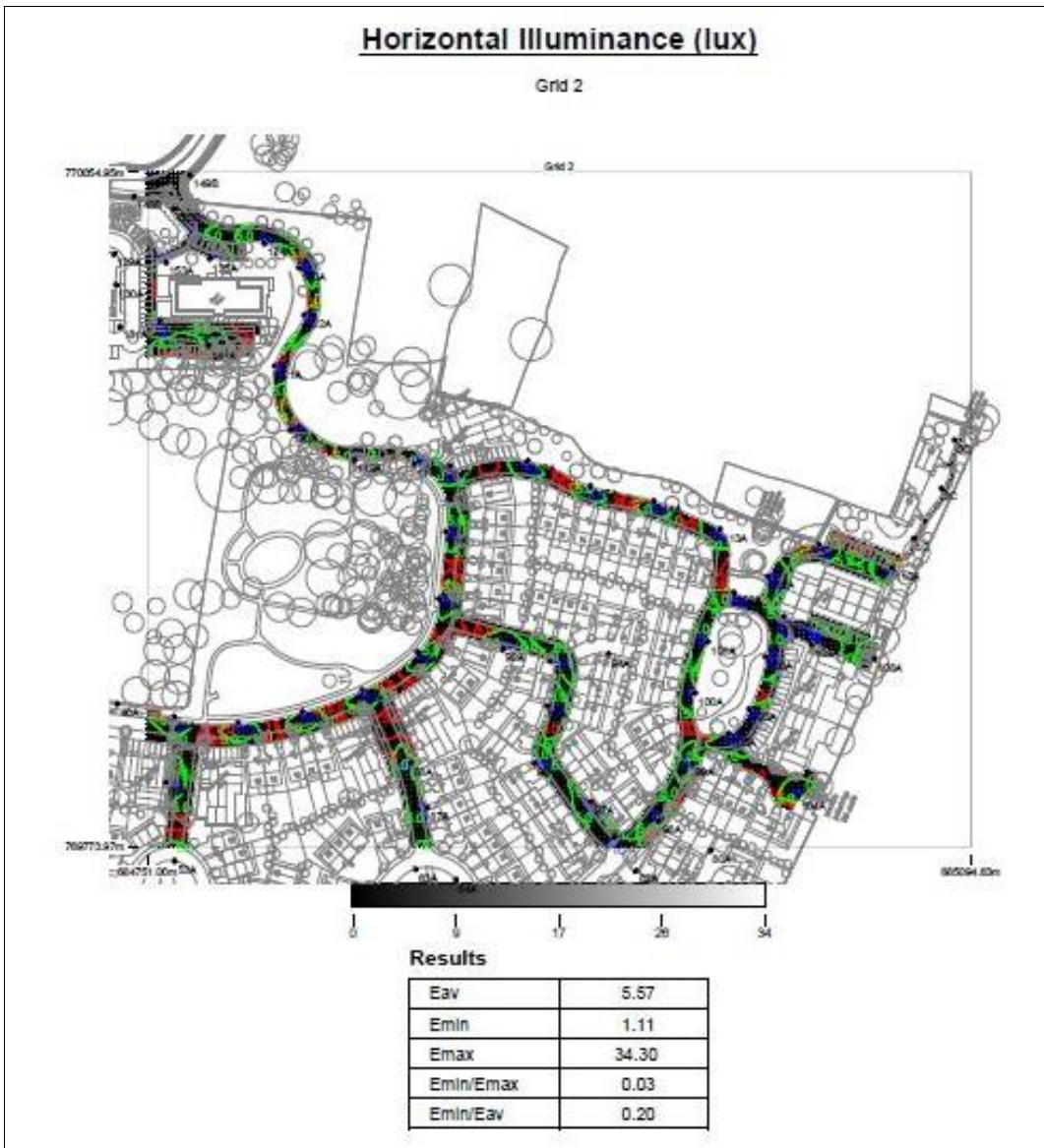


Figure 11b: Horizontal Illuminance levels for Grid 2.



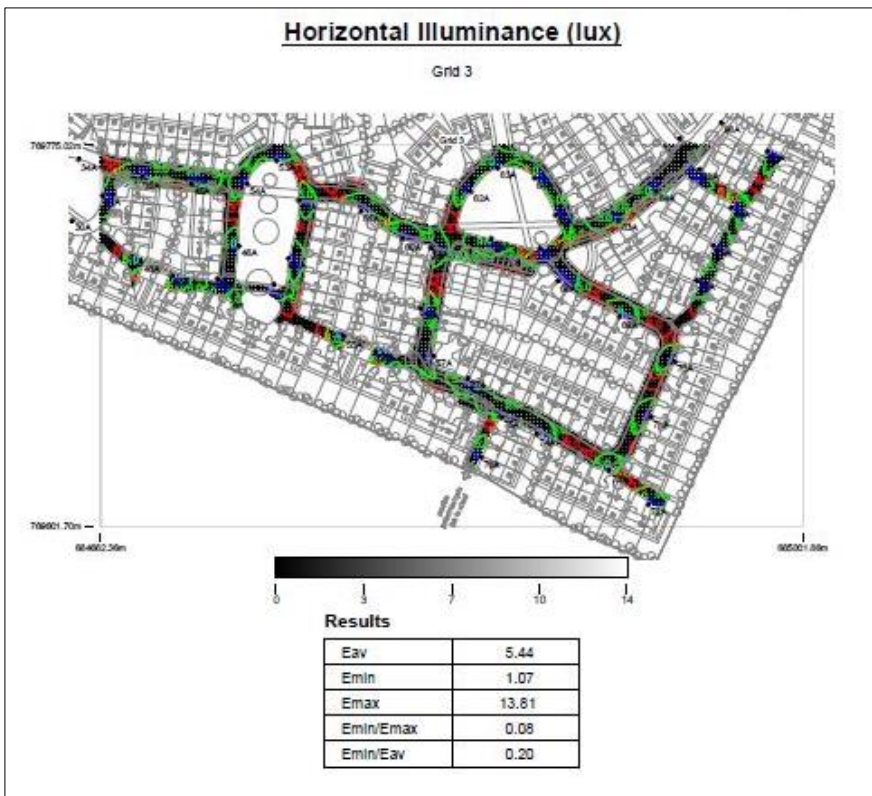


Figure 11c: Horizontal Illuminance levels for Grid 3.

## 5. Impact Assessment & Mitigation

The following bat species have been recorded during this bat survey: common pipistrelle, soprano pipistrelle, Leisler's bat, brown long-eared bat and Natterer's bats. This represents five of the nine residence bat species known to Ireland.

All bat species recorded during this Bat Survey are Annex IV species under the EU Habitats Directive and all have a Favourable Status in Ireland.

The presence of bats was given consideration at the design phases of the proposed development. For this ecological assessment, the habitats adjacent to the proposed development may be considered in terms of extent, diversity, naturalness, rarity, fragility, typicalness, recorded history, position, potential value and intrinsic appeal (Regini, 2000). The potential of these habitats for bat fauna is considered in this framework also.

- Bats may use trees with heavy ivy growth as occasional roosts. Bats may use mature trees with tree holes etc., as roosting sites all year around. A tree assessment in relation to Potential Bat Roosts (PBRs) was undertaken and this was compared to the Landscape plan to determine which trees will be felled. A large number of trees are located within the proposed development site, with 11 of the trees proposed to be felled identified as Potential Bat Roosts (PBRs). Overall, extensive retention and enhancement of linear habitat features and woodland habitat are proposed as part of the landscape strategy for the proposed development site.
- Foraging and commuting areas were recorded along hedgerows and treelines within the proposed development site, particularly for common and soprano pipistrelles while a large proportion of the bat activity was associated with the woodland and treelines of Belmont House for Leisler's bats, soprano pipistrelles, brown long-eared bats and Natterer's bats. Four bat species are reliant on linear habitats and woodlands for foraging and commuting. The exception to this is Leisler's bats, which is a bat species that fly high over the landscape. They are not a reliant on linear habitats to traverse through the landscape. However, they will frequently forage above the tree canopy, as recorded in this bat survey. Internal linear habitats are proposed to be removed to make way for the proposed development. To mitigate for this, the landscaping included a network of newly planted trees throughout the proposed development.
- There are no buildings within the survey area. An extensive array of buildings is located adjacent to the survey area. A selection of buildings adjacent to the proposed development area have been surveyed as part of this bat survey, three of which have been recorded as a bat roosts (maternity, satellite and night roosts).

### 1 *agricultural grasslands/arable fields.*

This habitat is present within the survey area as agricultural blocks surrounded by linear habitats. These agricultural blocks and associated hedgerows/treeline boundaries provides foraging habitat for all of the bat species recorded. May be considered as Medium ecological value.

## 2 *hedgerow and treeline boundaries, access tracks.*

These habitat types are present around agricultural blocks, boundaries of the survey area and roadways. Such provide wildlife corridors and foraging areas for many bat species. Bat roosts may be present in mature trees or larger ivy-covered trees. However, these linear habitats are essential for commuting bats. May be considered as High ecological value.

## 3 *Woodland*

Native woodland is located as part of Belmont House and this provides foraging and commuting habitat for the suite of bat species recorded. May be considered as of High ecological value for bats.

Bat fauna within the survey area will be affected by both the construction phase and operational phase of the proposed development. The impact assessment and mitigation will be undertaken in relation to the five bat species recorded within the proposed development area: common pipistrelle, soprano pipistrelle, Natterer's bat, Leisler's bat and brown long-eared bat.

Principal impacts of the proposed development, in general, on bat fauna may be summarised as follows:

1. A variety of habitats occur within the proposed development area, which vary in their importance for bats. The loss of areas of agricultural grassland/arable land within the proposed development area will have a negligible or minor impact on bats. The main impact on bats arises through the loss of internal hedgerows and treelines within the proposed development area which are widely used by all bat species recorded. Loss of bat habitats such as treelines, hedgerows as a result of construction will impact on commuting bats. Without mitigation measures and a Landscape Plan, the potential impact is considered as Moderate Negative Impact.
2. Loss or fragmentation of foraging habitats may diminish the available insect prey species and reduce feeding area for bats in some locations. This is considered as a Moderate Negative impact.
3. Bats will often use trees as roosting sites. Potential Bat Roosts in trees is also an important area to address and the proposed road route will be assessed for PBRs. There are 11 trees deemed to have roosting potential that are proposed to be felled. The loss of trees in the landscape as a result of proposed development is likely to be Moderate Negative impact.

The proposed works is likely to entail the following:

- a) Lighting of the general area.

Proposed lighting of the proposed development post works may impact on all bat species in relation to commuting, roosting and foraging potential. But the degree of impact is dependent on how sensitive the particular bat species is to lighting as some bats are tolerant of lighting. It is also dependent on the type of lighting installed and the location of such lighting.

Leisler's bats are tolerant of street lighting. Common pipistrelles and soprano pipistrelles will tolerate low levels of lighting while brown long-eared bats and *Myotis* species (Natterer's bat) are lighting sensitive bat species.



#### a) Removal of Linear habitats / woodland

There is large number of trees deemed to have roosting potential for bats as well as extensive treeline/hedgerow network within the proposed development site. As a consequence, many of the linear habitat features had bat activity recorded along their length. Particular linear habitats were deemed important for local bat populations.

In particular there are a number of mature trees to be felled and this will impact on Natterer's bats and brown long-eared bats. Eleven of these trees are deemed as Potential Bat Roosts.

The proposed development plan will require internal linear habitats to removed or partially removed to make way for the development. One of these linear habitats was deemed to be of High important for local bat populations, particularly common pipistrelles.

It is recommended that as much existing woodland, treelines and hedgerows is retained as part of the proposed development to ensure that there is foraging, roosting and commuting habitat for local bat populations and that newly planted hedgerows are planted using Irish native tree and shrub species to retain connectivity post development. New planting is particularly important around the external boundary of proposed development site to ensure connectivity for local bat populations.

#### b) Infrastructure

The construction and operation of infrastructure to support the proposed development (e.g. roads and street lighting etc.) will impact on linear habitats. This will result in the loss of some treelines/hedgerows and as a consequence commuting and foraging habitats. The lighting of infrastructure will also potentially impact on foraging and commuting bats as mentioned above.

#### c) Operational post-development

The operation of the proposed development site as a residential development with open spaces will increase human usage of the site and as a consequence potential disturbance due to increased noise levels and lighting. However, as the proposed development site is primarily used as a commuting and foraging area for three common bat species, landscaping and lighting controls will reduce this impact. The two additional bat species recorded are considered to be light-sensitive bat species and will be impacted by the operation of the proposed development site. The location of the records of these two species were on the external treelines / woodland edge of Belmont House and therefore landscaping and retention of the boundary linear habitats is likely to reduce the impact of the operation of the proposed development on these bat species.

In the absence of mitigation the proposed development is considered to have an overall potential Moderate negative impact on location bat populations.

**Table 12: Potential impact of the proposed development on the different bat species recorded during survey work.**

Works	SP	CP	Leis	BLE	Natt
<b>Lighting of development area</b>	Moderate	Moderate	Minor- Moderate	Moderate	Moderate
- Reduced foraging					
- Reduced commuting					
<b>Removal of linear habitats</b>	Moderate	Moderate	Moderate	Moderate	Moderate
<b>Removal of trees</b>	Moderate	Moderate	Moderate	Moderate	Moderate
<b>Operation of the development site</b>	Moderate	Moderate	Minor	Moderate	Moderate
<b>Infrastructure</b>	Moderate	Moderate	Minor	Moderate	Moderate

SP = soprano pipistrelle, CP = common pipistrelle, Leis = Leisler's bat, BLE = brown long-eared bat, Natt = Natterer's bat

## 5.1 Mitigation Measures

The following mitigation measures are recommended to reduce the potential impact of the proposed development on local bat populations. Figure 12 also provides additional information with regards to the location of some of the bat mitigation measures recommended.

### 5.1.1 Lighting plan

Nocturnal mammals are impacted by lighting. Therefore it is important that lighting installed within the proposed development site is completed with sensitivity for local wildlife while still providing the necessary lighting for human usage. The principal areas of concern are the woodland and treelines/hedgerows remaining within the proposed development area. The following principles will be followed especially in relation to the general residential area and will also be implemented for the woodland area:

- Artificial lights shining on bat roosts, their access points and the flight paths away from the roost **must always be avoided**. This includes alternative roosting sites such as bat boxes.
- Lighting design should be flexible and be able to fully take into account the presence of protected species. Therefore, appropriate lighting should be used within a proposed development and adjacent areas with more sensitive lighting regimes deployed in wildlife sensitive areas.
- Dark buffer zones can be used as a good way to separate habitats or features from lighting by forming a dark perimeter around them. This should be used for habitat features noted as foraging areas for bats.
- Buffer zones can be used to protect Dark buffer zones and rely on ensuring light levels (levels of illuminance measured in lux) within a certain distance of a feature do not exceed certain defined limits. The buffer zone can be further subdivided in to zones of increasing illuminance limit radiating away from the feature or habitat that requires to be protected.

- 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, 2018).
  - o All luminaires used will lack UV/IR elements to reduce impact.
  - o LED luminaires will be used due to the fact that they are highly directional, lower intensity, good colour rendition and dimming capability.
  - o A warm white spectrum (<2700 Kelvins will be used to reduce the blue light component of the LED spectrum).
  - o Luminaires will feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats.
  - o Column heights should be carefully considered to minimise light spill. The shortest column height allowed should be used where possible.
  - o Only luminaires with an upward light ratio of 0% and with good optical control will be used.
  - o Luminaires will be mounted on the horizontal, i.e. no upward tilt.
  - o Any external security lighting will be set on motion-sensors and short (1min) timers.
  - o As a last resort, accessories such as baffles, hoods or louvres will be used to reduce light spill and direct it only to where it is needed.

Planting of screening will also be effectively used to prevent lighting spillage areas where bat foraging is recorded. In particular, lighting will not shine onto important commuting and foraging areas identified for local bat populations.

A Lux level of 1 or less in relation to horizontal illuminance is recommended along the boundary habitat and woodland habitat within the proposed development site. This is particularly important in relation to any lighting within the woodland habitats. Low bollard lighting is also recommended for pedestrian areas in order to reduce the height of the outdoor lighting in the tree canopy of woodland areas. Dark zones are recommended and these are presented in Table 12.

A letter was received in relation to confirmation that guidelines will be followed in relation to the lighting plans for the proposed development plan. This is presented in Appendix 3.

### 5.1.2 *Landscaping plan*

It is important to ensure that as much treelines / hedgerows are retained within the survey area, particularly on the boundary and in connection with the woodlands and treelines of Belmont House.

The landscaping plan will incorporate (additional information is provided in Section 4):

- Retention and enhancement of boundary habitats.
- Retention of woodland habitat, where possible.
- Retention of a number of mature trees in linear habitats proposed to be retained.
- Planting of new native hedgerow.
- Planting of a variety of mature and semi-mature trees including a network of trees to mitigate for the loss of internal hedgerows.

In addition, the Landscape Plan proposes:

- Open spaces with additional planting are proposed. This will potentially provide additional foraging areas for local bat populations. It will be important to ensure that lighting is at a minimum in these areas in order for them to be suitable for foraging bats.

In general, the following will also be followed:

- Any semi-natural habitats will be protected from potential damage construction phase and post-construction.
- The use of chemicals (weed killers, *etc.*) will be kept to a minimum within the development zone and will not be used in near the woodland.

### 5.1.3 Removal of trees

- Minimise the removal of mature trees, where possible.
- A total of 11 trees, deemed as PBRs, are proposed to be removed. If the trees are to be removed, planting will be undertaken to mitigate for tree removal and landscaping plans will be planted “like for like” in relation to tree and shrub species removed. Consideration will be given towards hawthorn, blackthorn mix with individual ash, alder and birch to form a native tree hedge) and deciduous trees (native tree species include ash, oak, alder, birch).
- A 2<sup>nd</sup> assessment of the trees proposed to be removed will be undertaken prior to tree removal to determine total number of trees to be felled and the tree felling procedure to be undertaken. This will be undertaken in consultation with the tree surgeons.

Where possible, trees, which are to be removed, should be felled on mild days during the autumn months of September, October or November or Spring months of February and March (felling during the spring or autumn months avoids the periods when the bats are most active).

An assessment of trees according to their PBR value determines the methodology of felling. Trees with PBR Category 1 are highly suitable for roosting bats and require more intensive procedures prior to felling. The trees identified within the survey area are PBR Category 1 and 2. The procedure to fell these is as follows:

- Category 1: Trees with roosting features (dead wood, tree holes *etc.*) should be checked prior to felling. It is recommended that they are physically checked (using an endoscope and high power torch) or a dusk/dawn surveys are completed to determine if bats are roosting within. A tree felling plan will be required in consultation with the tree surgeons. A bat box scheme will need to be erected prior to felling and in consultation with the bat specialist. Any trees showing crevices, hollows, *etc.*, should be removed while a bat specialist is present to deal with any bats found. Such animals should be retained in a box until dusk and released on-site. Large mature trees will be felled carefully, essentially by gradual dismantling by tree surgeons, under supervision of a bat specialist. Care will be taken when removing branches as removal of loads may cause cracks or crevices to close, crushing any animals within.
- Category 2: Any ivy covered trees which require felling will be left to lie for 24 hours after cutting to allow any bats beneath the cover to escape.
- A bat box scheme is required to be erected prior to any tree felling. The number of bat boxes will be determined by the category and number of trees proposed to be felled. In principle this will follow the following:



For every Category 1 trees to be felled – one bat box is required  
For every three Category 2 trees to be felled – one bat box is required

**Standard woodstone bat boxes:**



Bat boxes scheme will be erected and to ensure that bats use the bat boxes, they will be sited carefully and this will be undertaken by a bat specialist. Bat boxes will be erected prior to tree felling. Some general points that will be followed include:

- Straight limb trees (or telegraph pole) with no crowding branches or other obstructions for at least 3 metres above and below position of bat box.
- Diameter of tree should be wide and strong enough to hold the required number of boxes.
- Locate bat boxes in areas where bats are known to forage or adjacent to suitable foraging areas. Locations should be sheltered from prevailing winds.
- Bat boxes should be erected at a height of 4-5 metres to reduce the potential of vandalism and predation of resident bats.
- It is recommended to erect a number of bat boxes on one tree at an array of aspects. South facing boxes will receive the warmth of the sun, which is necessary for maternity colonies. In large bat box scheme it is generally recommended to have three bat boxes arranged at the same height facing North, South-East and South-West. This ensures a range of temperatures are available all day. If the South facing boxes become warm, bats can safely remove to the cooler North facing box.
- Locations for bat boxes should be selected to ensure that the lighting plan for the proposed site does not impact on the bat boxes.

*5.1.4 Alternative Bat Roosts*

As part of biodiversity enhancement measures, it is recommended to erect four rocket bat boxes, the locations for which are recommended to be in the woodland and boundary corners (Please see Figure 12 for exact locations).

*5.1.5 Monitoring*

Monitoring is recommended post-construction works. This monitoring should involve the following aspects:

- Inspection of bat boxes within one year of erection of bat box scheme/rocket box and inspection of current bat box scheme. Register bat box scheme with Bat Conservation Ireland. This should be undertaken for a minimum of 2 years.

- Monitoring of any bat mitigation measures. All mitigation measures should be checked to determine that they were successful. A full summer bat survey is recommended post-works.

**Table 13: Potential impact of the proposed development on the different bat species recorded during survey work if bat mitigation measures are fully implemented.**

Works	SP	CP	Leis	BLE	Natt
<b>Lighting of development area</b>	Minor to Moderate	Minor to Moderate	Minor	Minor to Moderate	Minor to Moderate
- Reduced foraging					
- Reduced commuting					
<b>Removal of linear habitats / retention / replanting</b>	Minor	Minor to Moderate	Minor	Minor to Moderate	Minor to Moderate
<b>Removal of trees in a manner as prescribed</b>	Minor	Minor	Minor to Moderate	Moderate	Moderate
<b>Operation of the development site</b>	Minor	Minor	Minor	Minor to Moderate	Minor to Moderate
<b>Infrastructure</b>	Minor	Minor	Minor	Minor to Moderate	Minor to Moderate

SP = soprano pipistrelle, CP = common pipistrelle, Leis = Leisler's bat, BLE = brown long-eared bat, Natt = Natterer's bat



Figure 12: Proposed layout of proposed development at Limekiln, Navan, Co. Meath with bat mitigation measure locations (Source: John Spain Associates).

- Orange Lines / Hatching – recommended native treeline / hedgerow planting / woodland planting.
- Blue Lines – recommended retention of treeline / hedgerow with supplementary planting.
- Red Squares – recommended dark zones.
- Red Circles – location of free standing rocket bat boxes in dark zones.

## 6. Survey Conclusions

This report provides information on the bat usage of the proposed development site. Three bat species were frequently recorded during these bat surveys: common pipistrelle, Leisler's bat and soprano pipistrelle. The additional two bat species recorded were Natterer's bat and brown long-eared bat within the survey area.

The medium level of bat activity of common pipistrelles, soprano pipistrelles and Leisler's bats was recorded, while a low level of bat activity was recorded for Natterer's bat and brown long-eared bat. Overall, the level of bat activity could be considered as Medium level. A number of roost types were recorded for Leisler's bat, soprano pipistrelle, brown long-eared bats and common pipistrelles in buildings outside the proposed development site.

In relation to the bat evidence collected by this report, it is deemed that the bat populations recorded within the survey area are of Local Importance.

In the absence of mitigation the proposed development will likely have an overall Moderate Negative impact on local bat populations.

A number of mitigation measures have been provided and incorporated into the design of the proposed development, and strict adherence to these will reduce the overall impact level to Minor-Moderate Negative impact.

The proposed development area will result in the loss of a number of commuting hedgerows/treelines. Landscape Plan will retain the majority of the boundary hedgerows/treelines and new planting and enhancement planting will ensure connectivity of the woodland area of the Belmont House. A network of trees is planned throughout the site to mitigate for the loss of internal linear habitats. Additional open spaces will create potentially further foraging areas for bats which will also be connected as part of the green infrastructure.

The proposed development will increase the degree of lighting. However, the lighting plan is designed to reduce lighting spillage onto external hedgerows/treelines which will allow their continued usage by commuting and foraging bats.

The proposed development will result in the felling of 11 mature trees deemed as Potential Bat Roosts but this will be undertaken in a manner to ensure that no bats are harmed and alternative roosting will be provided in the form of bat boxes.

Additional alternative roosting sites are recommended in areas deemed suitable to foraging bats.

Additional measures have been recommended in relation to lighting and landscaping to reduce the overall impact of the proposed development on local bat populations.



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## 8. Appendices

### Appendix 1 Bat Habitat & Commuting Route Classifications

**Table 1.A: Hedgerow Category (Bat Conservation Ireland, 2015)**

Type of Hedgerow / Treeline	Code	Description / Bat Potential
<b>Small Hedgerow</b>	<b>SH</b>	<p>Hedgerow is less than approximately 1.5 m high, there are no, or very few, protruding bushes or trees. This type of hedgerow would provide little shelter to bats.</p> 
<b>Medium Hedgerow</b>	<b>MH</b>	<p>Hedgerow is approximately 1.5 to 3 m high. This type of hedgerow will provide foraging and commuting potential for bats.</p> 
<b>Sparse Treeline Hedgerow</b>	<b>ST</b>	<p>Hedgerow, low or medium in height, with individual trees (where tree canopies, for the most part, do not touch).</p>

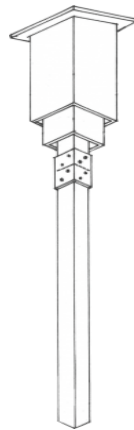
		
<p><b>Dense Treeline Hedgerow</b></p>	<p><b>DT</b></p>	<p>Large uncut hedgerows or treelines, dominated by mainly large tree or very tall scrub species (e.g. tall hawthorn, blackthorn or hazel), where the canopies are mostly touching.</p> 

**Table 1.B: Habitat Classification (Bat Conservation Ireland, 2015, based on Fossit, 2000)**

Cultivated land		Salt marshes		Exposed rock		Fens/flushes	
Built land		Brackish waters		Caves		Grasslands	
Coastal structures		Springs		Freshwater marsh		Scrub	
Shingle/gravel		Swamps		Lakes/ponds		Hedges/treelines	
Sea cliffs/islets		Disturbed ground		Heath		Conifer plantation	
Sand dunes		Watercourse		Bog		Woodland	



Appendix 2 Rocket Bat Box



(please view on [www.nhbs.com](http://www.nhbs.com))

Table 1: Summary of bat passes recorded on static units in 2019.

Static	Night	CP	SP	Leis	BLE	Natt / My
Unit A	Night 1	46 passes	15 passes	48 passes	0 passes	0 passes
	Night 2	12 passes	13 passes	2 passes	0 passes	0 passes
	Night 3	255 passes	44 passes	44 passes	0 passes	0 passes
	Night 4	6 passes	5 passes	2 passes	0 passes	0 passes
SM2 unit 5	Night 1	132 passes	19 passes	18 passes	0 passes	0 passes
	Night 2	21 passes	11 passes	11 passes	0 passes	0 passes
	Night 3	246 passes	12 passes	4 passes	0 passes	0 passes
	Night 4	67 passes	15 passes	8 passes	0 passes	0 passes
SM2 Unit 2	Night 1	56 passes	29 passes	12 passes	5 passes	2 passes
	Night 2	34 passes	38 passes	25 passes	4 passes	0 passes
	Night 3	27 passes	24 passes	17 passes	3 passes	3 passes
	Night 4	38 passes	46 passes	15 passes	1 pass	0 passes

## Appendix 3 Lighting Plan - Letter



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Mr. Simon Walsh,  
Davy Hickey Properties  
Ltd

Issued by Email: 13/11/2019  
Our Ref: Academy Street, Navan, 3114  
Public lighting  
Page 1 of 1

**RE: PUBLIC LIGHTING SUBMISSION – BELMONT, ACADEMY STREET, NAVAN,  
CO. MEATH**

Dear Simon,

In relation to the public lighting submission for the proposed development at Belmont, Academy Street, Navan, Co. Meath, please find attached Public lighting layout drawing and calculation report.

We can confirm that the public lighting has been designed to a lighting class of P4 (EN13201), with a step back to Lighting class P5 after 12 O' Clock Midnight.

We can further confirm we have designed the public lighting for the scheme in accordance with Bat Conservation Ireland guidelines: Bat Conservation Ireland (Bats and Lighting: Guidance Notes for Planners, Engineers, Architects and Developers, BCI, 2010) and the Bat Conservation Trust (Guidance Note 08/18 Bats and Artificial Lighting in the UK (BCT, 2018).

A lighting accessory in the form of cowls may be installed where necessary as a preventative measure to reduce unwanted light spill. The proposed lamps have limited backward light properties thus assisting in reducing backward light spill. Lamps have also been specified with 0 Degree tilt to ensure limited unwanted light spill. Lamps shall have a narrow spectrum and limited UV component.

If you require anything further, please do not hesitate to contact me. Regards,

Kieran Morley