ECOLOGICAL IMPACT ASSESSMENT REPORT

FOR

Proposed Strategic Housing Development

AT

Castle Street, Bray, Co. Wicklow

ON BEHALF OF

SILVERBOW LTD.

Prepared by
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1 INTRODUCTION

Enviroguide Consulting was commissioned by Silverbow Ltd. to undertake an Ecological Impact Assessment for a Proposed Strategic Housing Development at Castle Street, Bray County Wicklow.

This Ecological Impact Assessment (EcIA) assesses the potential effects of the Proposed Development on habitats and species; particularly those protected by National and International legislation or considered to be of particular nature conservation importance. This report will describe the ecology of the Proposed Development area, with emphasis on habitats, flora and fauna, and will assess the potential effects of the Construction and Operational Phases of the Proposed Development on these ecological receptors. The report follows Guidelines for Ecological Impact Assessment in the UK and Ireland, by the Chartered Institute of Ecology and Environmental Management (CIEEM, 2018).

1.1 Quality assurance and competence

Synergy Environmental Ltd., T/A Enviroguide Consulting, is wholly Irish Owned multi-disciplinary consultancy specialising in the areas of the Environment, Waste Management and Planning. All of Enviroguide's consultants carry scientific or engineering qualifications and have a wealth of experience working within the Environmental Consultancy sectors, having undergone extensive training and continued professional development.

Enviroguide Consulting as a company remains fully briefed in European and Irish environmental policy and legislation. Enviroguide staff members are highly qualified in their field. Professional memberships include the Chartered Institution of Wastes Management (CIWM), the Irish Environmental Law Association and Chartered Institute of Ecology and Environmental Management (CIEEM).

All surveying and reporting have been carried out by qualified and experienced ecologists and environmental consultants. Siobhán Atkinson, Senior Ecologist with Enviroguide undertook the habitat surveys and desktop research for this report. Liam Gaffney, Senior Ecologist with Enviroguide undertook the breeding bird survey for this report. Dr Tina Aughney, Professional Bat Ecologist with Bat Eco Services Ltd. undertook the on-site bat surveys.

Liam Gaffney has a B.Sc. Hons. (Zoology) and a M.Sc. Hons. (Wildlife Conservation and Management) from University College Dublin, and a wealth of experience in desktop research, literature scoping-review, and report writing, as well as practical field experience (Habitat surveys, Invasive species surveys, Wintering bird surveys, large mammals, fresh water macro-invertebrates etc.). Liam has extensive experience in compiling Biodiversity Chapters of EIARs, EcIAs, AA screening and NIS reports, and in the overall assessment of potential impacts to ecological receptors from a range of developments. Liam is also a Qualifying member of CIEEM, the Chartered Institute of Ecology and Environmental Management.

Siobhán has a B.Sc. (Hons) in Environmental Biology and a Ph.D. in Freshwater Biology from University College Dublin, and extensive experience in desktop research, literature review and reporting, as well as practical field and laboratory experience including environmental DNA analysis, freshwater macroinvertebrate sampling and identification, fish sampling and processing and habitat surveying. Siobhán has prepared Ecological Impact Assessments

(EcIA), Stage I and Stage II Appropriate Assessment Reports, Habitat Surveys and Invasive Species Surveys and input and reviewed Ecological and Environmental assessments for several EIA Reports.

Dr Tina Aughney has worked as a Professional Bat Ecologist since 2000 and is director of Bat Eco Services, an independent, professional environmental consultancy. Dr Aughney has a wealth of academic qualification having studied both a B.Sc. Hons. in Environmental Science from NUI Galway and a PhD in Environmental Science. A member of The Heritage Council Bat Panel, Dr Aughney is also the co-ordinator of large-scale bat monitoring projects e.g. The All-Ireland Daubentons Bat Waterways Survey. Bat Eco Services operatives are fully licenced by the NPWS to survey, capture and handle all Irish Bat Species.

2 RELEVANT LEGISLATION

An Ecological Impact Assessment (EcIA) is a process of identifying, quantifying, and evaluating potential effects of development-related or other actions on habitats, species and ecosystems (CIEEM, 2016). The Proposed Development is a sub-threshold for an Environmental Impact Assessment (EIA) under the Planning and Development Regulations 2011-2018.

When an EcIA is undertaken as part of an EIA process it is subject to the EIA Regulations (under the EU Planning and Development [Environmental Impact Assessment] Regulations 2001-2018). An EcIA is not a statutory requirement, however it is a best practice evaluation process. This EcIA has been undertaken to support and assess the Proposed Development planning application and assesses the potential impacts that the Proposed Development may have on the ecology of the site and its environs. Where potential for a risk to the environment is identified, mitigation measures are proposed on the basis that by deploying these mitigation measures the risk is eliminated or reduced to an insignificant level. This EcIA is provided to assist the Competent Authority with its decision making in respect of the Proposed Development.

2.1 National Legislation

2.1.1 Wildlife Act 1976 and amendments

The Wildlife Act 1976 was enacted to provide protection to birds, animals, and plants in Ireland and to control activities which may have an adverse impact on the conservation of wildlife. With regard to the listed species, it is an offence to disturb, injure or damage their breeding or resting place wherever these occur without an appropriate licence from the National Parks and Wildlife Service (NPWS). This list includes all wild birds along with their nests and eggs. Intentional destruction of an active nest from the building stage up until the chicks have fledged is an offence. This includes the cutting of hedgerows from the 1st of March to the 31st of August. The act also provides a mechanism to give statutory protection to Natural Heritage Areas (NHAs). The Wildlife Amendment Act 2000 widened the scope of the Act to include most species, including the majority of fish and aquatic invertebrate species which were excluded from the 1976 Act.

2.1.2 EU Habitats Directive 1992 and EC (Birds and Natural Habitats) Regulations 2011

The EU Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (Habitats Directive 1992) provides protection to particular species and habitats throughout Europe. The Habitats Directive has been transposed into Irish law through the EC (Birds and Natural Habitats) Regulations 2011.

Annex IV of the EU Habitats Directive provides protection to a number of listed species, wherever they occur. Under Regulation 23 of the Habitats Directive, any person who, in regards to the listed species, “Deliberately captures or kills any specimen of these species in the wild, deliberately disturbs these species particularly during the period of breeding, rearing, hibernation and migration, deliberately takes or destroys eggs from the wild or damages or destroys a breeding site or resting place of such an animal shall be guilty of an offence.”

2.1.3 Flora (Protection) Order, 2015

The Flora (Protection) Order (S.I. No. 356/2015) affords protection to several species of plant in Ireland, including 68 vascular plants, 40 mosses, 25 liverworts, 1 stonewort and 1 lichen. This Act makes it illegal for anyone to uproot, cut or damage any of the listed plant species and it also forbids anyone from altering, interfering, or damaging their habitats. This protection is not confined to within designated conservation sites and applies wherever the plants are found.

2.1.4 Invasive Species Legislation

Certain plant species and their hybrids are listed as Invasive Alien Plant Species in Part 1 of the Third Schedule of the *European Communities (Birds and Natural Habitats) Regulations* 2011 (SI 477 of 2011, as amended). In addition, soils and other material containing such invasive plant material, are classified in Part 3 of the Third Schedule as vector materials and are subject to the same strict legal controls.

Failure to comply with the legal requirements set down in this legislation can result in either civil or criminal prosecution, or both, with very severe penalties accruing. Convicted parties under the Act can be fined up to €500,000.00, jailed for up to 3 years, or both.

Extracts from the relevant sections of the regulations are reproduced below.

"49(2) Save in accordance with a licence granted [by the Department of Arts, Heritage and the Gaeltacht]*, any person who plants, disperses, allows or causes to disperse, spreads or otherwise causes to grow in anyplace* [a restricted non-native plant]*, shall be guilty of an offence.*

49(3) … it shall be a defence to a charge of committing an offence under paragraph (1) or (2) to prove that the accused took all reasonable steps and exercised all due diligence to avoid committing the offence.

50(1) Save in accordance with a licence, a person shall be guilty of an offence if he or she […] offers or exposes for sale, transportation, distribution, introduction, or release—
(a) an animal or plant listed in Part 1 or Part 2 of the Third Schedule,
(b) anything from which an animal or plant referred to in subparagraph (a) can be reproduced or propagated, or
(c) a vector material listed in the Third Schedule, in any place in the State specified in the third column of the Third Schedule in relation to such an animal, plant or vector material."

2.2 International Legislation

2.3.1 EU Birds Directive

The Birds Directive constitutes a level of general protection for all wild birds throughout the European Union. Annex I of the Birds Directive includes a total of 194 bird species that are considered rare, vulnerable to habitat changes or in danger of extinction within the European Union. Article 4 establishes that there should be a sustainable management of hunting of listed species, and that any large scale non-selective killing of birds must be outlawed. The Directive requires the designation of Special Protection Areas (SPAs) for: listed and rare species, regularly occurring migratory species and for wetlands which attract large numbers of birds.

There are 25 Annex I species that regularly occur in Ireland and a total of 153 Special Protection Areas have been designated.

2.3.2 EU Habitats Directive

The Habitats Directive aims to protect some 220 habitats and approximately 1000 species throughout Europe. The habitats and species are listed in the Directives annexes, where Annex I covers habitats and Annex II, IV and V cover species. There are 59 Annex I habitats in Ireland and 33 Annex IV species which require strict protection wherever they occur. The Directive requires the designation of Special Areas of Conservation for areas of habitat deemed to be of European interest. The SACs together with the SPAs from the Birds Directive form a network of protected sites called Natura 2000.

2.3.3 Water Framework Directive

The EU Water Framework Directive (WFD) 2000/60/EC is an important piece of environmental legislation which aims to protect and improve water quality. It applies to rivers, lakes, groundwater, estuaries, and coastal waters. The Water Framework Directive was agreed by all individual EU member states in 2000, and its first cycle ran from 2009 – 2015. The Directive runs in 6-year cycles, so the second (current) cycle runs from 2016 – 2021.The aim of the WFD is to prevent any deterioration in the existing status of water quality, including the protection of good and high water quality status where it exists. The WFD requires member states to manage their water resources on an integrated basis to achieve at least 'good' ecological status, through River Basin Management Plans (RBMP), by 2027.

2.3.4 Bern and Bonn Convention

The Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention 1982) was enacted to conserve all species and their habitats. The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention 1979, enacted 1983) was introduced to give protection to migratory species across borders in Europe.

2.3.5 Ramsar Convention

The Ramsar Convention on Wetlands is an intergovernmental treaty signed in Ramsar, Iran, in 1971. The treaty is a commitment for national action and international cooperation for the conservation of wetlands and their resources. In Ireland there are currently 45 Ramsar sites which cover a total area of 66,994 Ha.

3 DESCRIPTION OF THE PROPOSED DEVELOPMENT

3.1 Location

The Site of the Proposed Development is located in Bray, County Wicklow. The Site is located at the former Heiton Buckley site to the north of Caste Street, and to the west of Dwyer Park. An area of scrub borders the site at the northern and north-western boundary. North Wicklow Educate Together Secondary School is located to the north of the Site.

3.2 Description

The proposed Strategic Housing Development will consist of the following:

- Demolition of all existing vacant commercial and residential buildings and sections of boundary wall;
- Construction of a mixed-use residential and commercial development in 2 blocks ranging in height from 1 to 7 storeys set around a central podium level amenity space and a separate single storey pavilion building;
- The residential element will accommodate 139 no. apartments comprising 33 no. 1-bedroom units, 91 no. 2-bedroom units and 15 no. 3-bedroom units, with associated balconies;
- Block A (3-7 storeys) will accommodate 93 no. apartments and a creche at ground floor;
- Block B (1-6 storeys) will accommodate 46 no. apartments, 2 no. commercial units fronting Castle Street and a communal resident's room;
- The pavilion building will accommodate a community facility on Castle Street;
- Vehicular access from Castle Street to 59 no. undercroft car parking spaces and 3 no. creche drop-off spaces;
- Pedestrian access from Castle Street and Dwyer Park;
- New surface water sewer along Castle Street from the site to Bray Bridge;
- The development will include landscaped communal open spaces, boundary treatments, substation, plant rooms, bin stores, bicycle parking, signage and all associated site works and services.

The incorporation of Sustainable Urban Drainage Systems (SUDS) into the design of the Proposed Development is mandatory for all new developments under the Greater Dublin Regional Code of Practice for Drainage Works. As such, the Proposed Development design entails a suite of SuDS measures. SUDS is a series of management practices and control structures that aim to mimic natural drainage. SUDS reduces flood risk, improves water quality and provides amenity through the use of permeable paving, swales, green roofs, rainwater harvesting, detention basins, ponds and wetlands[1].

[1] https://www.dublincity.ie/dublin-city-development-plan-2016-2022/9-sustainable-environmental-infrastructure/95-policies-and-objectives/954-surface-water-drainage-and

3.2.1 Description of the Construction Phase

The following is extracted from the Construction Management Plan prepared by Corrigan Hodnett Consulting (2021).

The Site is a brown field site and will generally require stripping of topsoil, existing surfacing and demolition of the former builders' providers warehousing derelict buildings.

The outline method statement for the site clearance enabling works are as follows:

- Establish a site set-up and welfare facilities;
- Carry out a detailed services survey of the site to identify all buried services, determine what services are live, redundant and that may potentially serve neighbouring properties;
- Carry out any necessary services diversions and decommissioning works;
- All site waste materials associated with the clearing of the site are to be separated for reuse, recycling or off-site waste as deemed appropriate per the implemented Construction and Demolition Waste Management Plan.

Given the nature of the development there will be no bulk excavations required on the Site to accommodate any basement structure. Localised excavations will only be required for other typical substructures such as shallow surface water attenuation tanks. Excavations can also be expected for installation of general site infrastructure. Excavations in this regard are situated such that they are not anticipated to have any effect on the existing surrounding boundary features.

3.2.1.1 General Construction Methodology

Apartment Structures

The under-croft areas which accommodate the car parking and other ancillary spaces is such that there is no basement structure requiring a bulk dig.

The super structure of the apartments is anticipated to be a reinforced concrete frame which will be supported by transfer structures at appropriate levels to facilitate a supporting grid of columns and /or localised walls to suit the car parking or other ancillary use spaces.

The sub-structures will comprise a grid of piles founded in the anticipated rock head at a depth of circa 8 to 10m. Specialist pile installations will be of low vibration augured construction.

Site Infrastructure

It is anticipated that works to install civil infrastructure will commence in advance of or a least be phased with the relevant areas of buildings progress. The drainage infrastructure works will be co-ordinated as required by the relevant authority and Irish Water as necessary.

Following communications with the relevant local authority departments, the drainage strategy requires an extent of civil infrastructure which is routed externally of the site. The surface water drainage outfall is proposed to follow a route to the adjacent River Dargle at the Castle Street Bridge. Road opening licences etc., will be obtained from the local authority as appropriate. Connection licences and/or connection agreements as appropriate will need to be obtained in advance of such works commencing in the public domain.

There is a degree of realignment of existing road and footpaths etc. local to the site in order to facilitate an extended right turning lane all in the public domain.

Traffic management will require particular consideration along with any other relevant safety and health concerns within the surrounding live environs.

According to the Engineering Services Report by Corrigan Hodnett Consulting, based on the age of the existing development on the site, the most likely scenario is that the surface water collected from roofs and other areas within the development currently discharges to the existing combined sewer network, which is treated, along with wastewater, at Shanganagh-Bray wastewater treatment plant. However, the preferred connection location for surface water discharge is to the existing Dargle River via a new surface water pipe which will have to be constructed as part of the works as there are no surface water sewers in the area. The outfall connection will be to the existing culvert on the west side of Bray Bridge. Surface water attenuation and treatment is included as part of the surface water management and disposal proposals in accordance with the requirements of the Greater Dublin Strategic Drainage Study.

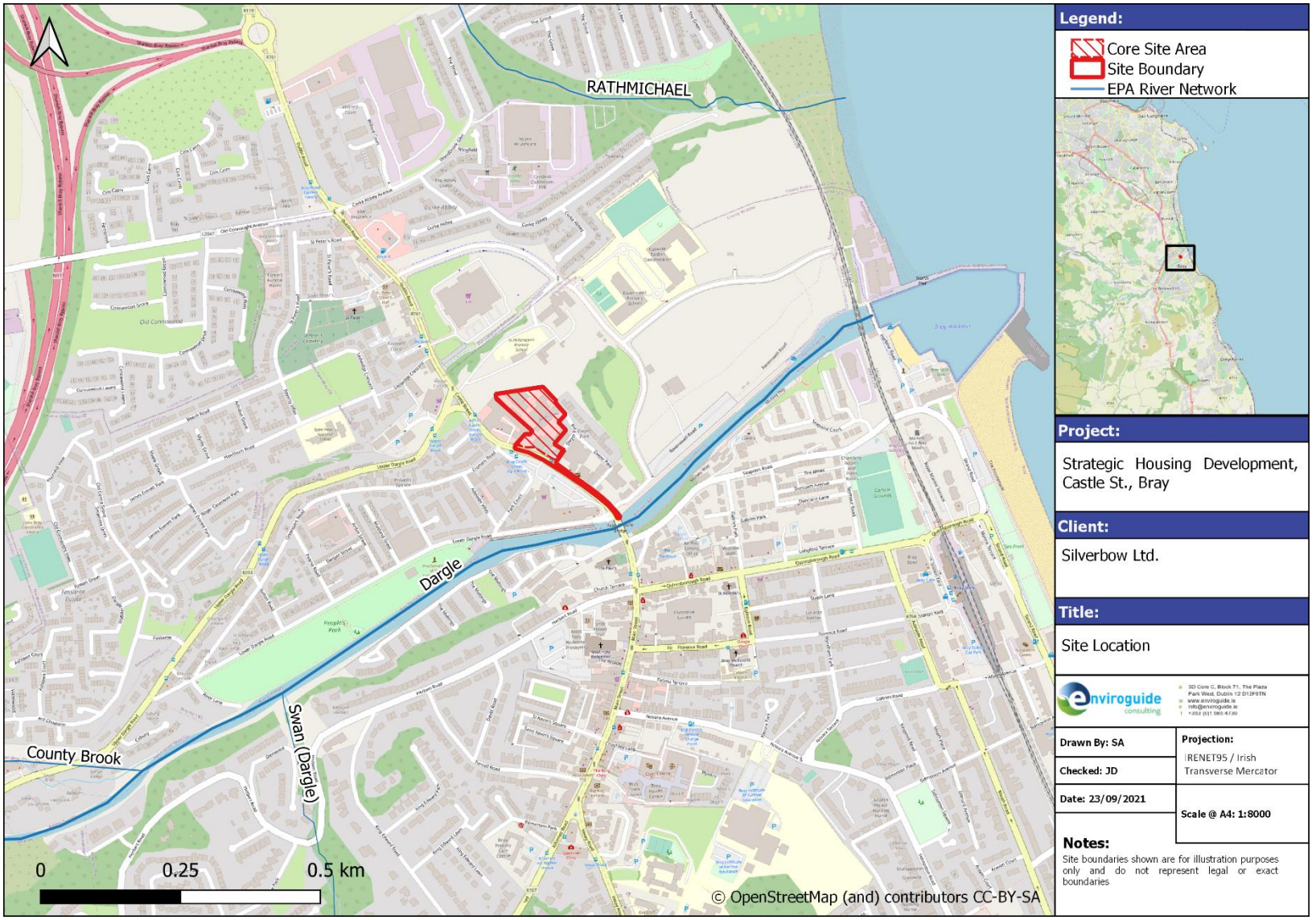

FIGURE 1. SITE LOCATION.

4 METHODOLOGY

This section details the steps and methodology employed to undertake an Ecological Impact Assessment of the Proposed Development.

4.1 Scope of Assessment

The specific objectives of the study were to:

- Undertake baseline ecological surveys and evaluate the nature conservation importance of the Site of the Proposed Development;
- Identify and assess the direct, indirect, and cumulative ecological implications or impacts of the Proposed Development during its lifetime; and
- Where possible, propose mitigation measures to remove or reduce those impacts at the appropriate stage of development.

4.2 Desk Study

A desktop study was carried out to collate and review available information, datasets and documentation sources pertaining to the site's natural environment. The desktop study relied on the following sources:

- Information on species records and distributions, obtained from the National Biodiversity Data Centre (NBDC) at *www.maps.biodiversityireland.ie* ;
- Information on waterbodies, catchment areas and hydrological connections obtained from the Environmental Protection Agency (EPA) at *www.gis.epa.ie* ;
- Information on bedrock, groundwater, aquifers and their statuses, obtained from Geological Survey Ireland (GSI) at *www.gsi.ie* ;
- Information on the network of designated conservation sites, boundaries, qualifying interests and conservation objectives, obtained from the National Parks and Wildlife Service (NPWS) at *www.npws.ie* ;
- Satellite imagery and mapping obtained from various sources and dates including Google, Digital Globe, Bing and Ordnance Survey Ireland;
- Information on the existence of permitted developments, or developments awaiting decision, in the vicinity of the Proposed Development from Wicklow County Council available at: https://www.wicklow.ie/Living/Services/Planning/Planning-Applications/Online-Planning
- Information on the extent, nature and location of the Proposed Development, provided by the applicant and/or their design team;
- The current conservation status of birds in Ireland taken from Gilbert et al. (2021).
- The pollinator friendly planting code provided by The All-Ireland Pollinator Plan (2015-2020) available at www.pollinators.ie.
- Wicklow County Development Plan 2016 - 2022.

A comprehensive list of all the specific documents and information sources consulted in the completion of this document is provided in Section 11, References.

4.3 Field surveys

4.3.1 Habitat Surveys

A habitat survey was carried out at the Site on the 7th May 2021. Habitats were categorised according to the Heritage Council's '*A Guide to Habitats in Ireland'* (Fossitt, 2000) to level 3. The habitat mapping exercise had regard to the 'Best Practice Guidance for Habitat Survey and Mapping' (Smith et al., 2010) published by the Heritage Council. Satellite imagery was used together with GPS to accurately enable field navigation. Habitat categories, characteristic plant species, invasive species and other ecological features were recorded.

4.3.2 Bat Surveys

A suite of bat surveys was undertaken at the Site of the Proposed Development by Dr Tina Aughney of Bat Eco Services between the 4th and the 10th of June 2021. The following table, extracted from the Bat Report highlights the range of surveys carried out. Full details of the bat surveys can be found in the bat report appended to this document.

TABLE 1. BAT SURVEY EFFORT AND CONSTRAINTS (BAT ECO SERVICES, 2021).

Category	Discussion
Timing of surveys **Surveying meets Collins, 2016 guidelines.**	Summer bat survey: 4th to 10th June 2021
Survey Type Full suite of surveys completed to ensure sufficient information was collated for bat assessment. Surveys completed according Collins, 2016 guidelines.	Bat Survey Duties Completed (Indicated by red shading) Tree PBR Survey ● Static Detector Survey ● Dusk Bat Survey ● Walking Transect ● Trapping/Mist Netting ○ Endoscope Inspection ● Daytime Building Inspection ● Daytime Bridge Inspection ● Dawn Bat Survey ● Driving Transect ○ IR Camcorder filming ● Other (Thermal Imagery) ●
Weather conditions	Suitable for bat surveys.
Survey Constraints	No internal access to dormer bungalow due to the fact that this was occupied.
Survey effort Daytime – 3 hrs Bat surveys – 19 hrs Static surveillance – 175 hrs TOTAL = 197 hrs	Summer bat survey: Daytime inspection – 3 hrs Dusk Surveys (x2, 2 surveyors) – 8 hrs Dawn Surveys (x1, 2 surveyors) – 4 hrs IR Filming (x2) – 4 hrs Thermal Imagery Filming (x1) – 2 hrs Walking Transects (x1, 1 surveyor) – 1 hrs Static Surveillance (x5 units, 5 nights) – 175 hrs
Extent of survey area	Summer bat survey: proposed development area and local road network
Equipment	Full suite of bat survey equipment as list under Section 2.2. All in good working order.

4.3.3 Mammal & Bird Surveys

Mammal and breeding bird surveys of the Site were carried out in conjunction with the habitat survey. The Site was examined for tracks and signs of mammals. The habitat types recorded throughout the survey area were used to assist in identifying the fauna considered likely to utilise the area.

4.3.4 Invasive Species Surveys

The Site was assessed for the presence of invasive plant species during the habitat survey undertaken.

4.4 Assessment

The value of the ecological resources, i.e., the habitats and species present or potentially present, was determined using the ecological evaluation guidance given in the National Roads Authority's Ecological Assessment Guidelines (NRA, 2009a), presented in Appendix I. This evaluation scheme, with values ranging from locally important to internationally important, seeks to provide value ratings for habitats and species present that are considered ecological receptors of impacts that may ensue from a proposal. As per the NRA guidelines, impact assessment is only undertaken of key ecological receptors (KERs).

The assessment of the potential effect or impact of the Proposed Development on the identified key ecological receptors was carried out with regard to the criteria outlined in the draft EPA Guideline (EPA, 2017), presented in Appendix II. These guidelines set out a number of parameters such as quality, magnitude, extent and duration that should be considered when determining which elements of the Proposed Development could constitute impact or sources of impacts.

4.5 Limitations

An extensive search of available datasets for records of rare and protected species within proximity of the Proposed Development has been undertaken as part of this assessment. However, the records from these datasets do not constitute a complete species list. The absence of species from these datasets does not necessarily confirm an absence of species in the area.

General habitat and invasive species surveys were carried out within the standard acceptable timeframe for general botanical field surveying. The bat survey carried out by Bat Eco Services was carried out in suitable weather conditions for a bat survey at the appropriate time of year. No internal access to dormer bungalow was available for the bat surveys due to the fact that this was occupied. However, the bat report states that assessment was completed according to Colins (2016) and was appropriate to complete the aims of the bat survey.

Mammal surveys were undertaken within the appropriate time of year. Mammal surveys can be undertaken at any time of year but are less likely to provide reliable results during mid- to late-summer, when the presence of dense vegetation may make it difficult to find field signs and dens. Given the urban nature of the Site, the presence of dense vegetation was not a limitation in this instance.

No limitations were encountered which would prevent robust conclusions being drawn as to the potential impacts of the Proposed Development.

5 BASELINE ECOLOGICAL CONDITIONS

5.1 Site Overview

5.1.1 Geology, Hydrology and Hydrogeology

The Site of the Proposed Development is within the Avoca-Vartry catchment and Dargle_SC_010 sub catchment. There are no river waterbodies within the Site of the Proposed Development.

The River Dargle is the closest river waterbody to the Site and is approximately 150 metres to the south east of the Site. The Dargle is a Designated Salmonid Water under S.I. No. 293/1988 - European Communities (Quality of Salmonid Waters) Regulations 1988. The river was assigned *Good* status (Q4*) by the EPA at People's Park (RS10D010270) in 2015. The river is considered to be *Not At Risk* of not meeting its Water Framework Directive (WFD) status objectives (EPA, 2021).

The Dargle discharges into the Dargle Estuary and Southwestern Irish Sea - Killiney Bay coastal waterbody. The status of the Dargle Estuary is currently unassigned and its WFD risk status is under review. The WFD status of Southwestern Irish Sea - Killiney Bay is *High* and it is *Not At Risk* of not achieving its Water Framework Directive status objectives (EPA, 2021).

The Site of the Proposed Development is situated on the Wicklow (IE_EA_G_076) groundwater body. The risk status of this groundwater body is under review (EPA, 2021). The aquifer type in the area is a *Locally Important Aquifer (Ll) - Bedrock which is Moderately Productive only in Local Zones*. The groundwater rock units underlying the aquifer are classified as Ordovician Metasediments. The level of vulnerability to groundwater contamination from human activities is *Low-Moderate* (GSI, 2021). The soil is classed as *urban* the subsoil is *made ground* (EPA, 2021).

5.2 Designated Sites

The Habitats Directive (92/43/EEC) seeks to conserve natural habitats and wild fauna and flora by the designation of Special Areas of Conservation (SACs) and the Birds Directive (2009/147/EC) seeks to protect birds of special importance by the designation of Special Protection Areas (SPAs). It is the responsibility of each member state to designate SPAs and SACs, both of which will form part of Natura 2000, a network of protected sites throughout the European Community. SACs are selected for the conservation of Annex I habitats (including priority types which are in danger of disappearance) and Annex II species (other than birds). SPAs are selected for the conservation of Annex I birds and other regularly occurring migratory birds and their habitats. The annexed habitats and species for which each site is selected correspond to the qualifying interests of the sites; from these the conservation objectives of the site are derived.

Natural Heritage Areas (NHAs) are designations under the Wildlife Acts to protect habitats, species, or geology of national importance. The boundaries of many of the NHAs in Ireland overlap with SAC and/or SPA sites. Although many NHA designations are not yet fully in force

under this legislation (referred to as 'proposed NHAs' or pNHAs), they are offered protection in the meantime under planning policy which normally requires that planning authorities give recognition to their ecological value.

Table 1 below presents details of the designated sites within a 15km radius of the Proposed Development. In addition, the potential for connectivity with designated sites at distances of greater than 15km from the Development was also considered in this initial assessment. In this case, there is no potential connectivity between the Development site and designated sites located at a distance greater than 15km from the Proposed Development.

The result of this preliminary screening concluded that there is a total of nine SACs, four SPAs and 19 pNHAs located within the Zone Of Influence of the Proposed Development Site. The distances to each site listed are taken from the nearest possible point of the Proposed Development Site boundary to nearest possible point of each Natura 2000 site or pNHA. In addition, Dublin Bay is designated as a UNESCO Biosphere[2]. Dublin Bay Biosphere contains three different zones, which are managed in different ways:

- The core zone of Dublin Bay Biosphere comprises 50km² of areas of high natural value. Key areas include the Tolka and Baldoyle Estuaries, Booterstown Marsh, Howth Head, North Bull Island, Dalkey Island and Ireland's Eye.
- The buffer zone comprises 82km² of public and private green spaces such as parks, greenbelts and golf courses, which surround and adjoin the core zones.
- The transition zone comprises 173km² and forms the outer part of the Biosphere. It includes residential areas, harbours, ports and industrial and commercial areas.

Potential impacts on Dublin Bay Biosphere are considered highly unlikely and insignificant given the considerable open marine water buffer between the Site of the Proposed Development and the Biosphere over which any potential surface water discharges containing sediment, silt and/or pollutants arising from the Construction/Operation Phases of the Proposed Development would become diluted to non-discernible levels. In addition, the intervening distance between the Site and the Biosphere is sufficient to exclude the possibility of significant effects on it arising from: emissions of noise, dust, pollutants and/or vibrations emitted from the Site during the Construction Phase; increased traffic volumes during the Construction and Operational Phase and associated emissions; potential increased lighting emitted from the Site during Construction and Operational Phase; and increased human presence at the Site during Construction and Operational Phase.

TABLE 2. DESIGNATED SITES WITHIN THE ZONE OF INFLUENCE (15KM) OF THE PROPOSED DEVELOPMENT, POTENTIAL PATHWAYS BETWEEN THE PROPOSED DEVELOPMENT SITE AND THE DESIGNATED SITES. SITES THAT HAVE BEEN SCREENED INTO THIS ECIA FOR FURTHER ASSESSMENT ARE SHADED IN GREEN.

Site Name & Code (Receptor)	Distance to Proposed Development	Potential Pathway to receptor
Special Area of Conservation		
Bray Head SAC (000714)	1.7 km	

[2] A biosphere is a special designation awarded by the United Nations Educational, Scientific and Cultural Organisation (UNESCO) but managed in partnership by communities, NGOs and local and national governments (https://www.dublinbaybiosphere.ie/).

Site Name & Code (Receptor)	Distance to Proposed Development	Potential Pathway to receptor
Ballyman Glen SAC (000173)	2.0 km	**None** – Refer to AA Screening Report accompanying this application.
Knocksink Wood SAC (000725)	4.1 km	
Rockabill to Dalkey Island SAC (003000)	4.6 km	
Glen of the Downs SAC (000719)	6.9 km	
Wicklow Mountains SAC (002122)	7.3 km	
South Dublin Bay SAC (000210)	10.2 km	
The Murrough Wetlands SAC (002249)	11.0 km	
Carriggower Bog SAC (000716)	11.3 km	
Special Protection Area		
Dalkey Islands SPA (004172)	7.0 km	**None** – Refer to AA Screening Report accompanying this application.
Wicklow Mountains SPA (004040)	7.8 km	
South Dublin Bay and River Tolka Estuary SPA (004024)	10.1 km	
The Murrough SPA (004186)	12.0 km	
Proposed Natural Heritage Area		
Bray Head (000714)	1.7 km	**Yes** – There is a **land** pathway between the Site and this pNHA. Bray Head is a popular recreational area and is especially used by walkers. It is possible that the Proposed Development will result in an increase in footfall and visitor numbers within the pNHA, which could result in habitat loss/alteration/erosion as a result of the increase in local population numbers during the Operational Phase of the Proposed Development.
Ballyman Glen (000713)	2.0 km	**None** – There is no hydrological pathway. All of these pNHAs are located either upstream of the Proposed Development Site or in a separate surface water catchment. In addition, the intervening distances between the Site and the pNHAs are sufficient to exclude the possibility of significant effects on the pNHAs arising from: emissions of noise, dust, pollutants and/or vibrations emitted from the Site during the Construction Phase; increased traffic volumes during the Construction and Operational Phase and associated emissions; potential increased lighting emitted from the Site during Construction and
Dargle River Valley (001754)	3.0 km	
Loughlinstown Woods (001211)	3.9 km	
Knocksink Wood (000725)	4.1 km	
Powerscourt Woodland (001768)	4.3 km	
Great Sugar Loaf (001769)	4.3 km	

Site Name & Code (Receptor)	Distance to Proposed Development	Potential Pathway to receptor
Kilmacanogue Marsh (000724)	4.6 km	Operational Phase; and increased human presence at the Site during Construction and Operational Phase.
Dingle Glen (001207)	5.4 km	
Ballybetagh Bog (001202)	5.7 km	
Glen of the Downs (000719)	6.9 km	
Glencree Valley (001755)	7.2 km	
Powerscourt Waterfall (001767)	7.9 km	
Fitzsimon's Wood (001753)	10.3 km	
Carriggower Bog (000716)	11.2 km	
Vartry Reservoir (001771)	13.0 km	
Dalkey Coastal Zone And Killiney Hill (001206)	4.3 km	**None** – These pNHAs are located within Dublin Bay and Southwestern Irish Sea - Killiney Bay. The hydrological pathway is insignificant given the considerable open marine water buffer between the Site of the Proposed Development and the pNHAs over which any potential surface water discharges containing sediment, silt and/or pollutants arising from the Construction/Operation Phases of the Proposed Development would become diluted to non-discernible levels. In addition, the intervening distance between the Site and the pNHAs is sufficient to exclude the possibility of significant effects on the pNHAs arising from: emissions of noise, dust, pollutants and/or vibrations emitted from the Site during the Construction Phase; increased traffic volumes during the Construction and Operational Phase and associated emissions; potential increased lighting emitted from the Site during Construction and Operational Phase; and increased human presence at the Site during Construction and Operational Phase.
South Dublin Bay (000210)	10.1 km	
The Murrough (000730)	10.2 km	
Booterstown Marsh (001205)	12.6 km	

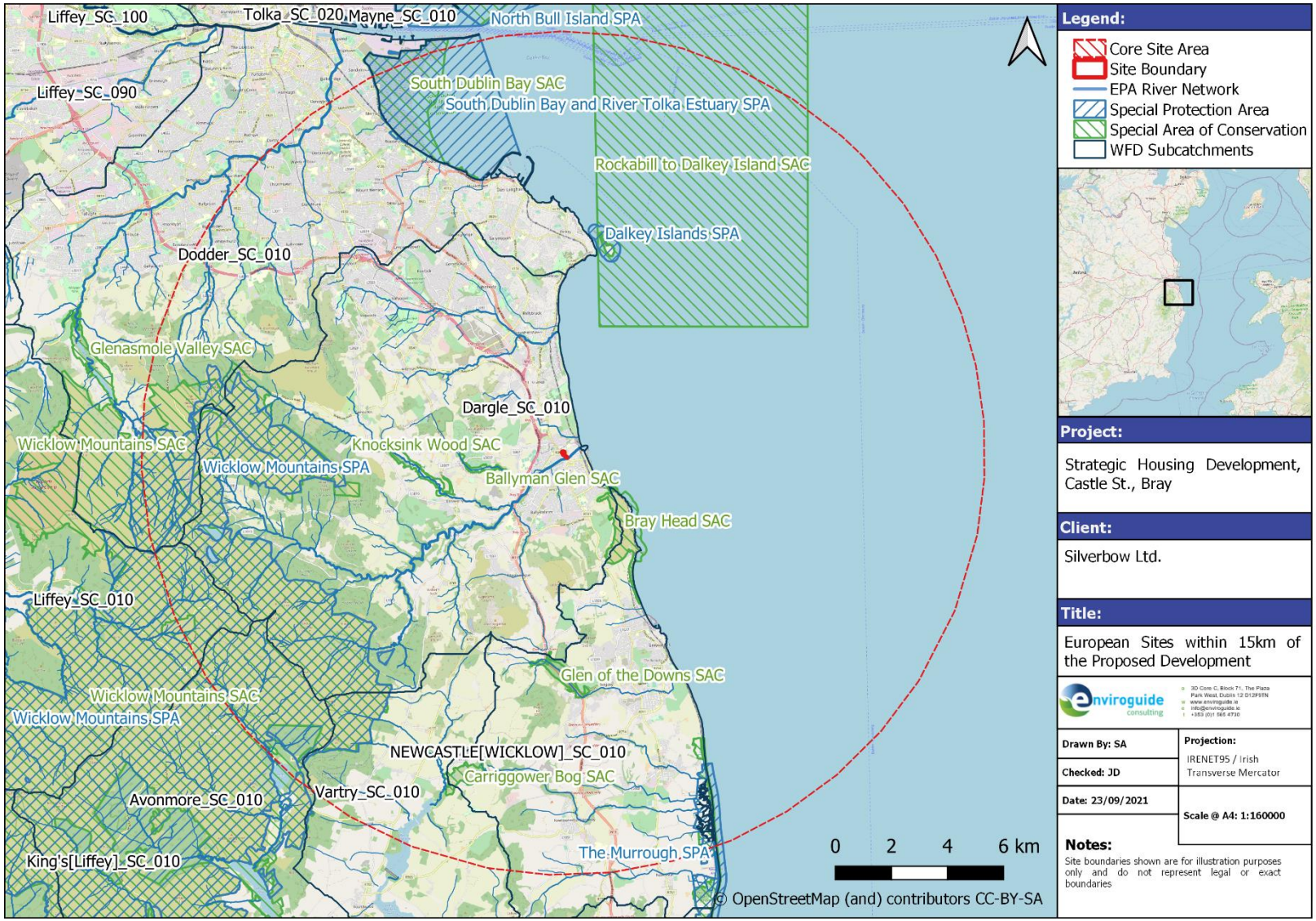

FIGURE 2. EUROPEAN SITES WITHIN 15KM OF THE PROPOSED DEVELOPMENT SITE.

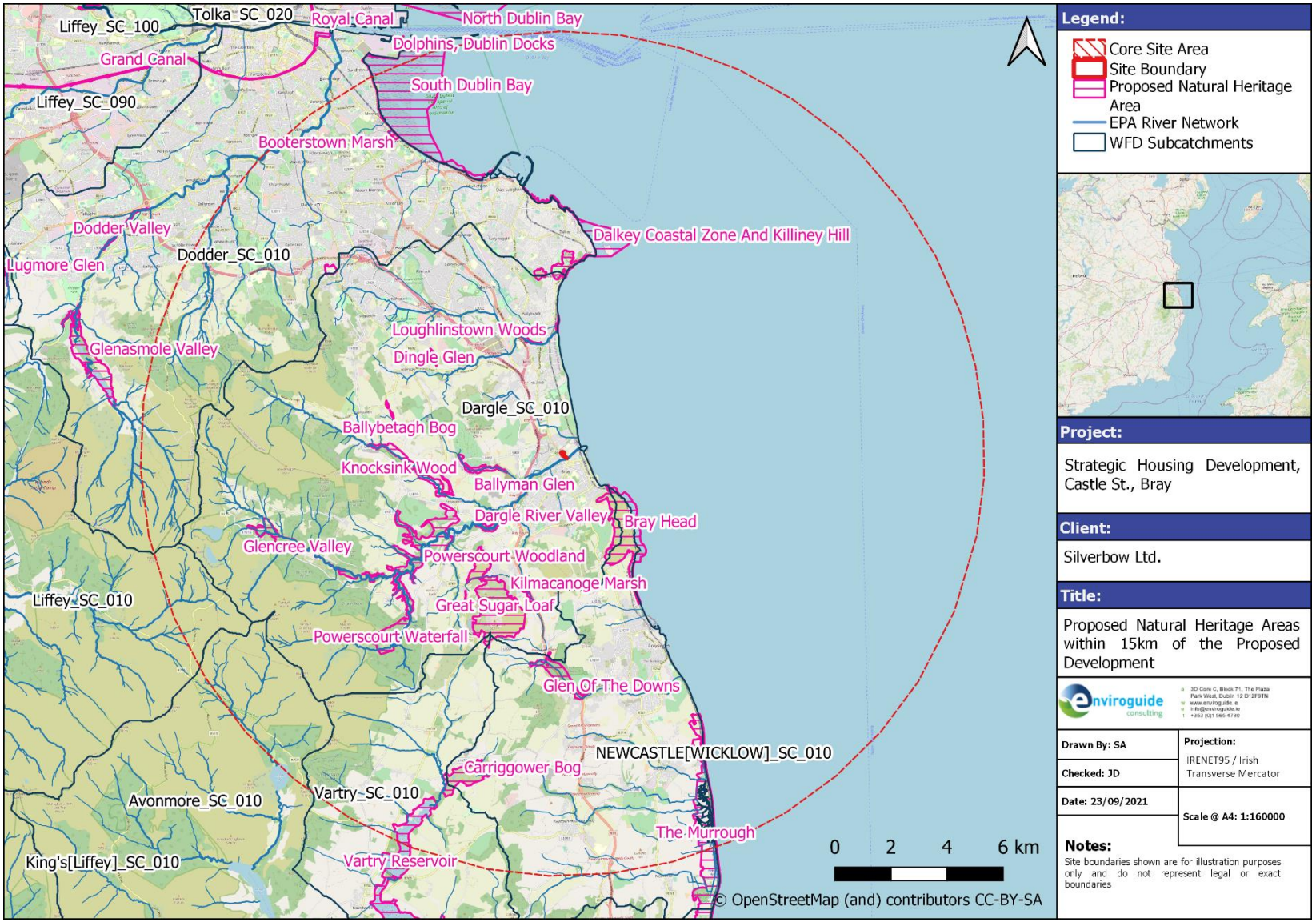

FIGURE 3. PROPOSED NATURAL HERITAGE AREAS WITHIN 15KM OF THE PROPOSED DEVELOPMENT SITE

5.3 Desk Study

5.3.1 Species and Species Groups

The Site of the Proposed Development is located within the Ordnance Survey Ireland National Grid 2km square O21U. Species records from the National Biodiversity Data Centre (NBDC) online database for this grid square was studied for the presence of rare or protected flora and fauna. The following records were excluded:

- Records greater than 20 years old;
- Species records with no designation or conservation status (excluding mammals and birds).
- Records of species placed on the Waiting List or identified as Least Concern, Data Deficient, Near Threatened, Not Evaluated, Extinct or Regionally Extinct in national red lists (Lockhart et al. 2012; Wyse Jackson et al., 2016), unless they are listed on the Flora Protection Order

In addition, data from various sources (e.g. Inland Fisheries Ireland) were used to determine the presence of species in the vicinity of the Proposed Development. The following sections outline the results of this assessment.

5.3.1.1 Flora

Rare and Protected Flora

Species records from the NBDC online database were studied for the presence of rare of protected flora. The only rare or protected floral species within the tetrad was Meadow Saxifrage *Saxifraga granulata* which was recorded on the 15th April 2020. This species is considered regionally extinct according to the most recent red-list (Wyse Jackson et al., 2016) and is listed under the Flora Protection Order 2015. The record within tetrad O21U relates to an observation made outside the red line boundary of the Site, in a restricted access area of Bray Garda Station, according to the NBDC. There are no records for protected bryophytes within the area[3].

Invasive Plant Species

The NBDC have records (dated within the last 20 years) of two high impact invasive plant species within the 2km (O21U) tetrad, namely Giant Hogweed *Heracleum mantegazzianum* and Japanese Knotweed *Reynoutria japonica* (Table 3).

TABLE 3. INVASIVE PLANT SPECIES WITHIN THE 2KM (O21U) TETRAD. THE RECORDS ARE DATED WITHIN THE LAST 20 YEARS AND ARE PROVIDED BY THE NBDC.

Name	Date of last record	Database	Legal status / Designaion
Giant Hogweed *Heracleum mantegazzianum*	31/12/2010	BSBI tetrad data for Ireland	- High Impact Invasive Species - Regulation S.I. 477 (Ireland)
Sycamore *Acer pseudoplatanus*	21/05/2016	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	- Medium Impact Invasive Species

[3] https://dahg.maps.arcgis.com/apps/webappviewer/index.html?id=71f8df33693f48edbb70369d7fb26b7e

Name	Date of last record	Database	Legal status / Designaion
Traveller's-joy *Clematis vitalba*	19/06/2017	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	- Medium Impact Invasive Species
Japanese Knotweed *Reynoutria japonica*	13/05/2021	National Invasive Species Database	- High Impact Invasive Species - Regulation S.I. 477 (Ireland)

5.3.1.2 Mammals

Records for terrestrial mammals were retrieved from the NBDC online database. Table 4 lists these species, their last record date and summarises their legal status/designation. Seven native terrestrial mammals were recorded within the relevant tetrad, four of which are bats.

Two non-native terrestrial mammals were recorded within the tetrad (Table 4).

TABLE 4. TERRESTRIAL MAMMAL SPECIES WITHIN THE 2KM (O21U) GRID SQUARE. THE RECORDS ARE DATED WITHIN THE LAST 20 YEARS AND ARE PROVIDED BY THE NBDC.

Name	Date of last record	Database	Legal Status / Designation
European Otter *Lutra lutra*	04/09/2017	Mammals of Ireland 2016-2025	- EU Habitats Directive [92/43/EEC] Annex II & IV - Wildlife (Amendment) Act, 2000
West European Hedgehog *Erinaceus europaeus*	24/04/2021	Hedgehogs of Ireland	- Wildlife (Amendment) Act, 2000
Daubenton's Bat *Myotis daubentonii*	29/08/2014	National Bat Database of Ireland	- EU Habitats Directive [92/43/EEC] Annex IV - Wildlife (Amendment) Act, 2000
Lesser Noctule *Nyctalus leisleri*	08/08/2005	National Bat Database of Ireland	- EU Habitats Directive [92/43/EEC] Annex IV - Wildlife (Amendment) Act, 2000
Pipistrelle *Pipistrellus pipistrellus sensu lato*	29/09/2007	National Bat Database of Ireland	- EU Habitats Directive [92/43/EEC] Annex IV - Wildlife (Amendment) Act, 2000
Soprano Pipistrelle *Pipistrellus pygmaeus*	29/09/2007	National Bat Database of Ireland	- EU Habitats Directive [92/43/EEC] Annex IV - Wildlife (Amendment) Act, 2000
Brown Rat *Rattus norvegicus*	03/11/2015	Atlas of Mammals of Ireland 2010-2015	- High Impact Invasive - Regulation S.I. 477 (Ireland)
Eastern Grey Squirrel *Sciurus carolinensis*	08/07/2015	Atlas of Mammals of Ireland 2010-2015	- High Impact Invasive - EU Regulation No. 1143/2014 - Regulation S.I. 477 (Ireland)
Red Fox *Vulpes vulpes*	16/06/2015	Atlas of Mammals of Ireland 2010-2015	- n/a

There are records for several protected marine mammals within the relevant tetra also, namely Bottle-nosed Dolphin *Tursiops truncatus,* Common Porpoise *Phocoena phocoena* and Grey Seal *Halichoerus grypus.* These species are protected under the Habitats Directive and Wildlife (Amendment) Act, 2000.

5.3.1.3 Birds

A total of 85 bird species have been recorded within the relevant tetrad by the NBDC within the last 20 years. Of these, 33 are listed as *Amber*, and 11 are listed as *Red* in *Birds of Conservation Concern in Ireland 2020-2026* (Gilbert et al., 2021).

Amber listed species include:

Arctic Tern *Sterna paradisaea*
Barn Swallow *Hirundo rustica*
Black-headed Gull *Larus ridibundus*
Black Guillemot Cepphus grylle
Branta bernicla subsp. hrota
Brent Goose *Branta bernicla*
Common Guillemot *Uria aalge*
Common Kingfisher *Alcedo atthis*
Common Linnet *Carduelis cannabina*
Common Starling *Sturnus vulgaris*
Common Tern *Sterna hirundo*
European Greenfinch *Carduelis chloris*
European Shag *Phalacrocorax aristotelis*
Goldcrest *Regulus regulus*
Great Cormorant *Phalacrocorax carbo*
Great Crested Grebe *Podiceps cristatus*
Greylag Goose *Anser anser*
Herring Gull *Larus argentatus*
House Martin *Delichon urbicum*
House Sparrow *Passer domesticus*
Lesser Black-backed Gull *Larus fuscus*
Little Gull *Larus minutus*
Mallard *Anas platyrhynchos*
Mediterranean Gull *Larus melanocephalus*
Mew Gull *Larus ca*nus
Mute Swan *Cygnus ol*or
Northern Fulmar *Fulmarus glacialis*
Northern Gannet *Morus bassanus*
Red-throated Diver *Gavia stell*ata
Ringed Plover *Charadrius hiaticula*
Ruddy Turnstone *Arenaria interpres*
Sand Martin *Riparia riparia*
Sandwich Tern *Sterna sandvicensis*

Red-listed species include:

Black-legged Kittiwake *Rissa tridactyla*
Common Kestrel *Falco tinnunculus*
Common Scoter *Melanitta nigra*
Common Swift *Apus apus*
Eurasian Curlew *Numenius arquata*
Stock Pigeon *Columba oenas*
Eurasian Oystercatcher *Haematopus ostralegus*
Grey Wagtail *Motacilla cinerea*
Meadow Pipit *Anthus pratensis*
Razorbill *Alca torda*
Redwing *Turdus iliacus*

5.3.1.4 Fish

The Inland Fisheries Ireland Water Framework Directive (WFD) monitoring site closest to the Site of the Proposed Development is approximately 1km upstream of Bray Bridge (site code 10D010250A). The salmonid species recorded during the most recent survey (carried out in 2009) included Brown Trout *Salmo trutta*, Salmon *S. salar* and Sea Trout *S. trutta*. No Lamprey species were recorded in the Dargle river during any of the WFD monitoring activities carried out by IFI. This includes surveys carried out at site code 10D010250A within Bray, but also two sites further upstream (site codes 10D010005A and 10G010200A). European Eel *Anguilla anguilla* and Flounder *Platichthys flesus* were recorded within the Dargle river at the Inland Fisheries Ireland Water Framework Directive (WFD) monitoring site closest to the Site of the Proposed Development (site code 10D010250A). The River Dargle is a Designated Salmonid Water under S.I. No. 293/1988 - European Communities (Quality of Salmonid Waters) Regulations 1988.

Data from the NBDC (Purse Search Shark and Ray Eggcase Sightings Scheme Data, 2007-2018) indicate the presence of Thornback Ray *Raja clavata* and Spotted Ray *Raja montagui* along the Bray coastline. Both of these species are listed as threated under the OSPAR Convention.

5.3.1.5 Amphibians

The Common Frog *Rana temporaria* was recorded within the relevant tetrad in February 2018.

5.3.1.6 Invertebrates

Dog whelk (*Nucella lapillus*) which is listed as threatened under the OSPAR Convention was recorded within the relevant tetrad along the coastline. The date of last record is 02/04/2021.

5.3.1.7 Reptiles

There are no records of common lizard *Zootoca vivipara* within the relevant tetrad. In addition, this species is associated with coastal and heathland habitats, but also locally in rural gardens, stone walls and roadside verges (King et al., 2011). The habitat at the Site of the Proposed Development is not considered suitable for this species.

5.4 Field Surveys

5.4.1 Habitats & Flora

Several distinct habitat types, as well as mosaics of different habitats (codes follow Fossitt, 2000) were recorded within the habitat survey area. Habitats identified included:

BL3 – Buildings and Artificial Surfaces

BC4 – Flower Beds and Borders

BL3/BC4 – Mosaic of the above

BL3/ED5 – Mosaic of Buildings and Artificial Surfaces and Refuse and Other Waste

ED5/BC4 - Mosaic of Refuse and Other Waste and Flower Beds and Borders

GA2 – Amenity Grassland (Improved)

WS1 – Scrub

WL1 – Hedgerow

FL8 – Other Artificial Lakes and Ponds

These are described below.

5.4.1.1 Buildings and Artificial Surfaces (BL3)

Buildings and artificial surfaces are one of the main habitats present at the Site of the Proposed Development. This habitat comprises the hardstanding, warehouses and buildings at the Site (Figure 4). A mosaic of this habitat with refuse and other waste (BL3/ED5) occurs towards the northern boundary of the Site.

A stonewall (BL3) comprised of red brick occurs within the former warehouse area of the Site and at the northern boundary.

FIGURE 4. WAREHOUSES AND HARDSTANDING AT THE SITE OF THE PROPOSED DEVELOPMENT. (IMAGE TAKEN 07/05/2021).

FIGURE 5. BRICK WALL AT THE SITE OF THE PROPOSED DEVELOPMENT. (IMAGE TAKEN 07/05/2021).

5.4.1.2 Flower Beds and Borders (BC4)

This habitat occurs within the residential dwelling area at the centre and northern boundary of the Site. The flowerbeds here were dominated by ornamental species including *Acanthus* sp., Roses *Rosa* sp., Monbretia *Crocosmia x crocosmiiflora,* Geraniums *Geranium* sp., *Clematis* sp., Spanish Bluebell *Hyacinthoides hispanica* (possibly a hybrid with the native bluebell *Hyacinthoides x massartiana*), *Acer* sp., *Hydrangea* sp., *Cotoneaster* sp., Jasmine *Jasminum* sp., Tutsan *Hypercium* sp. and the invasive Japanese Knotweed *Reynoutria japonica* and Three-cornered Leek *Allium triquetrum*.

Areas best described as mosaics of this habitat type occur towards the northern boundary of the Site, namely a mosaic of this habitat with buildings and artificial surfaces (BC4/BL3), and a mosaic of this habitat with refuse and other waste (ED5/BC4) (Figure 10).

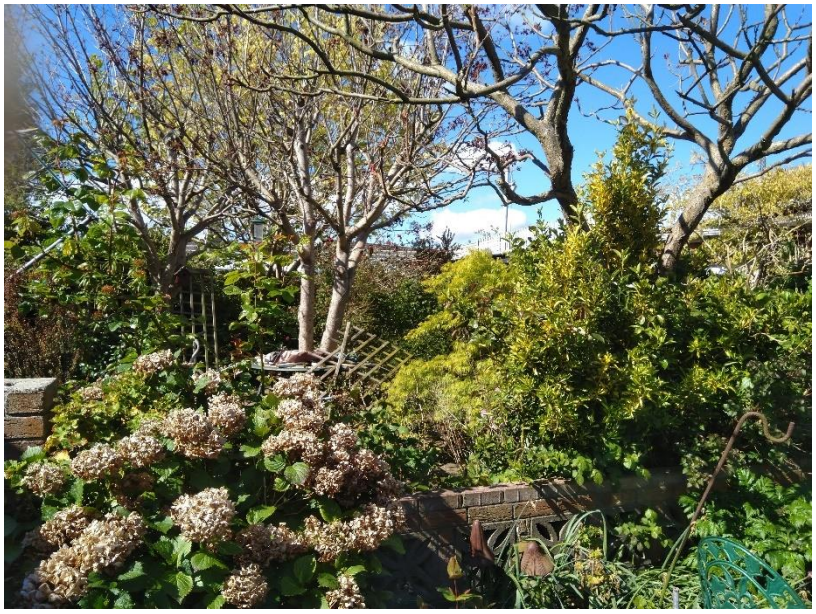

FIGURE 6. FLOWER BEDS AND BORDERS AT THE SITE OF THE PROPOSED DEVELOPMENT. (IMAGE TAKEN 07/05/2021).

5.4.1.3 Amenity Grassland (GA2)

This habitat occurs within a relatively small area in the front garden of no. 20 Dwyer Park. The hybrid bluebell *Hyacinthoides x massartiana* was recorded here.

FIGURE 7. AMENITY GRASSLAND AT THE SITE (IMAGE TAKEN 07/05/2021).

5.4.1.4 Scrub (WS1)

Patches of scrub habitat was recorded throughout the Site. The scrub habitat within the former warehouse area was typically comprised of Butterfly Bush *Buddleja davidii* and Brambles *Rubus fruticosus*. The scrub to the rear of no. 20 Dwyer Park and no. 7 Castle Street was comprised of Butterfly Bush, Sycamore *Acer pseudoplatanus*, Elder *Sambucus nigra*, Brambles and Old Man's Beard *Clematis vitalba*.

FIGURE 8. SCRUB HABITAT AT THE SITE. IMAGE TAKEN 07.05.2021.

5.4.1.5 Hedgerow (WL1)

A small hedgerow occurs within the garden of no. 20 Dwyer Park. It is primarily comprised of ornamental species (e.g., Privet *Ligustrum* sp., *Escallonia* sp., Cypress *Chamaecyparis* sp.) and Holly *Ilex aquifolium*.

5.4.1.6 Other Artificial Lakes and Ponds (FL8)

A small ornamental pond occurs within the garden of the dwelling on the Site.

5.4.1.7 Invasive Flora

Several invasive flora were recorded at the Site. The most notable of these are Japanese Knotweed and Three-cornered Leek, both of which are listed on Schedule III of the *European Communities (Birds and Natural Habitats) Regulations* 2011 (SI 477 of 2011, as amended). Other invasive species recorded included Monbretia, Old Man's Beard, Sycamore and Spanish Bluebell (potentially a hybrid).

FIGURE 9. JAPANESE KNOTWEED AT THE SITE OF THE PROPOSED DEVELOPMENT (IMAGE TAKEN 07/05/2021).

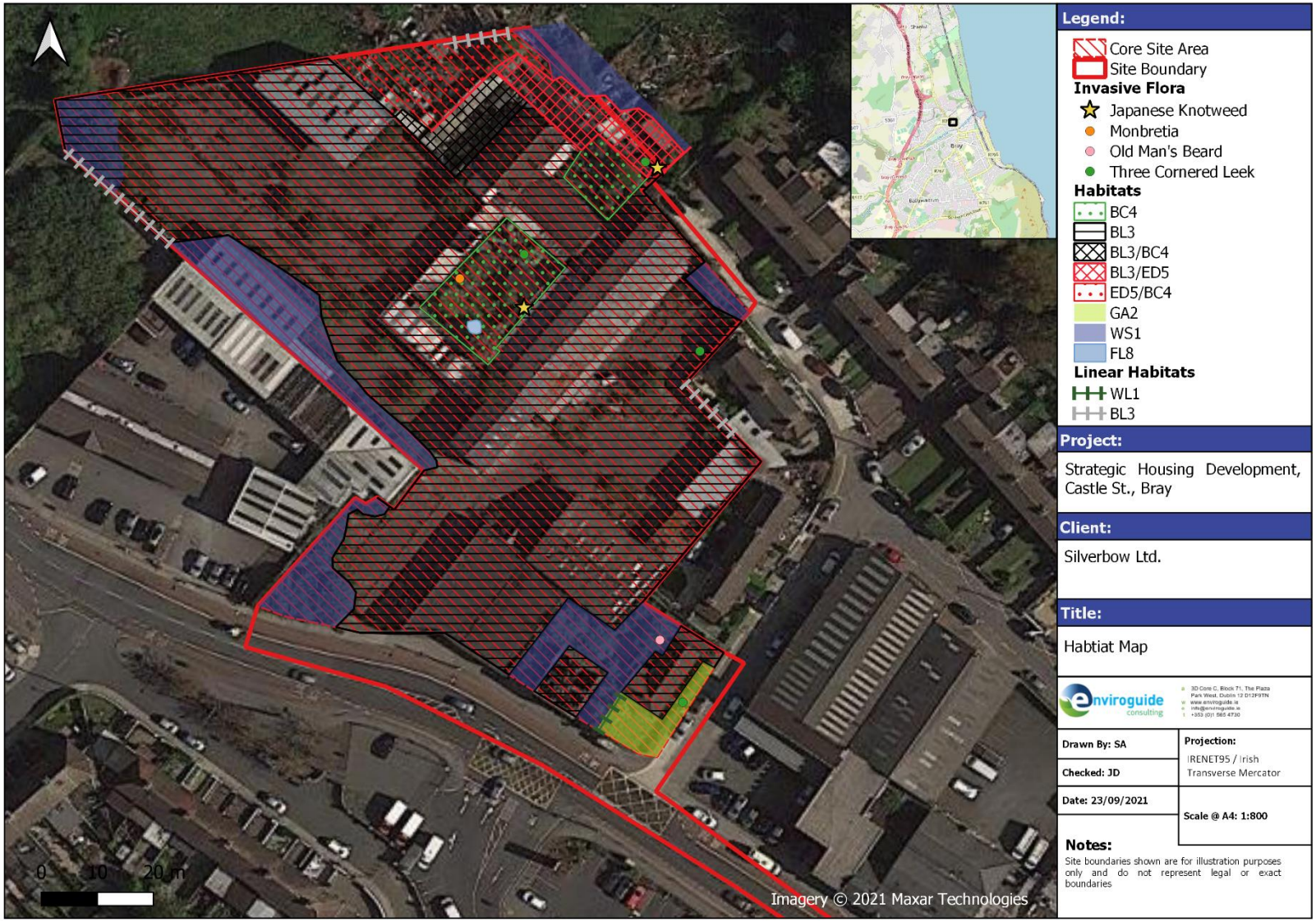

FIGURE 10. HABITATS AT THE SITE OF THE PROPOSED DEVELOPMENT.

5.4.2 Mammals (excl. bats)

There was no evidence of wild mammals at the Site. The resident of the dwelling within the Site at the time of survey provided anecdotal evidence of the presence of Fox *Vulpes vulpes* within the Site and environs. The woodland adjacent to the Site may provide habitat for a range of mammals including Fox, Badger and Hedgehog.

5.4.3 Breeding Birds

The only bird species found nesting in the warehouses and buildings at the Site were Feral Pigeons. Little activity and a low diversity of species in and over lands was recorded on the day of survey.

The bird species recorded during the site visit on 7th May 2021 are outlined in Table 5.

TABLE 5. BIRDS RECORDED AT THE SITE DURING THE BREEDING BIRDS SURVEY.

Species	BoCCI[4]	Observations/Notes
House Sparrow *Passer domesticus*	Amber	Frequently heard across warehouse land and garden areas. Juveniles spotted in adjoining lands.
Magpie *Pica pica*	Green	Recorded over lands, likely associated with woodier habitat adjacent to the Site.
Wren *Troglodytes troglodytes*	Green	Heard across warehouse lands and scrub/garden areas, likely breeding.
Robin *Erithacus rubecula*	Green	Observed in buddleja scrub in warehouse lands, likely breeding in scrub/hedgerow areas across site.
Starling *Sturnus vulgaris*	Amber	Observed frequently flying over the Site with juveniles heard calling in the distance. Likely breeding in residential sections of lands or adjacent houses.
Wood Pigeon *Columba palumbus*	Green	Observed in and flying over fields adjacent to the Site.
Feral Pigeon *Columba livia f. domestica*	Green	Present and possibly nesting in the warehouses.

There were no species recorded breeding on site which are on the Red List of the Birds of Conservation Concern in Ireland (Gilbert et al. 2021). Two amber-listed species, House Sparrow and Starling may be breeding within the Site.

5.4.4 Bats

The following is extracted from the Bat survey report:

"*A total three species of bat was recorded during the wide array of bat surveys undertaken for this proposed development: common pipistrelle, soprano pipistrelle and Leisler's bats.*

Common pipistrelles was the most frequently recorded bat species while soprano pipistrelle were only recorded on two occasions. Leisler's bats were generally recorded commuting through the survey area.

[4] Gilbert et al. (2021) Birds of Conservation Concern in Ireland 4: 2020–2026. *Irish Birds* 43: 1–22

A small common pipistrelle roost (2 individuals) was recorded in the occupied dormer bungalow. It is likely that this is a Day Roost. According to Figure 20 of Marnell et al. (2022), the conservation significance of this roost is deemed to be Low - "Small numbers of common species. Not a maternity roost". A low to medium level of bat activity was recorded for this species of bat within the proposed development site.

No other bat roosts were recorded in any of the remaining buildings or stone walls.

The are no tall vegetation deemed suitable as Potential Bat Roosts (PBRs).

The bat activity recorded within the proposed development site during dusk and dawn surveys was primarily associated with commuting bats. A low level of foraging was recorded.

The static surveillance only recorded bat activity for two bat species: common pipistrelle and Leisler's bats and this was in Low to Medium levels of bat activity.

The proposed development site is a small survey area with little habitat considered to be suitable for foraging and commuting bats. Overall the bat activity level recorded during surveys is considered to be Low. The level of bat activity and the number of bat encounters do not indicate that the proposed development site is an important area for local bat populations.

This is also in consideration of previous bat survey work undertaken by Bat Eco Services which indicated that the there is greater bat activity levels associated with lands east (old golf course) and north-east (Rathmichael Stream) of the proposed development site and with the River Dargle (particularly the People's Park due to the lack of street lighting). Therefore it is deemed that the bat activity levels recorded during this survey are due to local bat populations in vicinity of more suitable foraging, roosting and commuting habitat located in the areas named above."

5.4.5 Amphibians

There was no evidence of Common Frog or Smooth Newt within the pond at the Site. The area where the pond is located is not readily accessible from adjacent lands. Nevertheless, the current resident of the dwelling provided anecdotal evidence of the presence of Common Frog within the pond.

5.5 Designated sites, habitat and species evaluation

Fauna which have the potential to utilise habitat within the immediate area of the Proposed Development, or for which records exist in the wider area, have been evaluated below in Table 6 for their conservation importance. In addition, designated sites and habitats have been evaluated. This evaluation follows the Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA, 2009b). The rationale behind these evaluations is also provided. The term 'ecological receptors' is used when impacts upon an ecological feature are considered likely.

TABLE 6. EVALUATION OF DESIGNATED SITES, HABITATS AND FAUNA RECORDED WITHIN THE SUROUNDING AREA.

Designated Sites/Species/Habitats	Evaluation	Key Ecological Receptor (KER)	Rationale
Designated Sites			
SACs & SPAs	International Importance	No	Significant effects on Natura 2000 sites ruled out in AA Screening.
pNHAs	National Importance	**Yes**	Refer to Table 2
Habitats			
The River Dargle	National Importance	**Yes**	Designated salmonid river. New surface water infrastructure to be connected to this river.
Buildings and artificial surfaces (BL3) and mosaics (BL3/BC4 & BL3/ED5)	Negligible value	No	Man-made habitat of low biodiversity value.
Flowerbeds and Borders (BC4) and mosaics (ED5/BC4)	Local importance (lower value)	No	Man-made habitat of low biodiversity value. Flora dominated by ornamental species.
Amenity Grassland (GA2)	Local importance (lower value)	No	Small area of low diversity amenity grassland.
Scrub (WS1)	Local importance (lower value)	No	Low diversity scrub habitat dominated by invasive Butterfly Bush.
Other artificial lakes and ponds (FL8)	Local importance (lower value)	No	Very small ornamental pond. No evidence of frogs.
Hedgerow (WL1)	Local importance (lower value)	No	Very small hedgerow dominated by non-native ornamental species.
Fauna			
European Otter *Lutra lutra*	Local importance (higher value)	**Yes**	Hydrological connectivity to the Dargle River. No habitat for Otter at the Site.
Hedgehog *Erinaceus europaeus*	Local importance (lower value)	No	No evidence of Hedgehog during field survey. No significant habitat at the Site for Hedgehog.
Red Fox *Vulpes vulpes*	Local importance (lower value)	No	This species is not considered to be of conservation concern and is not afforded legal protection in Ireland.
Bat Assemblage	Local importance (higher value)	**Yes**	A small common pipistrelle roost (2 individuals) was recorded in the occupied dormer bungalow. A low to medium level of bat activity was recorded during the survey carried out.
Birds	Local importance (higher value)	**Yes**	A number of potential breeding species were recorded on site during the May 2021 field surveys.
Common Frog	Local importance (higher value)	**Yes**	No frog spawn observed within the pond. Area is not readily accessible from adjacent lands. Included here as a precautionary measure due to anecdotal evidence
Brown trout, Sea Trout, Salmon, European Eel	Local importance (higher value)	**Yes**	Hydrological connectivity to the Dargle River
Marine fish and mammals in Dargle Estuary and local coastline	Local importance (higher value)	**Yes**	Hydrological connectivity to the Dargle Estuary and adjacent marine environment

6 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

As per the relevant guidelines, likely significant effects have been assessed for Key Ecological Receptors only, as listed in Table 6. An impact is considered to be significant if it is predicted to affect the integrity or conservation status of a KER at a given geographical scale. All impacts are described ***in the absence of mitigation***.

6.1 Construction Phase

6.1.1 Impacts on Habitats

According to the Engineering Services Report by Corrigan Hodnett Consulting, based on the age of the existing development on the site, the most likely scenario is that the surface water collected from roofs and other areas within the development currently discharges to the existing combined sewer network, which is treated, along with wastewater, at Shanganagh-Bray wastewater treatment plant. However, the preferred connection location for surface water discharge is to the existing Dargle River via a new surface water pipe which will have to be constructed as part of the works as there are no surface water sewers in the area. The outfall connection will be to the existing culvert on the west side of Bray Bridge.

As such, there is potential for a ***negative, short-term, moderate*** impact to the River Dargle during the construction phase and during the construction of the surface water sewer and outfall. This would be due to water quality impacts arising from unmitigated surface water discharges to the River Dargle which could contain silt and other construction-related pollutants.

6.1.2 Impacts on fauna

6.1.2.1 Bats

There is little suitable habitat within the Proposed Development Site suitable for foraging and commuting bats. As a consequence, this loss of vegetation will not impact on commuting and foraging habitat for local bat populations. The construction of the proposed residential development will potentially increase the degree of light (both street and residential lighting) spilling onto the treelines adjacent to the survey area and boundaries of the proposed development site. There is a large array of buildings and structures located in the proposed development. Only a small Day Roost for common pipistrelles were recorded in the dormer bungalow during the bat surveys completed. Therefore, the Proposed Development will result in the loss of this Day Roost.

The impact assessment is as follows (Bat Eco Services, 2022):

- Roost loss of common pipistrelle Day Roost is assessed as ***permanent, slight negative*** effects
- Habitat loss (potential foraging/ commuting habitat) effects on all bat species are assessed as **permanent, not significant, negative** effects.
- Disturbance and/or displacement effects on all bat species during the construction phase are assessed as ***short-term, slight, negative effect***

6.1.2.2 Birds

There will be minor loss of habitat for birds at the Site of the Proposed Development through the removal of vegetation (mostly scrub) and warehouses at the Site. This could have a ***negative*, *permanent*, *slight* impact** on birds at a ***local*** level.

The increased noise and dust levels associated with the Construction Phase of the Proposed Development may have the potential to cause ***negative, short-term, slight*** *impacts* to **local** bird populations.

6.1.2.3 Common Frog

Removal of the small ornamental pond could result in mortality of Common Frog if it is present within the pond at the time. This constitutes a ***negative, permanent, moderate*** impact at a **local** scale, in the absence of suitable mitigation.

6.1.2.4 Fish, Marine Mammals & Otter

There is potential for ***negative, short-term, moderate*** impacts to aquatic fauna in the River Dargle, Dargle Estuary and nearby marine environment during the construction phase and construction of the surface water sewer. This would be due to water quality impacts arising from surface water discharges to the River Dargle which could contain silt and other construction-related pollutants.

6.2 Operational Phase

6.2.1 Impacts on Bray Head pNHA

There is a land pathway between the Site and Bray Head pNHA. Bray Head is a popular recreational area and is especially used by walkers. It is possible that the Proposed Development will result in an increase in footfall and visitor numbers within the pNHA, which could result in habitat loss/alteration/erosion as a result of the increase in local population numbers during the Operational Phase of the Proposed Development. However, according to the Wicklow County Development Plan 2016-2022, Wicklow County Council is committed to ensuring sustainable recreational use of the outdoors in County Wicklow in accordance with the objectives of the current County Wicklow Outdoor Recreational Strategy and in consultation with the Wicklow Uplands Council. The following outlines relevant objectives relating to the recreational use of natural resources in the Wicklow County Development Plan 2016-2022:

NH39: To facilitate the use of natural areas for active outdoor pursuits, subject to the highest standards of habitat protection and management and all other normal planning controls.
NH44: To implement the measures set out in the Bray Head Special Amenity Area Order (SAAO).

The Bray Head SAAO (2007) is designed to preserve and enhance the amenity value of the lands at Bray Head, Co. Wicklow. The following objectives are of relevance:

1.3: To manage the area in order to conserve its natural and cultural assets and realise its exceptional potential as a place for informal recreation, tourism and environmental education.

1.6: To preserve existing areas of heathland, maritime grassland and woodland areas.
1.12: It will be an objective of the Order to protect the coast and to prevent any works that could exacerbate, and promote works that would abate, coastal erosion.

As noted previously, Wicklow County Council is committed to ensuring sustainable recreational use of the outdoors in County Wicklow in accordance with the objectives of the current County Wicklow Outdoor Recreational Strategy and in consultation with the Wicklow Uplands Council. It is deemed that the Proposed Development will have a ***negligible*** impact on habitats within Bray Head pNHA due to the Special Amenity Area Order in place for Bray Head.

6.2.2 Impacts on the River Dargle

Attenuation and treatment are included as part of the surface water management and disposal proposals in accordance with the requirements of the GDSDS. The attenuation storage is provided within the confines of the site and will discharge, via a flow control device (Hydrobrake Vortex flow control, or similar) to a new manhole constructed in the public area in Castle Street at the head of the new pipeline which will flow to the discharge location at Bray Bridge. An oil interceptor is proposed to be installed on the network prior to discharge from the site to the new surface water sewer. Green roofs and permeable paving have been integrated into the development design. As surface water will be attenuated and treated prior to discharge to the River Dargle, ***no impacts*** on this water body will occur during the Operational Phase.

6.2.3 Impacts on Fauna

6.2.3.1 Birds

Collision with Site Structures

Tall structures such as electrical pylons, wind farms and tall buildings can lead to fatal collisions with commuting bird species. This is particularly true for those species considered to be “poor” fliers, with relatively low manoeuvrability compared to other more agile bird species (see Eirgrid, 2012).

The physical location of buildings and structures, and the amount of glass within the structure can affect the likelihood of bird collisions. Structures placed on or near areas regularly used by large numbers of feeding, breeding, or roosting birds, or on local flight paths, such as those between foraging and roosting areas can present a higher risk of collision. The risk of bird collisions increases as the ratio of glass to solid wall increases. A building designed with a total window surface area of 25-40 percent relative to the entire facade (low window to wall ratio) can reduce fatal bird collisions.

The Site itself is not deemed to be located in a sensitive area in terms of bird flight paths i.e., it is not located near any Special Protected Areas (SPAs) designated for wetland bird populations and is in itself not deemed to represent suitable *ex-situ* feeding/roosting habitat for any such species (habitats present comprise almost entirely of built-land).

In addition, the Proposed Development entails the construction of 7 storey structures above ground floor (maximum elevation is +29.475), and as such, the risk of migrating birds colliding with the structure due to its height is deemed to be ***negligible*** (Migrating species tend to

commute far above this with Swans and Geese flying up to 2500ft (ca.750m) during migration along Irish Coasts (Irish Aviation Authority, 2020)).

The percentage of glazing to solid wall was calculated for three typical elevations of the Proposed Development by Henry J Lyons Architects. The percentage of glazing in the three elevations assessed was between 26.9% and 32.4%. In addition, the overall façades of the proposed structures are well broken up, with a varied material composition which breaks up the reflective areas of the proposed structures. There is further subdivision occurring in the fenestration, balustrading etc. These architectural design features provide important visible cues as to the presence and extent of the proposed structures to any commuting/foraging bird species should they be in the vicinity of the Site. Therefore, it is considered that any local non-migratory bird species will adapt to the changing nature of the site as the construction phase progresses and for this reason the risk of bird collisions is ***negligible***.

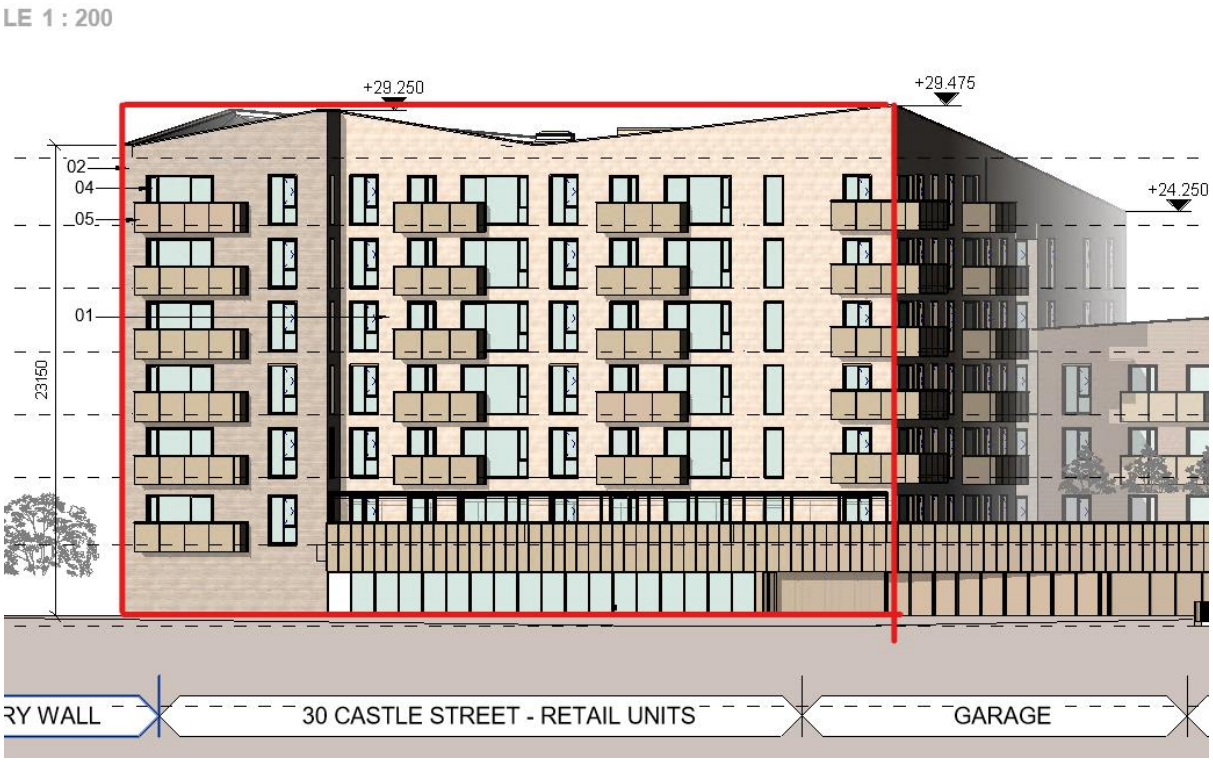

FIGURE 11. TYPICAL ELEVATION FOR WHICH THE RATIO OF GLAZING TO SOLID WALL WAS CALCULATED. IN THIS INSTANCE, THE PERCENTAGE OF GLAZING WAS CALCULATED AT 26.9%.

6.2.3.2 Bats

During the Operational Phase, there is potential for disturbance to bats utilising the Site through light pollution. This could have a ***negative, permanent, slight*** impact on bats in the locality (Bat Eco Services, 2022).

6.2.3.3 Fish & Otter

See above re. impacts on the River Dargle. Attenuation and treatment are included as part of the surface water management and disposal proposals, in accordance with the requirements of the GDSDS. As such, there will be ***no impacts*** to fish or Otter during the Operational Phase of the Proposed Development.

6.3 Do nothing impact

Under the do-nothing scenario, large areas of the Site would remain as they are. The scrub habitat is likely to increase in size and potentially offer suitable habitat for a number of species.

7 MITIGATION AND ENHANCEMENT MEASURES

7.1 Habitat Enhancement & Mitigation by Design

7.1.1 Landscape Plan

The vegetation at the Site is currently dominated by ornamental and non-native species. There will be a net gain for biodiversity by the proposed planting of native tree species, coupled with the planting of plants selected from a list of pollinator friendly species and maintained to increase the availability of flowering plants.

The scheme will be heavily planted, providing as much green areas as possible, enhancing biodiversity and carbon sequestration. Two community gardens are proposed to the North and South of the Proposed Development.

It is proposed to plant a range of tree species throughout the site. Tree planting along the Site boundary is Proposed, providing screening etc. as well as an ecological corridor. A mix of courtyard trees are proposed on the podium level.

Tree species have been selected for longevity, suitability to local soil conditions and micro-climate, biodiversity (native species) and where required suitability for proximity to residential buildings. Many plants from the Ireland 2020 Pollinator Plan were chosen to include the in the plant palette. In addition, as recommended by the Bat Specialist, Rowan/Mountain Ash and Crab Apple have been included in the plant palette.

The Bat Conservation Trust publication “Landscape and Urban Design for bats and biodiversity” (Gunnell et al., 2012) was taken into consideration by the landscaping team.

FIGURE 12. LANDSCAPE MASTER PLAN (NMP, 2021)

7.2 Construction Phase

7.2.1 River Dargle & Aquatic Fauna

Fuel and Chemical Storage

Appropriate storage facilities will be provided on Site. Areas of high risk include:

- Fuel and chemical storage;
- Refuelling Areas;
- Site Compound; and
- Waste storage areas.

There will be no washdown facilities for plant and equipment on the Proposed Development Site.

If required, fuel, oils and chemicals will be stored on an impervious base within a bund remote from any surface water ditches or locations.

All tank, container and drum storage areas shall be rendered impervious to the materials stored therein. Bunds shall be designed having regard to Environmental Protection Agency guidelines 'Storage and Transfer of Materials for Scheduled Activities' (2904). All tank and drum storage areas shall, as a minimum, be bunded to a volume not less than the greater of the following:

- 110% of the capacity of the largest tank or drum within the bunded area; or
- 25% of the total volume of substance that could be stored within the bunded area.

Concrete mixer trucks will not be permitted to wash out on Site with the exception of cleaning the chute into a container which will be removed off Site to an authorised facility.

Water will not be discharged to open water courses.

General Protection Measures

All works carried out as part of the Proposed Development will comply with all Statutory Legislation including the Local Government (Water Pollution) acts, 1977 and 1990 and the contractor will cooperate fully with the Environment Section of Wicklow County Council in this regard.

Personnel working on the Site will be trained in the implementation of environmental control and emergency procedures. The CEMP and the relevant documents produced will be formulated in consideration of standard best international practice including but not limited to:

- CIRIA, (2001), Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors;
- Construction Industry Research and Information Association (CIRIA) Environmental Good Practice on Site (C650), 2005;
- BPGCS005, Oil Storage Guidelines;
- CIRIA 697, The SUDS Manual, 2007;
- UK Pollution Prevention Guidelines (PPG) UK Environment Agency, 2004;
- Construction Industry Research and Information Association CIRIA C648: Control of water pollution from linear construction projects: Technical guidance (Murnane et al. 2006);
- CIRIA C648: Control of water pollution from linear construction projects: Site guide (Murnane et al. 2006); and
- Inland Fisheries Ireland (2016). Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters.

The following standard operational measures will protect surface waters during the Construction Phase of the Proposed Development:

- Storm drain inlets which could receive stormwater from the project will be protected throughout the Construction Phase. Inlet protection will be installed before soil disturbing activities begin.
- Run-off from the working site or any areas of exposed soil should be channelled and intercepted at regular intervals for discharge to silt-traps or lagoons with over-flows directed to land rather than to a watercourse.
- Pumping of concrete will be monitored to ensure that there is no accidental discharge;
- There will be no mixer washings or excess concrete discharged on Site. All excess concrete is to be removed from Site and all washout of concrete chutes to be captured in a tank which shall be removed offsite for disposal at an authorised wastewater treatment facility;
- Any oil and lubricant changes and maintenance will take place offsite;

- Refuelling of plant and machinery on Site shall take place in a designated, impermeable area;
- Any imported materials will, as much as possible, be placed on Site in their proposed location and double handling will be avoided. Where this is not possible designated temporary material storage areas will be used;
- Temporary oil interceptor facilities will be installed and maintained where Site Works involve the discharge of drainage waters to nearby watercourses.
- All containment and treatment facilities will be regularly inspected and maintained.
- If cast-in-place concrete is required, all work must be carried out in the dry and effectively isolated from any water courses or drainage ditches.
- Refuelling of plant during the Construction Phase will only be carried out at designated refuelling station locations on site. Each station will be fully equipped for spill response and a specially trained and dedicated Environmental and Emergency Spill Response team will be appointed before the commencement of works on site.
- Only emergency breakdown maintenance will be carried out on site. Drip trays and spill kits will be available on site to ensure that any spills from vehicles are contained and removed off site;
- All personnel working on site will be trained in pollution incident control response. Emergency silt control & spillage response procedures contained within the CEMP will ensure that appropriate information will be available on site outlining the spillage response procedures and a contingency plan to contain silt during an incident;
- Any other diesel, fuel or hydraulic oils stored on site will be stored in bunded storage tanks- the bunded area will have a volume of at least 110% of the volume of the stored materials as per best practice guidelines (Enterprise Ireland, BPGCS005);
- Portaloos and/or containerised toilets and welfare units will be used to provide facilities for site personnel. All associated waste will be removed from site by a licenced waste disposal contractor;

All wastewater generated on-site during the Construction Phase will be stored and disposed of appropriately by discharge to foul sewer or by tankering off site. Under no circumstances will any untreated wastewater generated onsite (from equipment washing, road sweeping etc.) be released into nearby ditches or watercourses.

7.2.2 Groundwater

Measures set out above will serve to protect soil and groundwater.

Groundwater may be encountered during the construction works. Where water must be pumped from the excavations, water will be managed in accordance with best practice standards (i.e. CIRIA – C750) and regulatory consents.

Excavations and potentially contaminated stockpiled soils will be constructed/located/sheeted in a manner that ensures water is contained within the site boundary.

7.2.3 Bats

The following mitigation measures are taken from the Bat Report (Appendix III).

7.2.3.1 Dormer Building Removal

A NPWS Derogation Licence is required for of the structure recorded as a roosting site for common pipistrelle bat (day roost). As a derogation licence is required for the loss of the bat roost, a draft derogation licence application is appended to the Bat Survey report (located in Appendix III). This is appended for information purposes, so that all information relevant to this impact is provided. The derogation licence application will not be submitted until prior to when construction is due to commence, if the proposed development is granted.

It is important that the following steps are strictly adhered to in order to protect potential roosting common pipistrelle bats during the demolition process:

- Demolition of building will be undertaken outside the summer months of May to August to reduce the likelihood of bat being present.

- A bat specialist is required to supervise the works.

The procedure of supervision and surveying is as follows:

i) 1 week prior to removal undertake the following:
   a. Undertake a daytime inspection of the internal space of the building.
   b. Place static units in potentially likely roosting places within the internal space of the building and leave for a minimum of 5 nights surveillance.
   c. Undertake a dusk survey of the building to determine if bat are roosting within the building.

ii) Day 1
   a. Undertake a Dawn Survey to determine if bats are roosting within the building.
   b. Remove ½ of the roof tiles by hand under supervision of a bat specialists.
   c. Leave open over-night.

iii) Day 2
   a. Undertake a Dawn Survey to determine if bats are roosting within the building.
   b. Remove the remaining ½ of the roof tiles by hand under supervision of a bat specialists.

7.2.3.2 Bat Box Scheme

The following is extracted from the Bat Report (Bat Eco Services, 2022).

The Conservation Significance according to Marnell et al. (2022) results determines the bat mitigation measures required. In relation to the Day Roost recorded for common pipistrelles, the mitigation requirement is “Flexibility over provision of bat boxes, access to new buildings etc. No conditions about timing or monitoring”.

Therefore, three sets of bat boxes are proposed as part of mitigation:

- Bat Box Scheme – summer bat boxes (general bat conservation measure);
- Bat Tubes – inserted into the external walls of the boundary of the proposed development (to mitigate for the loss of a common pipistrelle Day Roost);

- Rocket Bat Box – x2 to be erected in the North Garden (to mitigate for the loss of a common pipistrelle Day Roost).

Bat Box Scheme

- 6 summer bat boxes (Schwegler Woodcrete 1FF bat box or equivalent – source www.nhbs.com) to be erected on 4m wall boundary of the proposed development site.
- These will be erected **prior to the demolition of the dormer bungalow**. Bat boxes scheme be sited carefully and this will be undertaken by a bat specialist with assistance from the contractor.

Bat Tubes

Eight bat tubes will be permanently incorporated into the boundary wall (Figure 8a of Bat Report). These bat tubes are designed to be built into the external walls of structures (located a minimum of 4m off the ground). These will be located in the boundary wall where there is no lighting and where there is proposed landscaping.

Rocket Bat Boxes

Erect two Rocket Bat Boxes along the boundary of the North Garden.

7.2.3.3 Construction Phase Lighting

The following is extracted from the Bat Report (Bat Eco Services, 2022).

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).

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

Any external lighting for the proposed development will strictly follow the above guidelines and these will be strictly implemented during construction of the proposed development.

7.2.4 Birds

Any clearance of vegetation will be carried out outside the main breeding season, i.e. 1st March to 31st August, in compliance with the Wildlife Act 2000. Should any vegetation removal be required during this period, the NPWS will be consulted, and instruction taken from them. If the buildings on Site are to be demolished during the breeding bird season, the buildings will be inspected for breeding birds prior to demolition. Should nesting birds be discovered, the nest will be protected until any nesting birds have fledged and departed the site.

7.2.5 Reduction of noise and dust related impacts

Reduction of noise impacts

Short-term increases in disturbance levels as a direct result of human activity and through increased generation of noise during the Construction Phase can have a range of impacts depending upon the sensitivity of the ecological receptor, the nature and duration of the disturbance and its timing.

Noise generated during the Construction Phase of the Proposed Development could cause temporary disturbance to a number of faunal species in the vicinity of the Site of the Proposed Development. To mitigate this disturbance, the following measures will be implemented:

- Selection of plant with low inherent potential for generating noise.
- Siting of plant as far away from sensitive receptors as permitted by site constraints.
- Avoidance of unnecessary revving of engines and switch off plant items when not required.
- Keep plant machinery and vehicles adequately maintained and serviced.
- Proper balancing of plant items with rotating parts.
- Keep internal routes well maintained and avoid steep gradients.
- Minimise drop heights for materials or ensure a resilient material underlies.
- Use of alternative reversing alarm systems on plant machinery.
- Where noise originates from resonating body panels and cover plates, additional stiffening ribs or materials should be safely applied where appropriate.
- Limiting the hours during which site activities likely to create high levels of noise are permitted.
- Appointing a site representative responsible for matters relating to noise.
- Monitoring typical levels of noise during critical periods and at sensitive locations.

These measures will ensure that any noise disturbance to nesting birds or any other fauna species in the vicinity of the Site of the Proposed Development will be reduced to a minimum.

Reduction of dust related impacts

The following general dust control measures will be followed for the duration of the Construction Phase of the Proposed Development and will ensure no significant dust related impacts occur to nearby sensitive receptors including local faunal species.

- In situations where the source of dust is within 25m of sensitive receptors screens (permeable or semi-permeable) will be erected.
- Haulage vehicles transporting gravel and other similar materials to site will be covered by a tarpaulin or similar.
- Access and exit of vehicles will be restricted to certain access/exit points.
- Vehicle speed restrictions of 20km/hr will be in place.
- Bowsers will be available during periods of dry weather throughout the construction period.
- During dry and windy periods, and when there is a likelihood of dust nuisance, a bowser will operate to ensure moisture content is high enough to increase the stability of the soil thereby reducing the amount of dust.
- Stockpiles will be stored in sheltered areas of the site, covered, and watered regularly or as needed if exposed during dry weather.
- Gravel should be used at site exit points to remove caked-on dirt from tyre tracks.
- Equipment should be washed at the end of each work day.
- Hard surfaced roads will be wet swept to remove any deposited materials.
- Unsurfaced roads will be restricted to essential traffic only.
- If practical, wheel-washing facilities should be located at all exits from the construction site.
- Dust production as a result of site activity will be minimised by regular cleaning of the site access roads using vacuum road sweepers and washers. Access roads should be cleaned at least 0.5km on either side of the approach roads to the access points.
- Public roads outside the site shall be regularly inspected for cleanliness, as a minimum daily, and cleaned as necessary. A road sweeper will be made available to ensure that public roads are kept free of debris.
- The frequency of cleaning will be determined by the site agent and is weather and activity dependent
- The height of stockpiles will be kept to a minimum and slopes should be gentle to avoid windblown soil dust.
- The following will be dampened during dry weather:
    - Unpaved areas subject to traffic and wind
    - Stockpiles
    - Areas where there will be loading and unloading of dust-generating materials
- Under no circumstances should wastewater from equipment, wheel or surface cleaning enter the surface water drainage network.

7.2.6 Common Frog

In the instance of frog breeding sites being potentially impacted on site, detailed proposals will be agreed with NPWS prior to construction/disturbance taking place.

Prior to works being undertaken, a qualified Ecologist will check the pond for Common Frog and other amphibians (Smooth Newt).

If present within the affected pond, amphibians will be removed under licence from the NPWS (Wildlife and Amendment Acts 1976/200) prior to construction proceeding and placed into alternative suitable habitats in the locality.

7.2.7 Invasive Species

Two invasive plant species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations (S.I. 477 of 2011) were recorded at the Site of the Proposed Development, Japanese Knotweed and Three-Cornered Leek. It is recommended that a specialist biosecurity company is appointed to undertake additional surveys and prepare a management plan prior to works being undertaken.

7.2.8 Biosecurity

The following will be adhered to, to avoid the introduction of invasive species to the Proposed Development site.

- Any material required on the site will be sourced from a stock that has been screened for the presence of any invasive species by a suitably qualified ecologist and where it is confirmed that none are present.
- All machinery will be thoroughly cleaned and disinfected prior to arrival on site to prevent the spread of invasive species.

7.3 Operational Phase

7.3.1 Birds

It is recommended that Swift Boxes or Bricks are incorporated into the Proposed Development where possible. The incorporation of Swift Boxes or Bricks would help recover the declining swift population, which are now Red Listed in Ireland (Gilbert et al., 2021). The following recommendations are extracted from “Saving Swifts” by Birdwatch Ireland[5].

Swift bricks/boxes:

- should be constructed of long-lasting material and securely fixed in position.
- should be erected at least five metres above ground level
- should be erected in sheltered cool areas out of the sun, or under an overhang and /or under the eaves. Bricks can be placed at any aspect, however, as they tend not to overheat the way that externally fitted boxes can.
- should have a clear airspace in front for access
- should be grouped (side by side in rows) as swifts are colony nesters
- should avoid sites which can be accessed by predators- cats, squirrels, magpies, rats.

[5] https://birdwatchireland.ie/app/uploads/2019/10/Saving-Swifts-Guide_pdf.pdf

- should avoid sites near plate glass windows because they are a known collision hazard for birds.
- should not be placed directly above ledges or other obstructions. Swifts drop before taking flight and can collide with obstacles below the nest entrance.
- should not be one above the other.
- should not be near spotlights or later fit spotlights near them.

It is advised to install a Swift calling system to attract Swifts and encourage them to take up residence at a new site.

7.3.2 Bats

The following is extracted from the Bat Report (Bat Eco Services, 2022).

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).

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

Any external lighting for the proposed development will strictly follow the above guidelines and these will be strictly implemented during construction and operation phase of the proposed development.

The horizontal illuminance map of the proposed lighting plan was examined as part of the bat assessment by Bat Eco Services (Appendix III) in relation to potential impact of light spillage on local bat populations. This map indicates that the lighting has been designed to reduce spillage which will benefit nocturnal wildlife.

8 CUMULATIVE IMPACTS

If the Proposed Development and existing or proposed projects or plans impact on the same KERs, there is potential to lead to cumulative impacts which could be of a higher level of

significance. This applies to potential impacts on bats due to the combined loss of suitable commuting and/or foraging habitat in the locality and potential impacts on birds due to the combined loss of nesting or foraging habitat in the locality.

8.1.1 Existing granted planning permissions

There are several existing planning permissions on record in the area ranging from small-scale extensions and alterations to existing residential properties to some larger-scale developments. The larger-scale developments are outlined below:

SH202103: Change of use of lands from golf course use to residential and other uses consisting of 591 no. residential units and c. 1,336 sq.m of other uses comprising of a retail unit, 2 no. commercial units, a childcare facility and a café.

PRR 21/869 Part VIII - Bray Sustainable Transport Bridge: The construction of the Bray Sustainable Transport Bridge, link road and associated works in the townlands of Bray, Bray Commons and Ravenswell. The proposed bridge and link road will consist of a two-lane public transport road 3.25m wide and variable width pedestrian, cyclist and shared path facilities. A new pedestrian boardwalk is proposed along the southern bank wall to link the existing walkway to the bridge crossing.

15535: Extension of duration for a development on a site of c. 0.149 hectares, lying with the St. John of God Complex, Ravenswell, Dublin Road, Bray, Co. Wicklow. The development will consist of a) a single carriageway vehicular road (c. 59m in length) to serve the 'lower' lands at the St. John of God Complex. This road will be accessed off the proposed northern access road at the Bray Golf Club lands (the alignment of which immediately adjoins the application site to the east) as applied for to Bray Town Council under Reg. Ref. 07/194 and to Dun Laoghaire-Rathdown County Council under Reg. Ref. D074/1495. B) Associated site development works

20672: Extension of duration for a mixed use development of residential (603 units), community and commercial and all other associated works on a site of c.15.99 hectares.

It is considered that significant in-combination effects of the Proposed Development and the aforementioned developments will not arise as:

- The distances between the proposed and permitted developments are sufficient to exclude the possibility of significant effects arising from *combined* emissions of noise, dust, airborne pollutants and/or vibrations emitted from the Site during the Construction Phase; increased traffic volumes during the Construction and Operational Phase and associated emissions; potential increased lighting emitted from the Site during Construction and Operational Phase; and increased human presence at the Site during Construction and Operational Phase.
- The construction phase of the Proposed Development will be short-term in duration.
- The WwTP serving the Site is currently below capacity (Shanganagh-Bray WWTP).
- The Special Amenity Area Order in place for Bray Head.
- The small-scale and temporary nature of the works adjacent to the Dargle River.

8.1.2 Relevant policies and plans

Plans and policies that may result in possible in-combination effects with the Proposed Development include:

- County Wicklow Biodiversity Action Plan 2010 - 2015
- County Wicklow Development Plan 2016-2022
- Bray Municipal District Local Area Plan 2018 - 2024

Upon examination of the listed projects and plans, it is concluded that there is no possibility for any in-combination effects between these projects and plans and the Proposed Development.

The Wicklow Biodiversity Action Plan 2010 - 2015 is set out to protect and improve biodiversity, and as such will not result in negative in-combination effects with the Proposed Development. In addition, sustainable development including SuDS measures for all new developments is inherent in the objectives of all development plans within the Greater Dublin Area.

The Site is listed as an “Opportunity Site” in the Bray Municipal District LAP. The Objectives for this Site within the LAP are as follows:

Objectives OP2

- To provide for a mixed-use development including commercial, retail, residential, community and cultural uses;
- Active commercial, community or cultural uses will generally be required at ground and street levels, with residential use above, other than (a) along the Dwyer Park frontage and (b) on the truncated northernmost sector of the site.
- A high-density development, that makes the best use of this serviced urban land will be expected, in a 3-4 storey development;
- The design (including height) of any development shall pay particular regard to the height of immediately adjoining (mostly 2-storey) residences and in general heights shall not exceed 3-storeys along Dwyer Park;
- Any development on the lands shall include street frontage directly onto Castle Street, ideally with limited set back across the frontage of the site; (other than that required for adequate pedestrian / cyclist usage); any set back in excess of 5m from the road kerb will require to be justified based on specific design criteria and in any event buildings shall not be set back any further than 15m from the kerb.
- Those parts of any proposed development that adjoin existing streets shall provide for an active street frontage that addresses and connects with the public domain.

It is also an objective of the Bray LAP to improve the Castle Street – Dublin Road (Objective RO7). This objective is dependent on available funding.

Considering the general lack of KERs at the Site and the urban nature of the surrounding lands, it is not anticipated that there will be any in-combination effects between the Proposed

Development and the above listed plans/policies that could result in significant effects on any KERs listed in this document.

9 RESIDUAL IMPACTS

Residual impacts are impacts that remain once mitigation has been implemented or impacts that cannot be mitigated. Table 7 provides a summary of the impact assessment for the identified Key Ecological Resources (KERs) and details the nature of the impacts identified, mitigation proposed and the classification of any residual impacts.

Provided all mitigation measures are implemented in full and remain effective throughout the lifetime of the Development, no significant negative residual impacts on the local ecology or on any designated nature conservation sites are expected from the Proposed Development.

TABLE 7. SUMMARY OF POTENTIAL IMPACTS ON KER(S), MITIGATION PROPOSED AND RESIDUAL IMPACTS.

Key Ecological Resource	Level of Significance	Potential Impact	Impact Without Mitigation				Proposed Mitigation	Residual Impact
			Quality	Magnitude / Extent	Duration	Significance		
River Dargle	National Importance	Pollution of River Dargle during the construction phase and construction of the surface water sewer.	Negative	Local	Short-term	Moderate	Surface water protection measures to be implemented.	**Negligible**
Bat assemblage	Local Importance (higher value)	Loss of Common Pipistrelle day roost Habitat Loss Disturbance/displacement due to lighting during construction and operational phases	Negative	Local	Permanent Permanent Short-term & Permanent	Slight Not Significant Slight	Mitigation measures as outlined in sections 7.2.3 and 7.3.2.	**Negative; Not significant**
Breeding-Bird assemblage	Local Importance (higher value)	Loss of potential foraging and nesting habitat. Disturbance due to noise generated during Construction Phase.	Negative	Local	Permanent Short-term	Slight Slight	Planting of shrub and tree species to take place as part of project design. Any clearance of vegetation will be carried out outside the main breeding season, i.e. 1st March to 31st August, in compliance with the Wildlife Act 2000. Should any vegetation removal be required during this period, the NPWS will be consulted, and instruction taken from them. If the buildings on Site are to be demolished	**Negligible.**

Key Ecological Resource	Level of Significance	Potential Impact	Impact Without Mitigation				Proposed Mitigation	Residual Impact
			Quality	Magnitude / Extent	Duration	Significance		
							during the breeding bird season, the buildings will be inspected for breeding birds prior to demolition. Should nesting birds be discovered, the nest will be protected until any nesting birds have fledged and departed the site. Construction related noise control/minimisation measures to be implemented.	
Common Frog	Local Importance (higher value)	Mortality due to pond removal, should frogs be present	Negative	Local	Permanent	Moderate	Prior to works being undertaken, a qualified Ecologist will check the pond for Common Frog and other amphibians (Smooth Newt). If present within the affected pond, amphibians will be removed under licence from the NPWS (Wildlife and Amendment Acts 1976/200) prior to construction proceeding and placed into alternative suitable habitats in the locality.	**Negligible.**

Key Ecological Resource	Level of Significance	Potential Impact	Impact Without Mitigation				Proposed Mitigation	Residual Impact
			Quality	Magnitude / Extent	Duration	Significance		
Fish, marine mammals & Otter	Local Importance (higher value)	Pollution of River Dargle, Dargle Estuary and local marine environment during the construction phase and construction of the surface water sewer.	Negative	Local	Short-term	Moderate	Surface water protection measures to be implemented.	**Negligible**

10 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 boxes. Register bat box scheme with Bat Conservation Ireland. This should be undertaken for a minimum of 2 years.
- Monitoring of any other bat mitigation measures. All mitigation measures should be checked to determine their level of success to inform future mitigation. A full summer bat survey is recommended post-works.

11 CONCLUSION

It is considered that provided the mitigation measures proposed are carried out in full, there will be no significant negative impact to any valued habitats, designated sites or individual or group of species as a result of the Proposed Development.

Based on the successful implementation of these measures and proposed works, to be carried out in accordance with the landscape plan, there will be no significant negative ecological impacts arising from Construction and Operational Phases of the Proposed Development.

The proposed landscape planting will result in a net biodiversity gain at the Site, through the replacement of what is largely hard-standing, built-land and non-native scrub, with a more heterogenous landscape, comprising extensive tree planting, green roofs, grassland areas and pollinator friendly ornamental planting throughout.

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APPENDIX I – VALUE OF ECOLOGICAL RESOURCES

The criteria outlined in the table below, taken from the Guidelines for *Assessment of Ecological Impacts of National Road Schemes* published by the NRA, were used for assigning value to designated sites, habitats and species within the Site of the Proposed Development and surrounding area.

Importance	Criteria

International Importance	- 'European Site' including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation.
	- Proposed Special Protection Area (pSPA).
	- Site that fulfills the criteria for designation as a 'European Site' (see Annex III of the Habitats Directive, as amended).
	- Features essential to maintaining the coherence of the Natura 2000 Network.
	- Site containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive.
	- Resident or regularly occurring populations (assessed to be important at the national level) of the following:
	  - Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and/or
	  - Species of animal and plants listed in Annex II and/or IV of the Habitats Directive.
	- Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971).
	- World Heritage Site (Convention for the Protection of World Cultural & Natural Heritage, 1972).
	- Biosphere Reserve (UNESCO Man & The Biosphere Programme).
	- Site hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals, 1979).
	- Site hosting significant populations under the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979).
	- Biogenetic Reserve under the Council of Europe.
	- European Diploma Site under the Council of Europe.
	- Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988).

National Importance	- Site designated or proposed as a Natural Heritage Area (NHA).
	- Statutory Nature Reserve.
	- Refuge for Fauna and Flora protected under the Wildlife Acts.
	- National Park.
	- Undesignated site fulfilling the criteria for designation as a Natural Heritage Area (NHA); Statutory Nature Reserve; Refuge for Fauna and Flora protected under the Wildlife Act; and/or a National Park.
	- Resident or regularly occurring populations (assessed to be important at the national level) of the following:
	  - Species protected under the Wildlife Acts; and/or
	  - Species listed on the relevant Red Data list.
	- Site containing 'viable areas' of the habitat types listed in Annex I of the Habitats Directive.

County Importance	- Area of Special Amenity. - Area subject to a Tree Preservation Order.

	- Area of High Amenity, or equivalent, designated under the County Development Plan.
	- Resident or regularly occurring populations (assessed to be important at the County level) of the following:
	  - Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;
	  - Species of animal and plants listed in Annex II and/or IV of the Habitats Directive;
	  - Species protected under the Wildlife Acts; and/or
	  - Species listed on the relevant Red Data list.
	- Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or National importance.
	- County important populations of species, or viable areas of semi-natural habitats or natural heritage features identified in the National or Local BAP (Biodiversity Action Plan), if this has been prepared.
	- Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county.
	- Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.

Local Importance (Higher Value)	- Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared;
	- Resident or regularly occurring populations (assessed to be important at the Local level) of the following:
	  - Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;
	  - Species of animal and plants listed in Annex II and/or IV of the Habitats Directive;
	  - Species protected under the Wildlife Acts; and/or
	  - Species listed on the relevant Red Data list.
	- Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality;
	- Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.

Local Importance (Lower Value)	- Sites containing small areas of semi-natural habitat that are of some local importance for wildlife; - Sites or features containing non-native species that are of some importance in maintaining habitat links.

APPENDIX II – EPA IMPACT ASSESSMENT CRITERIA

Criteria used to define quality of effects.

In line with the draft EPA Guidelines (EPA, 2017), the following terms are defined when quantifying the quality of effects:

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

Criteria used to define significance of effects.

In line with the draft EPA Guidelines (EPA, 2017), the following terms are defined when quantifying significance of impacts:

Significance of Effects	Definition
Imperceptible	An effect capable of measurement but without significant consequences.
Not significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate	An effect which alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
Very significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
Profound	An effect which obliterates sensitive characteristics.

Criteria used to define duration of effects.

In line with the draft EPA Guidelines (EPA, 2017), the following terms are defined when quantifying duration and frequency of effects:

Quality of Effects	Definition
Momentary	Effects lasting from seconds to minutes
Brief	Effects lasting less than a day
Temporary	Effects lasting less than a year
Short-term	Effects lasting one to seven years
Medium term	Effects lasting seven to fifteen years

Long-term	Effects lasting fifteen to sixty years
Permanent	Effects lasting over sixty years
Reversible	Effects that can be undone, for example through remediation or restoration.

APPENDIX III – BAT SURVEY REPORT

2022

Bat Assessment: Former Heiton Buckley Site, Castle Street, Bray, Co. Wicklow.

Dr Tina Aughney

Bat Eco Services

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

Licenced Bat Specialist: Dr Tina Aughney (tina@batecoservices.com, 086 4049468)
NPWS licence C13/2020 (Licence to handle bats, expires 31st December 2022)
NPWS licence 08/2020 (Licence to photograph/film bats, expires 31st December 2022)
NPWS licence DER/BAT 2022-36 on expiry (Survey licence, expires 24th March 2025).

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

All analysis and reporting is completed by Dr Tina Aughney. Data collected and surveying is completed with the assistance of a trained field assistant.

Mr. Shaun Boyle (Field Assistant) NPWS licence DER/BAT 2022-37 (Survey licence, expires 24th March 2025).

Client: Enviroguide Consulting on behalf of McNamara Property (Project Managers).

Project Name & Location: SHD, Former Heiton Buckley Site, Castle Street, Bray, Co. Wicklow.

Report Revision History

Date of Issue	Draft Number	Issued To (process of issuing)
27th September 2021	Draft 1	By email to Enviroguide Consulting
27th September 2021	Draft 2	By email to Enviroguide Consulting
13th April 2022	Final	By email to Enviroguide Consulting

Purpose

This document has been prepared as a Report for Enviroguide Consulting. 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: SHD, Former Heiton Buckley Site, Castle Street, Bray, Co. Wicklow.

Proposed work: Proposed housing development (SHD).

Bat Survey Results - Summary

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

Bat Survey Duties Completed (Indicated by red shading)

Tree PBR Survey	◯	Daytime Building Inspection	◯
Static Detector Survey	◯	Daytime Bridge Inspection	◯
Dusk Bat Survey	◯	Dawn Bat Survey	◯
Walking Transect	◯	Driving Transect	○
Trapping / Mist Netting	○	IR Camcorder filming	◯
Endoscope Inspection	◯	Other	◯
		Thermal Imagery filming	

Citation: Bat Eco Services (2022) Bat Assessment : Former Heiton Buckley, Castle Street, Bray, Co. Wicklow. Unpublished report prepared for Enviroguide Consulting.

Contents

1. Introduction

Bat Eco Services was commissioned by Enviroguide Consulting to undertake a preliminary bat survey of Former Heiton Buckley, Castle Street, Bray, Co. Wicklow.

1.1 Relevant Legislation & Bat Species Status in Ireland

1.1.1 Irish Statutory Provisions

A small number of animals and plants are protected under Irish legislation (Nelson, *et al.,* 2019). The principal statutory provisions for the protection of animal and plant species are under the Wildlife Act 1976 (as amended) and the European Communities (Birds and Natural Habitats) Regulations 2011, as amended. The Flora (Protection) Order 2015 (S.I. no. 356 of 2015) lists the plant species protected by Section 21 of the Wildlife Acts. See www.npws.ie/ legislation for further information.

The codes used for national legislation are as follows:

- WA = Wildlife Act, 1976, Wildlife (Amendment) Act, 2000 and other relevant amendments
- FPO = Flora (Protection) Order, 2015 (S.I. No. 356 of 2015)

1.1.2 EU Legislation

The Birds Directive (Directive 2009/147/EC) and Habitats Directive (Council Directive 92/43/EEC) are the legislative instruments which are transposed into Irish law, *inter alia,* by the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011) ('the 2011' Regulations), as amended.

The codes used for the Habitats Directive (Council Directive 92/43/EEC) are:

- Annex II Animal and plant species listed in Annex II
- Annex IV Animal and plant species listed in Annex IV
- Annex V Animal and plant species listed in Annex V

The main aim of the Habitats Directive is the conservation of biodiversity by requiring Member States to take measures to maintain or restore natural habitats and wild species listed on the Annexes to the Directive at a favourable conservation status. These annexes list habitats (Annex I) and species (Annexes II, IV and V) which are considered threatened in the EU territory. The listed habitats and species represent a considerable proportion of biodiversity in Ireland and the Directive itself is one of the most important pieces of legislation governing the conservation of biodiversity in Europe.

Under Article 11 of the Directive, each member state is obliged to undertake surveillance of the conservation status of the natural habitats and species in the Annexes and under Article 17, to report to the European Commission every six years on their status and on the implementation of the measures taken under the Directive. In April 2019, Ireland submitted the third assessment of conservation status for 59 habitats and 60 species. There are three volumes with the third listing details of the species assessed.

Article 12 of the Habitats Directive requires Member States to take measures for the establishment of a strict protection regime for animal species listed in Annex IV(a) of the Habitats Directive within the whole territory of Member States. Article 16 provides for derogation from these provisions under defined conditions. These provisions are implemented under Regulations 51 and 54 of the 2011 Regulations.

1.1.3 IUCN Red Lists

The International Union for the Conservation of Nature (IUCN) coordinates the Red Listing process at the global level, defining the categories so that they are standardised across all taxa. Red Lists are also produced at regional, national and subnational levels using the same IUCN categories (IUCN 2012, 2019).

Since 2009, Red Lists have been produced for the island of Ireland by the National Parks and Wildlife Service (NPWS) and the Northern Ireland Environment Agency (NIEA) using these IUCN categories. To date, 13 Red Lists have been completed. The Red Lists are an assessment of the risk of extinction of each species and not just an assessment of their rarity. Threatened species are those species categorised as Critically Endangered, Endangered or Vulnerable (IUCN, 2019) – also commonly referred to as 'Red Listed'.

1.1.4 Irish Red List - Mammals

Red Lists in Ireland refer to the whole island, i.e. including Northern Ireland, and so follow the guidelines for regional assessments (IUCN, 2012, 2019). The abbreviations used are as follows:.

- RE Regionally Extinct
- CR Critically Endangered
- EN Endangered
- VU Vulnerable
- NT Near Threatened
- DD Data Deficient
- LC Least Concern
- NA Not Assessed
- NE Not Evaluated

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

1.1.5 Irish Bat Species

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

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

Regulation 51(2) of the 2011 Regulations provides –

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

(a) deliberately captures or kills any specimen of these species in the wild, (b) deliberately disturbs these species particularly during the period of breeding, rearing, hibernation and migration,

(c) deliberately takes or destroys eggs of those species from the wild,

(d) damages or destroys a breeding site or resting place of such an animal, or

(e) keeps, transports, sells, exchanges, offers for sale or offers for exchange any specimen of these species taken in the wild, other than those taken legally as referred to in Article 12(2) of the Habitats Directive,

shall be guilty of an offence."

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

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

There are eleven recorded bat species in Ireland, nine of which are considered resident on the island. Eight resident bat species and one of the vagrant bat species are vesper bats and all vespertilionid bats have a tragus (cartilaginous structure inside the pinna of the ear). Vesper bats are distributed throughout the island. Nathusius' pipistrelle *Pipistrellus nathusii* is a recent addition while the Brandt's bat has only been recorded once to-date (Only record confirmed by DNA testing, all other records has not been genetically confirmed). The ninth resident species is the lesser horseshoe bat *Rhinolophus hipposideros*, which belongs to the Rhinolophidea and has a complex nose leaf structure on the face, distinguishing it from the vesper bats. This species' current distribution is confined to the western seaboard counties of Mayo, Galway, Clare, Limerick, Kerry and Cork. The eleventh bat species, the greater horseshoe bat, was only recorded for the first time in February 2013 in County Wexford and is therefore considered to be a vagrant species. A total of 41 SACs have been designated for the Annex II species lesser horseshoe bat (1303), of which nine have also been selected for the Annex I habitat 'Caves not open to the public' (8310).

Irish bat species list is presented in Table 1 along with their current status.

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

Species: Common Name	Irish Status	European Status	Global Status
Resident Bat Species ^			
Daubenton's bat *Myotis daubentonii*	Least Concern	Least Concern	Least Concern
Whiskered bat *Myotis mystacinus*	Least Concern	Least Concern	Least Concern
Natterer's bat *Myotis nattereri*	Least Concern	Least Concern	Least Concern
Leisler's bat *Nyctalus leisleri*	Least Concern	Least Concern	Least Concern
Nathusius' pipistrelle *Pipistrellus nathusii*	Least Concern	Least Concern	Least Concern
Common pipistrelle *Pipistrellus pipistrellus*	Least Concern	Least Concern	Least Concern
Soprano pipistrelle *Pipistrellus pygmaeus*	Least Concern	Least Concern	Least Concern
Brown long-eared bat *Plecotus auritus*	Least Concern	Least Concern	Least Concern
Lesser horseshoe bat *Rhinolophus hipposideros*	Least Concern	Least Concern	Least Concern
Possible Vagrants ^			
Brandt's bat Myotis brandtii	Data deficient	Least Concern	Least Concern
Greater horseshoe bat *Rhinolophus ferrumequinum*	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 (3rd 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.
- Marnell, F., Kelleher, C. & Mullen, E. (2022) Bat mitigation guidelines for Ireland v2. Irish Wildlife Manuals, No. 134. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland (Version 1: Kelleher & Marnell, 2006).
- The status of EU protected habitats and species in Ireland: Conservation status in Ireland of habitats and species listed in the European Council Directive on the Conservation of Habitats, Flora and Fauna 92/43/EEC. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government.
- Bat Conservation Trust (2018) Bats and artificial lighting in the UK: bats and the built environment series. Guidance Note 08/2019. BCT, London.
- Guidance document on the strict protection of animal species of Community interest un the Habitats Directive (Brussels, 12.10.2021 C(2021) 7391 final.
- EPA (2017) Guidelines on the information to be contained in Environmental Impact Assessment Reports.

Collins (2016) is the principal document used to provide guidance in relation to bat survey effort required but the level of surveying is assessed on a case-by-case basis taking into consideration the historical bat

records for the survey area, presence of built, structures and trees potentially suitable for roosting bats and the presence of suitable bat habitats for foraging and commuting. Additional reference is made to this document in relation to determining the value of buildings, trees etc. as bat roosts. The tables referred to from this document are described in the following section and in the section on methodology.

Marnell *et al.* (2022) is referred to for guidance in relation to survey guidance (timing and survey design), derogation licences and mitigation measures.

1.2.1 Bat Survey Requirements & Timing

With reference to Collins (2016) and Marnell *et al.* (2022), the information presented in this section is used to determine the bat survey requirements for the proposed development site. Collins (2016) provides a trigger list in relation to determining if a bat survey is required and this is presented Appendix 3 (Figure B) for reference. In addition, Chapter 2 of Collins (2016) discusses that a bat survey is required when proposed activities are likely to impact on bats and their habitats. The level of surveying is to be determined by the ecologist and these are influenced by the following criteria:

- Likelihood of bats being present;
- Type of proposed activities;
- Scale of proposed activities;
- Size, nature and complexity of the site;
- Species concerned;
- No. of individuals.

Collins (2016) also provides the following table detailing when different survey components should be undertaken.

Table 2.2 Recommended UK survey times for survey types described in these guidelines.

Survey type	Month											
	J	F	M	A	M	J	J	A	S	O	N	D
Preliminary ecological appraisal - fieldwork												
Preliminary roost assessment – structures[a]												
Emergence/re-entry survey for maternity or summer roosts[b]												
Emergence/re-entry[c] survey for transitional roosts[b]												
Emergence survey for mating roosts[b]												
Hibernation survey – structures[a]												
Preliminary ground level roost assessment - trees[d]												
Potential roost feature (PRF) inspection survey - trees												
Ground level bat activity survey – transects and automated/static												
Pre-, during and post-hibernation – automated/static bat activity survey												
Swarming survey												
Back-tracking survey												
Trapping survey[e]												
Radio tagging and tracking survey[c]												

= optimal period

= sub-optimal period

= weather or location dependent (i.e. may not be suitable due to spring and autumn conditions in any one year or in more northerly latitudes). Note that October surveys are not acceptable in Scotland.

Figure 1a: Table 2.2 reproduced from Collins (2016).

1.2.1.1 Buildings

In Marnell *et al.* (2022), Table 3 (The applicability of survey methods) provides information on the type of surveys that can be undertaken according to the different seasons.

Marnell *et al.* (2022) states that it is more suitable to survey buildings in the summer months. The following is a summary of the principal points:

1. The presence of a significant bat roost (invariably a maternity roost) can normally be determined on a single visit at any time of year, provided that the entire structure is accessible and that any signs of bats have not been removed by others. However, a visit during the summer or autumn has the advantage that bats may be seen or heard.
2. Roosts used by a small number of bats, as opposed to maternity sites, can be particularly difficult to detect and may require extensive searching backed up (in summer) by bat detector surveys or emergence counts.
3. If the entire building is not accessible or signs of bats may have been removed by others, or by the weather, bat detector or exit count methodologies may be required to back up a limited search.

Table 3. The applicability of survey methods.

Season	Roost type	Inspection	Bat detectors and emergence counts
Spring (Mar – May)	Building	Suitable (signs, perhaps bats)	Limited, weather dependent
	Trees	Difficult (best for signs before leaves appear)	Rarely useful
	Underground	Suitable (signs only)	Static detectors may be useful
Summer (June-August)	Building	Suitable (signs and bats)	Suitable
	Trees	Difficult	Limited; use sunrise survey
	Underground	Suitable (signs only)	Rarely useful
Autumn (September –November)	Building	Suitable (signs and bats)	Limited, weather dependent
	Trees	Difficult	Rather limited weather dependent; use sunrise survey?
	Underground	Suitable (signs, perhaps bats)	Static detectors may be useful
Winter (December-February)	Building	Suitable (signs, perhaps bats))	Rarely useful
	Trees	Difficult (best for signs after leaves have gone)	Rarely useful
	Underground	Suitable (signs and bats)	Static detectors may be useful

Figure 1b: Table 3 reproduced from Marnell *et al.* (2022).

The following table is used to determine the level and timing of surveys for buildings/structures with reference to the surrounding habitat. Buildings are assessed to determine their suitability as a bat roost and are described using the parameters Negligible, Low, Medium or High suitability in view of Table 2 from Marnell *et al.* (2022). The level of suitability informs the level of surveying and timing of surveys required based on Table 7.3 of Collins, 2016 (Note: These two tables are presented in Appendix 1 but a summary is provided in the table below).

Table 2a: Building Bat Roost Classification System & Survey Effort (Adapted from Collins, 2016 and Marnell *et al.*, 2022).

Suitability Category	Description (examples of criteria)	Survey Effort (Timings)
Negligible	Building have no potential as a roost site Urban setting, heavily disturbed, building material unsuitable, building in poor condition etc.	No surveys required.
Low	Building has a low potential as a roost site. No evidence of bat usage (e.g. droppings)	One dusk or dawn survey.
Medium	Building with some suitable voids / crevices for roosting bats. Some evidence of bat usage Suitable foraging and commuting habitat present.	At least one survey in May to August, minimum of two surveys (one dusk and one dawn).
High	Building with many features deemed suitable for roosting bats. Evidence of bat usage. Largely undisturbed setting, rural, suitable foraging and commuting habitat, suitable roof void and building material.	At least two surveys in May to August, with a minimum of three surveys (at least one dusk survey and one dawn survey).

1.2.1.2 Trees

Marnell *et al.* (2022) recommends the following in relation to detecting roosts in trees:

- "The best time to carry out surveys for suitable cavities is between November and April, when the trunk and branches are not obscured by leaves. If inspection suggests that the tree has suitable cavities or roost sites, a bat detector survey at dusk or dawn during the summer may help to produce evidence of bats, though the nomadic nature of most tree-dwelling species means that the success rate is very low.
- It can also be difficult to pinpoint exactly which tree a bat emerged from. A dawn survey is more likely to be productive than a dusk one as swarming bats returning to the roost are much more visible than those leaving the roost. Because tree-dwelling bats move roosts frequently, a single bat-detector survey is unlikely to provide adequate evidence of the absence of bats in trees that contain a variety of suitable roosting places.
- Several dawn or dusk surveys spread over a period of several weeks from June to August will greatly increase the probability of detecting significant maternity roosts and is recommended where development proposals will involve the loss of multiple trees".

As a consequence, the BTHK (2018) Potential Roost Features (PRFs) list and the classification system adapted from Collins (2016) is recommended as part of the daytime inspection of trees to determine their PBR or Potential Bat Roost value. Details of the methodology followed is presented in Section 3.2.2.

1.2.1.3 Underground Structures

Marnell *et al.* (2022) recommends the following in relation to underground structures:

1. Underground structures are used mainly for hibernation, so surveys should generally be carried out during the winter.

1.2.2 Evaluation & Assessment Criteria

Based on the information collected during the desktop studies and bat surveys, an ecological value is assigned to each bat species recorded based on its conservation status at different geographical scales (Table 2b). 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 2b: The six-level ecological valuation scheme used in the CIEM Guidelines (2016) Ecological Value

Ecological Value	Geographical Scale of Importance
International	International or European scale
National	The Republic of Ireland or the island of Ireland scale (depending on the bat species)
Regional	Province scale: Leinster
County	County scale: County Dublin
Local	Proposed development and immediate surroundings
Negligible	None, the feature is common and widespread

If bat roosts are recorded, their roost status is determined using Figure 20 from Marnell *et al.* (2022). This figure is presented below (Figure 1c). This figure is also used to determine the conservation significance of the roost in order to prepare appropriate bat mitigation measures.

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 conflicts. In particular the Table 4 (presented as Figure 1d below) and Figure 20 (presented as Figure 1c) from Marnell *et al.* (2022) are referenced during this process.

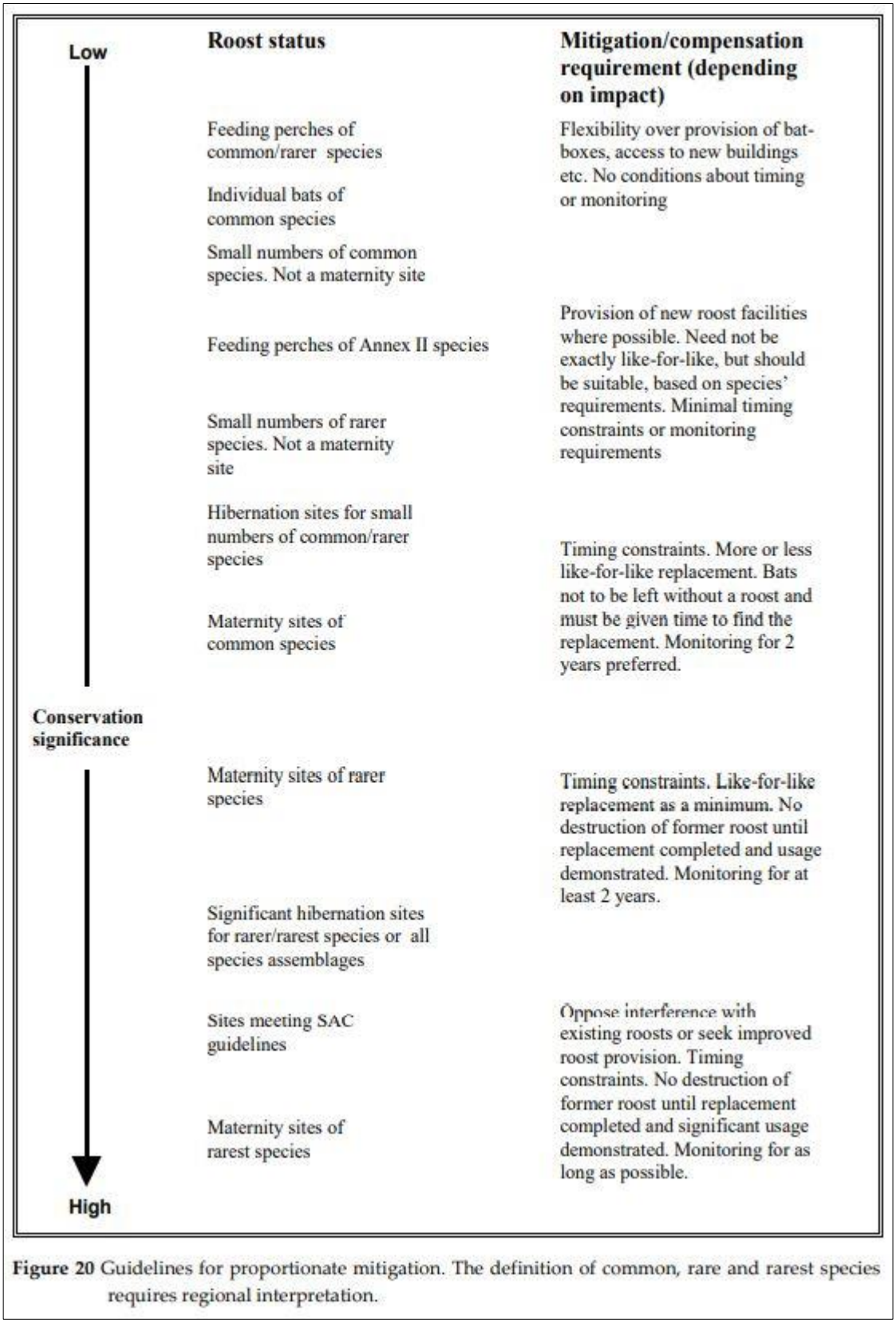


Figure 20 Guidelines for proportionate mitigation. The definition of common, rare and rarest species requires regional interpretation.

Figure 1c: Figure 20 (p 46) Reproduced from Marnell *et al.* (2022).

Table 4 The scale of main impacts at the site level on bat populations. [**NB** This is a general guide only and does not take into account species differences. Medium impacts, in particular, depend on the care with which any mitigation is designed and implemented and could range between high and low.]

Roost type	Development effect	Scale of impact		
		Low	Medium	High
Maternity	Destruction			✓
	Isolation caused by fragmentation			✓
	Partial destruction; modification		✓	
	Temporary disturbance outside breeding season	✓		
	Post-development interference			✓
Major hibernation	Destruction			✓
	Isolation caused by fragmentation			✓
	Partial destruction; modification		✓	
	Temporary disturbance outside hibernation season	✓		
	Post-development interference			✓
Minor hibernation	Destruction			✓
	Isolation caused by fragmentation			✓
	Partial destruction, modification		✓	
	Modified management		✓	
	Temporary disturbance outside hibernation season	✓		
	Post-development interference		✓	
	Temporary destruction, then reinstatement	✓		
Mating	Destruction		✓	
	Isolation caused by fragmentation		✓	
	Partial destruction	✓		
	Modified management	✓		
	Temporary disturbance	✓		
	Post-development interference	✓		
	Temporary destruction, then reinstatement	✓		
Night roost	Destruction	✓		
	Isolation caused by fragmentation	✓		
	Partial destruction	✓		
	Modified management	✓		
	Temporary disturbance	✓		
	Post-development interference	✓		
	Temporary destruction, then reinstatement	✓		

Figure 1d: Table 4 (p 44) Reproduced from Marnell *et al.* (2022).

Different parameters are considered for the overall assessment of the potential impact(s) of a proposed development on local bat populations.

The overall impacts of the proposed project on local bat populations is assessed using the following criteria:

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

Table 2c: Criteria for assessing impact quality based on EPA, 2017,

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

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

- Impact Significance of the proposed development on local bat populations maybe determine, where applicable, using the parameters listed in Table 2d (based on EPA, 2017).

Table 2d: Criteria for assessing significance of effects based on EPA, 2017,

Significance of Effects	Definition
Imperceptible	An effect capable of measurement but without significant consequences.
Not significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
Profound	An effect which obliterates sensitive characteristics

The following terms will be used, where possible and applicable, when quantifying the duration of the potential effects (selected from EPA, 2017):

- Temporary – effects lasting less than a year

- Short-term – effects lasting 1 to 7 years
- Medium term – effects lasting 7 to 15 years
- Long term – effects lasting 15 to 60 years
- Permanent – effects lasting over 60 years
- Reversible – effects that can be undone, for example through remediation or restoration

1.2.3 Bat Mitigation Measures

1.2.3.1 Bats & Lighting

All European bat species, including Irish bat species, are nocturnal. Light levels as low as typical full moon levels, i.e. around 0.1 LUX, can alter the flight activity of bats (Voigt *et al.* 2018). Any level of artificial light above that of moonlight can mask the natural rhythms of lunar sky brightness and, thus, can disrupt patterns of foraging and mating and might, for instance, interfere with entrainment of the circadian system.

Artificial light pollution is an increasing global problem (Rich and Longcore, 2006) and Artificial light at night (ALAN) is considered a major threat to biodiversity, especially to nocturnal species. As urbanisation expands into the landscape, the degree of street lighting also expands. Its ecological impacts can have a profound affect the behaviour of nocturnal animals including impacts on reproductive behaviours, orientation, predator-prey interaction and competition among others, depending on the taxon and ecosystem in question (Longcore and Rich 2004). It is considered by Hölker *et al.* (2010) to be a key biodiversity threat to biodiversity conservation. In relation to bats, the potential impacts of artificial night lighting can result in habitat fragmentation (Hanski, 1998), delay in roost emergence (Downs *et al.,* 2003) and a reduction in prey items.

In the context of behavioural ecology, lights can work to attract or repel certain animals. Many groups of insects, including moths, lacewings, beetles, bugs, caddisflies, crane flies, midges, hoverflies and wasps, can be attracted to artificial light (Eisenbeis and Hassel 2000; Frank 1988; Kolligs 2000). Attraction depends on the spectrum of light. In the context of street lights, white (mercury vapour) lamps emit a white light that includes ultraviolet. High pressure sodium lights (yellow) emit some ultraviolet, while low pressure sodium lamps (orange) emit no ultraviolet light (e.g. Rydell 2006). As a result of the attractiveness of lights to aerial invertebrates, swarms of insects often occur in and around street lights and, particular bat species such as aerial insect predators, can exploit the swarming insects to their advantage. Such attraction can also take prey items away from dark zones where light sensitive species are foraging, thus reducing their likelihood of feeding effectively.

Rydell (2006) divides bats into four categories in terms of their characteristic behaviours at street lamps. The four categories are based on bat size, wing morphology and echolocation call characteristics which were highlighted by Norberg and Rayner (1987) to determine flight speed, manoeuvrability, and prey detection capabilities of bats. Rydell (2006) stated that the large, fast flying bats, which are confined to open airspace, fly high over lit areas and are rarely observed near ground level. None of these, typically large free-tailed bats (e.g. large species of the family Molossidae), are found in Ireland. The second category are the medium-sized fast flying species, including the *Nyctalus* species, which patrol the street well above the lights and can be seen occasionally as they dive for prey into the light cone. This group includes the Leisler's bat, which is found in Ireland. Rydell's third category describes the small but fast flying bats that are manoeuvrable enough to forage around light posts or under the lights, and includes the small *Pipistrellus* species of the old world, three of which are found in Ireland. The fourth category includes broad-winged slow flyers, most of which are seldom or never observed at lights. Slow flying bat species may be more vulnerable to predation by diurnal birds of prey and this may restrict their exploitation of insects around artificially illuminated areas (e.g. Speakman 1991). There are also the concerns that some bat species are more light sensitive and therefore actively avoid lit up areas. This is particularly relevant

for lesser horseshoe bats. Therefore from this, we can categorise the suite of Irish bats species as follows (please note that the sensitivity category is the author's description):

Table 3: Potential light sensitivity of the Irish bat fauna using categories described by Rydell, 2006.

Species: Common Name	Rydell Category	Sensitivity
Daubenton's bat *Myotis daubentonii*	Category 4	Light sensitive
Whiskered bat *Myotis mystacinus*	Category 4	Light sensitive
Natterer's bat *Myotis nattereri*	Category 4	Light sensitive
Leisler's bat *Nyctalus leisleri*	Category 2	Light tolerant
Nathusius' pipistrelle *Pipistrellus nathusii*	Category 3	Semi-tolerant
Common pipistrelle *Pipistrellus pipistrellus*	Category 3	Semi-tolerant
Soprano pipistrelle *Pipistrellus pygmaeus*	Category 3	Semi-tolerant
Brown long-eared bat *Plecotus auritus*	Category 4	Light sensitive
Lesser horseshoe bat *Rhinolophus hipposideros*	Category 4	Light sensitive

The ability of different bat species to exploit insects gathered around street lights varies greatly. Gleaning species such as *Myotis* bats rarely forage around street lights (Rydell and Racey, 1995). The ecological effects of illuminating aquatic habitats are also poorly known. Moore *et al.* (2006) found that light levels in an urban lake, subject simply to sky glow and not direct illumination from lights, reached the same order of magnitude as full moonlight.

All European bat species, including Irish bat species, are nocturnal. As a consequence, the scientific literature provides evidence that artificial lighting does impacts on bats. The degree of impact depends on the light sensitivity of the bat species and the type of luminaire. Lesser horseshoe bats are light sensitive and therefore adversely effected by the presence of lighting in all aspects of their life strategies (e.g. foraging, commuting, drinking and roosting).

The potential impacts of street lighting can be summarised as follows:

- Attracting Prey Items

Lights can work to attract or repel certain animals. Many groups of insects can be attracted to artificial light and this attraction depends on the spectrum of light. As a result of the attractiveness of lights to aerial invertebrates, swarms of insects often occur in and around street lights. Such attraction can also take prey items away from dark zones where light sensitive species, such as lesser horseshoe bats, are foraging, thus reducing their likelihood of feeding effectively.

- Reducing Foraging Habitat

The research documents that there is less bat species diversity foraging in habitats lit up by artificial lighting. Only bat species considered to be light tolerant are generally able to exploit habitats with lighting present, but overall, all bat species activity tends to be less in lit up habitats compared to non-lit up habitats.

- Fragmenting The Landscape

Scientific evidence shows that lighting is a barrier to the movement of light sensitive bat species, such as lesser horseshoe bats. Light sensitive bat species will actively seek dark corridors to commute along and therefore the presence of lighting in commuting habitats will restrict their movement of such species in the landscape.

- Reducing Drinking Sites

There is increasing evidence that drinking sites for bats is an essential component for local bat population survival and that the presence of artificial lighting at waterbodies prevents bats from availing of this resource.

Lighting, including street lights come in an array of different types but for street lights they typically include High Pressure Sodium, Low Pressure Sodium, Mercury Vapour and the more modern Light Emitting Diodes (LED). An array of field-based research has been undertaken to document the potential impact of lighting on bat flight activity. LED lighting is predicted to constitute 70% of the outdoor and residential lighting markets by 2020. While the use of LEDs promotes energy and cost savings relative to traditional lighting technologies, little is known about the effects these broad-spectrum "white" lights will have on wildlife, human health, animal welfare, and disease transmission. As a consequence, a large array of research has been undertaken recently on the potential impact of LED on bats.

Stone *et al.* (2012) undertook research in relation to "Cool" LED street lights on an array of local bat species in England. Overall the presence of LED street lights had a significant negative impact on lesser horseshoe bats and *Myotis* spp. for all light treatments investigated while there was no sign impact of light treatment type on *Pipistrellus pygmaeus* (soprano pipistrelle – a common Irish bat species) or *Nyctalus* (Leisler's bats is part of this bat family and is a common Irish bat species)/*Eptesicus* species. This research paper also documented behavioural changes for the different bat species. Lesser horseshoe bats and *Myotis* spp. did not avoid lights by flying along the other side of the hedge but altered their commuting behaviour altogether. It was concluded that LEDs can fragment commuting routes causing bats to alter their behaviour with potentially negative conservation consequences. Lesser horseshoe bat activity was significantly lower during high intensity treatment than medium, but at all treatment levels (even as low as 3.6 LUX), activity was significantly lower than unlit control (LUX level measurements were taken at 1.7m at the hedge below the light).

Russo *et al.* (2017) investigated the impact of LED lighting on drinking areas for bats in Italy. Drinking sites are considered to be important components for the survival of local bat populations. Drinking sites were illuminated with a portable LED outdoor light emitting (48 high-power LEDs generated a light intensity of 6480 lm (4000–4500 K) at 25°C, two peaks of relative luminous flux at 450 and 590 nm). *Plecotus auritus* (brown long-eared bat – resident in Ireland), *Pipistrellus pygmaeus* (soprano pipistrelle – resident in Ireland) and *Rhinolophus hipposideros* (lesser horseshoe bat – resident in Ireland) did not drink when troughs were illuminated.

Rowse *et al.* (2018) researched the impacts of LED lights (portable lights, 97W 4250K LED on 10m high poles) in England on local bat populations. Treatments were either 100% light intensity; dimmed (using pulse width modulation) at 50% or 25% light intensity; and unlit. Sites were in suburban areas along busy roads but with vegetation and tree lines adjacent. High light levels (50% & 100% light treatments) increased activity of opportunistic *Pipistrellus pipistrellus* (common pipistrelle – resident in Ireland) but reduced activity of *Myotis* species group. Conversely 25% and unlit sites had no difference from each other. The research paper conclude that dimming could be an effective strategy to mitigate ecological impacts of street lights.

Wakefield *et al.* (2017) stated that an important factor to be aware of in relation to LED is the direction of the light projected. Therefore it is recommended that highly focused/shielded LEDS designed to filter out short wavelengths of light may should be used as they attract relatively fewer insects. Less insects

attracted to street lights means less insects leaving dark zones where light sensitive bat species primarily feed.

Martin *et al.* (2021) showed that LED street lights lead to a reduction in the total number of insects captured with light traps in a wide range of families. Coleoptera and Lepidoptera orders were the most sensitive groups to ecological light pollution in the study area. The paper suggested that LED was the least attractive light system for most of the affected groups both because of its very little emitted short-wavelength light and because of its lower light intensity. They also concluded that reduction in insect attraction to LED could be even larger with current LED technologies emitting warmer lights, since other research showed that LED emitting "warmer white" colour light (3000 K) involves significantly lower attraction for insects than "colder white" LED (6000 K).

Wilson *et al.* (2021) investigate the impact of LED on biting insects and concluded because LED is highly malleable with regard to spectral composition, they can be tailored to decrease or increase insect catches, depending on situation. Therefore this design control of LED could greatly assist in reducing impact of street lighting on local bat populations.

Stone *et al*. (2015) reviewed the impacts of ALAN on bat roosts and flight paths in order to provide recommendations in relation to street lighting. The principal recommendations were to avoid lighting places where bats are present and to ensure that there are interconnected light exclusion zones and variable light regimes with reduced intensity of light in specific areas (e.g. important foraging and commuting habitats) as responses to street lighting may vary between species. It recommends that there should be a 'light threshold'.

1.2.3.1.1 Lighting Guidelines – Effective Mitigation Measures

As a consequence of this extensive amount of research there are two principal guideline documents available for best practice for effective mitigation relating to outdoor lighting.

EUROBATS (2018) guidelines recommends the following:

- ALAN should be strictly avoided, and artificial lighting should be installed only where and when necessary coupled with the following:
    - Dynamic lighting schemes, where possible.
    - Use a minimal number of lighting points and luminaires on low positions in relation to the ground for minimising light trespass to adjacent bat habitats or into the sky.
    - Use focused light, e.g. by using LED or shielded luminaires which limit the light flux only to the required areas and prevent light trespass into adjacent bat habitats.
    - Create screens, either by erecting walls or by planting hedgerows or trees, to prevent light trespass, e.g. from illuminated roads, to surrounding bat habitats.
    - Exits of bat roosts and a buffer zone around them should be protected from direct or indirect lighting to preserve the natural circadian rhythm of bats.

This BCT (2018) guidelines provides a list of recommendations in relation to luminaire design, which is based on the extensive research completed to-date on the potential impact of lighting on bats, and therefore provides best practice mitigation measures. These recommendations are the basis of mitigation measures pertaining to bats listed in this report and are summarised as follows:

- All luminaires used should lack UV/IR elements to reduce impact.
- A warm white spectrum (<2700 Kelvins should be used to reduce the blue light component of the LED spectrum).
- Luminaires should have a peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats.
- Only luminaires with an upward light ratio of 0% and with good optical control should be used.

- Luminaires should be mounted on the horizontal, i.e. no upward tilt.
- Column heights should be carefully considered to minimise light spill. The shortest column height allowed should be used where possible.
- Bollard lighting should be considered for pedestrian, parks and greenway areas, if deemed necessary.

1.2.3.2 Bat Box Schemes

Bat Boxes are frequently used as part of bat mitigation to retain local bat populations within an area proposed to be development. The NPWS Survey and Mitigation Guidelines (Marnell *et al.* 2022) considers that where roosts of low conservation significance (Figure 20, Marnell *et al.* (2022)) are to be lost due to a development, bat boxes may provide an appropriate form of mitigation and the effectiveness depends on the type of bat box provided, which should be appropriate to the bat species (Figure 1f).

Table 7 The types of bat box used by different species.

Species	Summer/ maternity	Summer/non breeding	Hibernation*	Notes
Rhinolophus hipposideros	N/A	N/A	N/A	Horseshoe bats cannot use bat boxes
Myotis daubentonii	H	H		
Myotis mystacinus	H	H		
Myotis nattereri	H	?		
Pipistrellus nathusii	H	H		
Pipistrellus pipistrellus	C	C/H	C	H are rarely used as maternity roosts.
Pipistrellus pygmaeus	C	C/H	C	
Nyctalus leisleri	H	H	H?	
Plecotus auritus	H	H		Maternity roosts

Key

* Large well-insulated hibernation boxes may be more successful

N/A -not applicable; bat boxes should not be considered as replacement roosts

H – tree hollow-type box, providing a void in which bats can cluster

C – tree crevice-type box, with 25-35mm crevices

? – few data on which to base an assessment

Figure 1f: Table 7 (p 58) Reproduced from Marnell *et al.* (2022).

1.2.3.2.1 Effectiveness of Bat Boxes as a Mitigation Measure

Two publications that provide good scientific advise in relation to the effectiveness of bat boxes are presented below. McAney & Hanniffy (2015) reviewed the use of bat boxes in Ireland in relation to the bat usage of the following bat box schemes: 62 Schwegler boxes of three models erected in Portumna Forest Park (Bat box scheme consisted of 30x 1FF design, 30x 2FN design and 2x 1FW design); 50 2FN boxes erected in Coole-Garryland Nature Reserve and 50 2FN boxes erected in Knockma Nature Reserve of which 40 were later transferred to Glengarriff Nature Reserve County Cork. The bat box schemes were set up in March 1999 and data was collected up to 2015. Eight of the nine resident bat species were recorded roosting in bat boxes (lesser horseshoe bats cannot use bat boxes due to their need to fly, rather than crawl, into roosts). The main summary points are as follows:

- Leisler's, brown long-eared and *Pipistrellus* spp. were recorded in boxes at all three Galway woods, Daubenton's bat was only recorded in Garryland, Natterer's bat was only recorded in Glengarriff and whiskered/Brandt's was recorded just twice.

- There was a 31% chance of encountering a bat at Portumna Forest Park compared to 11.5% and 10% at Coole-Garryland Nature Reserve and Knockma Nature Reserve respectively.
- Pipistrellus spp. preferred 1FF boxes as this bat box design offer crevice-like roosting conditions. This species group also showed a seasonal preference with more bats present later in the season (visual observations confirmed the bats were using the boxes as mating roosts) and their numbers increased from the time that the bat box scheme was originally established.
- Brown long-eared bats preferred 2FN boxes that mimic holes in trees, the natural roosting sites for this species. This species also showed no seasonal pattern to their occurrence in the boxes. However one aspect of 2FN boxes that this report mentions is the high occupancy by birds which can be an issue in relation to nesting material reducing the availability of bat boxes for roosting bats.
- Leisler's bat showed no preference for box model but showed a seasonal preference with more bats present later in the season.
- Aspect was not a significant factor for occupancy but most boxes received dappled sunshine for part of the day.
- The other factor that proved significant was the length of time the boxes were in place, with occupancy rates increasing for all three species, although in the case of pipistrelles this increase appears to have stabilised. So, although the boxes were occupied very quickly, it took several years before they were regularly occupied and before clusters of bats were formed and breeding was confirmed.

Collins *et al.* (2020) investigated the implementation and effectiveness of bat roost mitigation, which included bat boxes, in building developments completed between 2006 and 2014 in England and Wales. The bat species studied were: common and soprano pipistrelle, brown long-eared bat and *Myotis* species, all of which are present in Ireland. A summary of the main points relating to bat boxes are as follows:

- Bat boxes were the most frequently deployed roosting provision (i.e. alternative roosts), being installed at 64% (n = 71) of sites surveyed as a compensation or enhancement measure.
- Box frequencies ranged from 1 to 41 at sites where they were installed, with an average of 6.6 boxes per site.
- Bats, or evidence of bats, were recorded in 20% of these bat boxes.
- Bat boxes mounted externally on buildings showed the highest occupation rate regardless of species while Common pipistrelle showed a preference for these over tree mounted boxes; the opposite was true for soprano pipistrelle.
- The four most popular bat box models used by consultants in the study were all Schwegler woodcrete bat boxes. Bat presence was highest in the 1FF bat box design (32%, n = 53) and lowest for birds (8%). The tree-mounted 2F and wall-integrated 1FR/2FR models both demonstrated similar bat presence rates of 23% (n = 43) and 25% (n = 32) respectively. The 2FN tree-mounted model showed the lowest presence rate for bats (11%, n = 19) and the highest for birds (58%). There were also 26 timber bat boxes, none of which were used by bats.

The author has also erected a number of bat box schemes and, where possible, has completed occasional monitoring visits. One such example is a bat box scheme erected in Kileshandra, Co. Cavan which consists of 8 Schwegler woodcrete bat boxes of various designs. The bat boxes were erected on mature trees located in a linear woodland adjacent to a river. This bat box scheme was erected in 2012 as part of mitigation for the demolishment of a large derelict building where small satellite roosts were recorded for *Pipistrellus* spp. and Daubenton's bat. Two site visits have been completed since 2012 and during these visits the bat boxes were checked for evidence of bat usage. The first site visit was on 25/8/2015 and one bat box was occupied by a single Leisler's bat while the additional seven bat doxes had evidence of bat droppings (*Pipistrellus* spp. and *Myotis* spp.). During the second site visit (27/7/2019) four bat boxes were occupied by bats (Soprano pipistrelle x1 individual (adult male), Leisler's bat x1 individual (adult male) and two bat boxes with x16 Daubenton's bats and x10 Daubenton's bats respectively). Biometrics was

recorded for the 12 of the bats (which included 10 of the Daubenton's bats recorded in the bat box with 16 individuals) and five of these Daubenton's bats were lactating females with the remaining five Daubenton's bats recorded as juveniles, thereby indicating that this bat box was used as a maternity roost. The remaining four bat boxes all had droppings within for *Pipistrellus* spp and Leisler's bats. This bat box scheme, while just one example, demonstrates that when bat boxes are erected in an area with good bat habitat (bat survey documented a high level of bat activity for the named bat species), a high level of occupancy of bat boxes will occur.

In relation to bat boxes, Marnell *et al.* (2022), a document that provides guidelines that are considered to be practical and effective based on past experience, recommends that the design life of potential bat boxes, including essential maintenance, should be about 10 years, as this would be comparable with the lifespan of the tree roosts that bat boxes are designed to mimic. The guidelines continues by stating that the "This lifespan can be achieved with good quality wooden boxes and exceeded by woodcrete bat boxes or other types of construction that ensure any softwoods are protected from the weather and attack by squirrels" (note – this includes woodstone bat boxes).

In relation to the number of bat boxes recommended to be erected, Lintott & Mathews (2018) found that the greater the number of bat boxes deployed, the greater the probability of at least one of the boxes becoming occupied and that the odds of bats occupying at least one box increased by approximately 7% with each additional bat box that was deployed. Bat boxes are erected, as part of this proposed development, to mitigate for the loss of potential roosts in trees. Therefore the number of bat boxes are calculated according to the number of trees with additional boxes added for greater bat conservation value.

Therefore Schwegeler woodcrete bat boxes are recommended as a bat mitigation measure and the authors preference to use 1FF designs as this box is open at the bottom which reduces build-up of droppings (i.e. it is a self-cleaning bat box). Both McAney & Hannify (2015) and Collins *et al.* (2020) demonstrated that usage of this bat box design by bat species recorded in this survey report. This bat box is also less likely to be used by birds and therefore retaining it for bat usage between monitoring visits. To increase occupancy of bat boxes by bats it is important to erect bat boxes 4m or higher (to ensure that bat boxes are out of reach from disturbance by humans and predation by other mammals) and that they should be located where bats have been documented foraging and commuting. The aspect of the bat box is not an influencing factor in relation to occupancy. These recommendations have all been included in this report.

1.2.3.3 Landscaping For Bats

Bats depend on the landscape for foraging, roosting and commuting. Different bat species will travel different distances, to and from their principal roosting sites, depending on their morphology, life stage and preferred foraging areas. Bats in Ireland are insect eating mammals and feed on an array of insects, whose populations are ultimately supported by vegetation. Areas of rich vegetation habitat tend to support higher abundances of insect populations and therefore a higher abundance of bats. In addition, many bat species rely on continuous linear habitats (e.g. treelines and hedgerows) to commute along. As a consequence landscaping as part of a proposed development project is an important element to the goal of retaining local bat populations.

The Bat Conservation Trust publication "Landscape and Urban Design for bats and biodiversity" (Gunnell *et al.,* 2012) is a resource for planning landscape design in our urban areas. This resource encourages measures to enhance existing bat foraging habitat, create water features such as ponds (drinking sites for bats and as a source of emerging insects), manage species rich grassland and planting of tall vegetation to ensure that exiting treelines and hedgerows are linked. It also recommends that use of landscaping as a means to creating dark zones or dark corridors for this mammal group to fly along in our lit urban areas.

This is also support by the BCT Lighting Guidelines (BCT, 2018) where landscape design can be utilised to buffer potential light spillage from developments.

1.2.3.4 Seasonality of Bat Mitigation Measures

The NPWS Survey and Mitigation Guidelines (Marnell *et al.* 2022) provides best practice guidance in relation to the timing of bat mitigation measures. It states that the most common and effective method of avoiding potential harm to a bat is to carry out the work at an appropriate time of the year. The following table provides a summary of timings.

Table 5 Optimum season for works in different types of roosts.

Bat usage of site	Optimum period for carrying out works (some variation between species)
Maternity	1st October – 1st May
Summer (not a proven maternity site)	1st September – 1st May
Hibernation	1st May – 1st October
Mating/swarming	1st November – 1st August

Figure 1e: Table 5 (p 50) Reproduced from Marnell *et al.* (2022).

Timing of bat mitigation measures is relevant to the proposed tree felling of Potential Bat Roosts (PBRs). Felling is recommended outside the principal maternity season and during mild weather conditions (to avoid cold weather that would encourage bats to hibernate). This coupled with dusk/dawn surveys and additional daytime inspections is best practice to ensure that tree felling is completed without causing harm to potentially roosting bats. The preferred tree felling months also avoids the bird nesting season.

1.3 Project Description

1.3.1 Site Location

The proposed development is located at Castle Street, Bray, Co. Wicklow. The site is bounded to the South by Castle St. and to the East and North East by the residential streets of Dwyer Park.

Figure 2a: Location of proposed development site: Castle Street, Bray, Co. Wicklow (Source: Enviroguide Consulting).

1.3.2 Proposed Project

Silverbow Limited, intend to apply to An Bord Pleanála for permission for a strategic housing development at the former Heiton Buckley site on Castle Street; St. Anthony's Dwyer Park and No. 20 Dwyer Park, Bray, Co. Wicklow (Eircodes A98 V973, A9 XW31 and A98 YC44).

The proposed Strategic Housing Development will consist of the following:-

1. Demolition of all existing vacant commercial and residential buildings and sections of boundary wall;
2. Construction of a mixed-use residential and commercial development in 2 blocks ranging in height from 1 to 7 storeys set around a central podium level amenity space and a separate single storey pavilion building;
3. The residential element will accommodate 139 no. apartments comprising 33 no. 1-bedroom units, 91 no. 2-bedroom units and 15 no. 3-bedroom units, with associated balconies;
4. Block A (3-7 storeys) will accommodate 93 no. apartments and a creche at ground floor;
5. Block B (1-6 storeys) will accommodate 46 no. apartments, 2 no. commercial units fronting Castle Street and a communal resident's room;
6. The pavilion building will accommodate a community facility on Castle Street;
7. Vehicular access from Castle Street to 59 no. undercroft car parking spaces and 3 no. creche drop-off spaces;

8. Pedestrian access from Castle Street and Dwyer Park;
9. New surface water sewer along Castle Street from the site to Bray Bridge;
10. The development will include landscaped communal open spaces, boundary treatments, substation, plant rooms, bin stores, bicycle parking, signage and all associated site works and services.

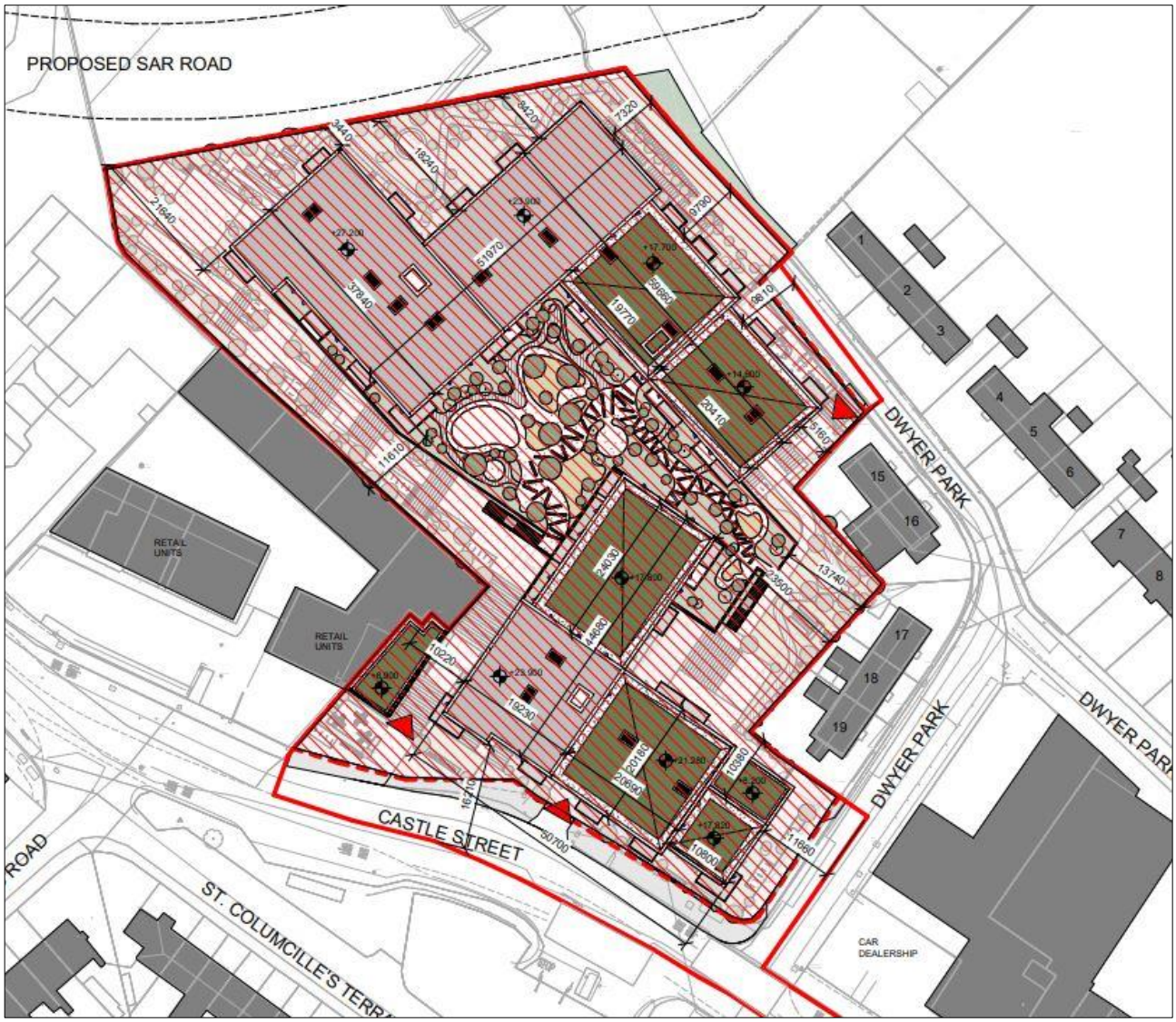


Figure 2b: Layout of proposed development (Source: Enviroguide Consulting).

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. Due to the transient nature of bats and their seasonal life cycle, there are a number of different type 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 4a: Bat Roost Types (adapted from Collins 2016).

Roost Type	Definition	Time of Survey
Day Roost	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
Night Roost	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
Feeding Roost	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
Transitional Roost	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.
Swarming Site	Where large numbers of males and females gather. Appear to be important mating sites.	Late summer and autumn
Mating Site	Where mating takes place.	Late summer and autumn
Maternity Site	Where female bats give birth and raise their young to independence.	Summer months
Hibernation Site	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
Satellite Roost	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).

Buildings were assessed to determine their suitability as a bat roost (4th June 2021) and described using the parameters Negligible, Low, Medium or High suitability in view of the table presented below. The level of suitability informs the level of surveying required.

Table 4b: Building Bat Roost Classification System & Survey Effort (Adapted from Collins, 2016 and Marnell *et al. 2022*).

Suitability Category	Description (examples of criteria)	Survey Effort (Timings)
Negligible	Building have no potential as a roost site Urban setting, heavily disturbed, building material unsuitable, building in poor condition etc.	No surveys required.
Low	Building has a low potential as a roost site. No evidence of bat usage (e.g. droppings)	One dusk or dawn survey.
Medium	Building with some suitable voids / crevices for roosting bats. Some evidence of bat usage Suitable foraging and commuting habitat present.	At least one survey in May to August, minimum of two surveys (one dusk and one dawn).
High	Building with many features deemed suitable for roosting bats. Evidence of bat usage. Largely undisturbed setting, rural, suitable foraging and commuting habitat, suitable roof void and building material.	At least two surveys in May to August, with a minimum of three surveys (at least one dusk survey and one dawn survey).

Stone structures were assessed using a 4-point classification system designed for bridges by Billington & Norman (1997) as follows:

Table 4c: Bridge and Stone Structure Bat Roost Classification System (Adapted from Billington & Norman, 1997).

Bridge Category	Description
0	No potential (i.e. no suitable crevices for roosting bats).
1	Low potential (i.e. crevices present that may be of use to bats).
2	High potential (i.e. crevices ideal for roosting bats but no evidence of usage during inspections).
3	Roost (evidence of bats roosting either because bats are present or other evidence is recorded during inspection (e.g. bat droppings).

2.1.2 Tree Potential Bat Roost (PBRs) Inspection

The procedure to determine if trees present within a survey area are likely to provide roosting site for bats are inspected during the daytime and classified using the Bat Tree Habitat Key (BTHK, 2018) and the classification system adapted from Collins (2016). The Potential Roost Features (PRFs) listed in this guide were used to determine the PBR value of trees.

A daytime inspection was undertaken on 4th June 2021 in view of the above and, where possible, to search 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.

Daytime inspections were undertaken of all of tall vegetation within the proposed development site. These inspections followed the Phase 1 guidance (Collins, 2016) in order to make a list of trees within the proposed development site that may be suitable as roosting sites for bats. Inspections were undertaken visually, from the ground, with the aid of a strong torch beam (LED Lenser P14.2) during the daytime searching for PRFs.

Table 4d: Tree Bat Roost Category Classification System (adapted from Collins, 2016).

Tree Category	Description
1 High	Trees with multiple, highly suitable features (Potential Roosting Features = PRFs) capable of supporting larger roosts
2 Moderate	Trees with definite bat potential but supporting features (PRFs) suitable for use by individual bats;
3 Low	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;
4 Negligible	Trees have no potential.

2.1.3 Bat Habitat & Commuting Routes Mapping

The survey site was assessed during daytime walkabout surveys (4th June 2021), in relation to potential bat foraging habitat and potential bat commuting routes. Such habitats were classified according to Fossit, 2000 (Appendix 1, Table 1.B) while hedgerows were classified according to BATLAS 2020 classification (Bat Conservation Ireland, 2015) (Appendix 1, Table 1.A). Bat habitats and commuting routes identified were 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

Due to the complex array of buildings within the proposed development site, the survey area was divided into sections (A-C as shown below) to ensure that there adequate coverage. In addition, the occupied dormer bungalow and the unoccupied bungalow were two additional separate survey sections. In addition, due to the large array of buildings associated with this site, the bat survey concentrated efforts on surveying the immediate area of the proposed development site.

Figure 3: Division of survey area into sections: Castle Street, Bray, Co. Wicklow (Source: Enviroguide Consulting).

2.2.1 Dusk & Dawn Bat Surveys

Dusk Emergence Surveys were completed on the 4th June & 8th June 2021 from 10 minutes before sunset to 110 minutes post sunset and the surveyors position themselves within the proposed development site to determine if bats were roosting within the buildings and also the general bat activity of the proposed development site. A Dawn Survey was completed on the 5th June 2021 from 110 minutes prior to sunrise and 10 minutes after sunrise.

The following equipment was used:

Surveyor 1: Anabat Walkabout Full Spectrum Bat Detector and Pettersson D200 Heterodyne Bat Detector.

Surveyor 2: Bat Logger M2 Full Spectrum Bat Detector and Pettersson D200 Heterodyne Bat Detector.

Surveyor 3: Anabat Scout Full Spectrum Bat Detector and Pettersson D200 Heterodyne Bat Detector.

Walking transects were completed post Dusk Emergence Surveys on the 4th June 2021 and involved the surveyor walking the local roads and the area within ownership of the client. Validation of bat records was completed by the principal bat surveyor prior to mapping.

2.2.2 Infra-red & Thermal Imagery Filming

A Guide TrackIR Pro25 thermal imagery scope filming was also deployed to capture potential emerging bats from the occupied dormer bungalow within the proposed development area on the 4th June 2021. Two camcorders with IR lamps were located in the yard to film stone walls with crevices and/or heavy vegetation growth. These were completed from 10 minutes before sunset till at least 110 minutes after sunset. Captured film was watched post-survey and any emerging bats were noted.

2.2.3 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. Wildlife Acoustics Song Meter SM4 Bat FS and Mini 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 Wildlife Acoustics Kaleidoscope Pro. 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 this static bat detector survey (4th to 10th June 2021):

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

Static Unit Code	Bat Detector Type	Recording Function	Microphone
SM Mini Bat Units 11 & 12	Wildlife Acoustics SongMeter Mini Bat	Passive Full Spectrum	SMM-U2
SM4 FS Units 6, 7, & 8	Wildlife Acoustics SongMeter SM4 Bat FS	Passive Full Spectrum	SMM-U2 on 4m cable

2.3 Desktop Review

2.3.1 Bat Conservation Ireland Database

Bat Conservation Ireland acts as the central depository for bat records for the Republic of Ireland. Its' bat database is comprised of >60,000 bat records. The database primarily contains bat records from the following datasets:

- Irish Bat Monitoring Programme

The Irish Bat Monitoring Programme is comprised of four surveys (Car-based Bat Monitoring Scheme (2003-), All Ireland Daubenton's Bat Waterways Survey (2006-), Brow Long-eared Bat Roost Monitoring Scheme (2007-) and Lesser Horseshoe Bat Monitoring Scheme (1980s-). Apart from the latter survey, all monitoring data is stored on the BCIreland database.

- BATLAS 2020 & 2010

BCIreland has undertaken two all-Ireland species distribution surveys (2008-2009 for BATLAS 2010 and 2016-2019 for BATLAS 2020) of four target bat species (Common and soprano pipistrelle, Leisler's bats and Daubenton's bat).

- Ad Hoc Bat Records

Ad hoc bat records from national bat groups, ecological consultants and BCIreland members are also stored on the BCIreland database.

- Roost Records

These records are only report at a 1km level to protect the location of private dwellings and to protect such important bat records.

A 1km and 10km radius search was requested for the Irish Grid Reference O2695717490.

2.3.2 Bat Conservation Ireland Bat Landscape Favourability Model

Bat Conservation Ireland produced a landscape conservation guide for Irish bat species using their database of species records collated during the 2000 - 2009 survey seasons. An analysis of the habitat and landscape associations of all bat species deemed resident in Ireland was undertaken and reported in Lundy *et al*., 2011. The geographical area suitable for individual species was used to identify the core favourable areas of each species. This was produced as a GIS layer for local authorities and planners in order to provide a guide to the consideration of bat conservation. The island is divided into 5km squares and the landscape favourability of each 5km square for each species of bat was modelled. A caveat is attached to the model and it is that the model is based on records held on the BCIreland database, while core areas have been identified, areas outside the core area should not be discounted as unimportant as bats are a landscape species and can travel many kilometres between roosts and foraging areas nightly and seasonally. This model was used as part of the desktop study for this report.

2.4 Photographic Record

A photographic record is completed for the survey and is presented throughout the report.

3. Bat Survey Results

3.1 Daytime Inspections

3.1.1 Building & Structure Inspection

The following buildings / structures were inspected on the 4th June 2021. Internal spaces and attic spaces, where possible, were examined for bat usage. No bat evidence usage was recorded in any of the buildings surveyed.

Table 6: Buildings / Structures inspection results.

Building Code	Description	Roost Type / Suitability	Bat Species
Bungalow (unoccupied)	Tile roof, attic space (no bat evidence) – **Orange Square**	Low to Medium	No evidence documented.
Dormer bungalow (occupied)	Slate roof (internal inspection was not undertaken as this building was occupied) – **Red Square**	Medium	No evidence documented.
Derelict houses on Castle Street	Fire damage, roof in poor repair – **Green Square**	Low suitability for roosting bats due to fire damage and poor roof condition	No evidence documented.
Corrugated Sheds	Corrugated iron and concrete blocks - **Triangles**	Low	No evidence documented.
Office building	Mixed materials – corrugated iron, concrete blocks, slate roofs - **Circles**	Low to Medium	No evidence documented.

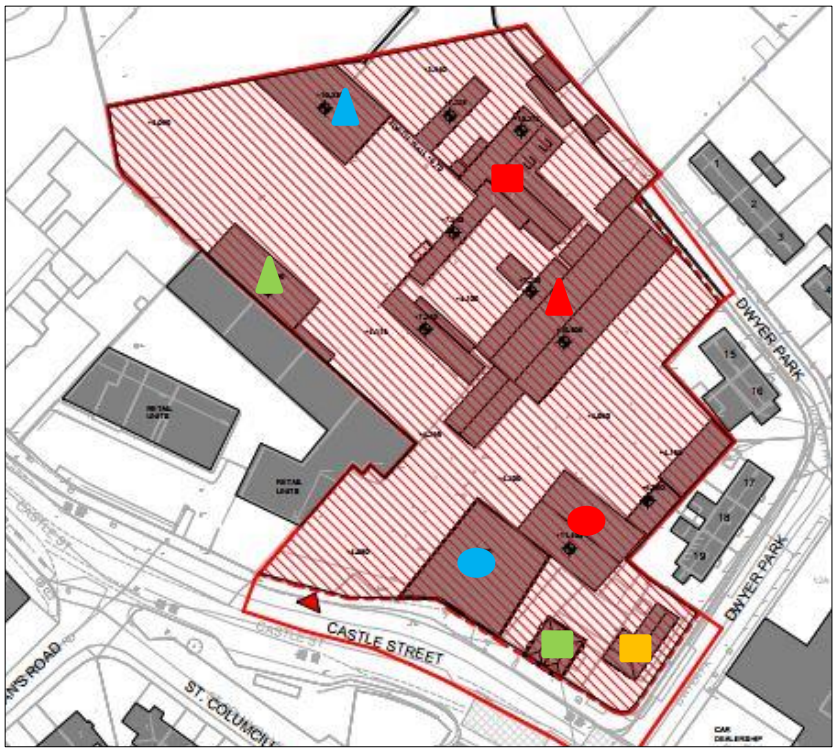


Figure 4a: Buildings within the proposed development area: Castle Street, Bray, Co. Wicklow (Source: Enviroguide Consulting).

Plate 1: Unoccupied bungalow within the proposed development site.

Plate 2: Office building within the proposed development site.

Plate 3: Derelict houses on Castle Street, Bray, Co. Wicklow.

Plate 4: Example of corrugated building within the proposed development site.

3.1.2 Stone Wall Inspections

The stone walls within the yard were inspected and graded according to Bridge assessment to determine the suitability of crevices for roosting bats. A small number of crevices of Low suitability (Category 1) was recorded in the walls. No evidence of bat usage was recorded.

Plate 5: Stonewalls located within the proposed development site subjected to IR filming.

3.1.3 Tree Potential Bat Roost (PBRs) Inspection

There were no trees located within the proposed development area. Therefore there are no PBRs present in tall vegetation within the proposed development site.

3.1.4 Bat Habitat & Commuting Routes Mapping

The habitat types, with reference to Fossit (2000) were recorded both within the survey area and adjacent to the survey area. The proposed development site is primarily buildings and hard surfaces associated with these buildings. There is little vegetation to provide commuting and foraging habitats for local bat populations.

Table 7a: Habitat types present within survey area.

Habitat	Yes	Habitat	Yes	Habitat	Yes	Habitat	Yes
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	

There are suitable bat habitats in the wider area of Bray, Co. Wicklow, particularly to the east and north east of the proposed development site. There are also a large number of unoccupied buildings associated with the old Ravenshill School (north of the proposed development site) and there are a large number of mature trees associated with the old golf course (located directly east of the proposed development site). In addition there are two parks (one to the north-west associated with Rathmichael Stream and one associated with the River Dargle). A section of the People's Park associated with the River Dargle does not have street lighting and therefore is an area that the author has previously documented as a foraging area for local bat populations: Daubenton's bats, common pipistrelle, soprano pipistrelle and Leisler's bats (See Bat Eco Services, 2020).

Table 7b: Habitat types present adjacent to survey area.

Habitat	Yes	Habitat	Yes	Habitat	Yes	Habitat	Yes
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	√

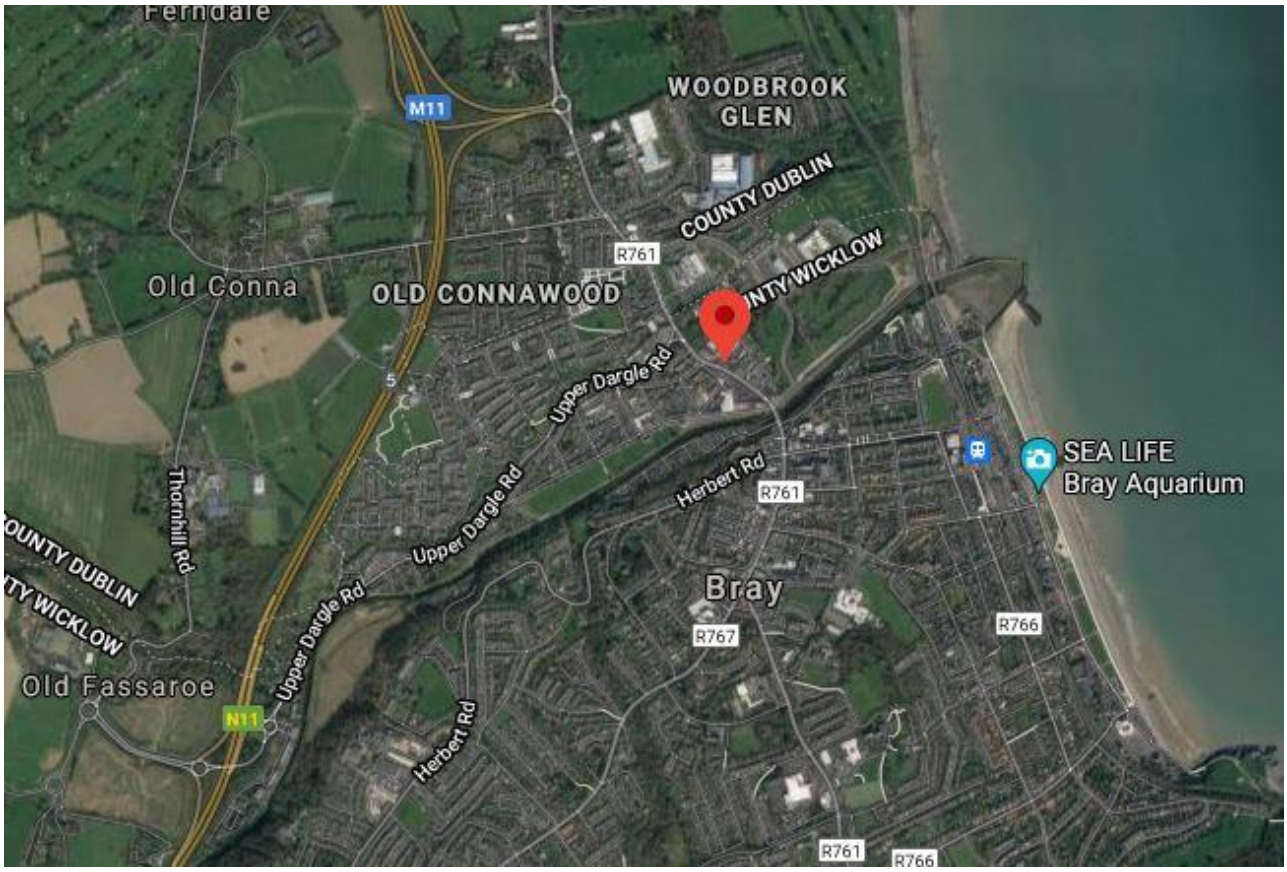


Figure 4b: Aerial photograph of Bray urban area (proposed development site – red pin) (Google Maps).

3.2 Night-time Bat Detector Surveys

The buildings within the proposed development area are considered to have a Low to Medium suitability for bat roosts and as a consequence two dusk surveys (2 people per survey) and one dawn survey (2 people) was undertaken coupled with Thermal Imagery. As mentioned earlier in the report, the survey area was divided into sections to ensure that all areas were surveyed. In addition, two stonewalls (Plate 5) were also filmed using (camcorders and IR lamps) to determine if bats were roosting in crevices and/or in vegetation.

Figure 4c: Division of survey area into sections: Castle Street, Bray, Co. Wicklow (Source: Enviroguide Consulting).

3.2.1 Dusk & Dawn Bat Survey & Walking Transects

Bat detector surveys completed on 4/6/2021 (Dusk Survey - Weather conditions: 16oC, full cloud cover, light breeze and dry), 5/6/2021 (Dawn Survey - Weather conditions: 11oC, patchy cloud cover, light breeze and dry) and 8/2021 (Dusk Survey – Weather conditions: 14oC, patchy cloud cover, dry and breezy).

The surveyors, over the course of the three surveys were located as indicated on the aerial photograph below: Dusk Survey (4/6/2021 – Section A (Figure 4c) and occupied dormer bungalow); Dawn Survey (5/6/2021 – Section C/derelict houses and unoccupied bungalow/derelict houses) and Dusk Survey (8/6/2021 – Section A, B and C). While the buildings were the primary focus of the surveys in order to record roosting sites, surveyors documented any bat activity presented within the survey area (i.e. commuting and foraging activity). The Thermal Imagery scope was also used to recorded the rear/gable of the occupied dormer bungalow during the Dusk Survey (4/6/2021). IR filming was focused on stonewalls to determine if there was any roosting bats in crevices (8/6/2021).

3.2.1.1 Dusk Survey & Walking Transect 4/6/2021

During this Dusk Survey, Surveyor 1 was located within the grounds of the dormer bungalow while the thermal imagery scope filmed the rear and gable of the dormer bungalow as it was impossible for Surveyor 1 to cover the entire complex without filming support. Surveyor 1 did not record any bats emerging from the section of the dormer bungalow visible from her position.

The thermal imagery filming recorded two bats emerging from the rear of the dormer bungalow (Plates 6) and these were identified as common pipistrelles (full spectrum bat detector attached to thermal imagery scope). It is likely that this is a Day Roost.

Surveyor 2 was located in the Section A of the yard as indicated on Figure 4c. No bats were recording emerging from any of the buildings surveyed by Surveyor 2.

The following bat activity was recorded by the surveyors:

Surveyor 1

22:04 hrs Leisler's bat foraging in field to rear of proposed development site (east of proposed development site).

22:19 hrs Common pipistrelle foraging in field to rear of proposed development site. There is a common pipistrelle roost in a house adjacent to the proposed development site (Bat Eco Services, 2020 and reconfirmed during this survey).

22:24 hrs Common pipistrelle foraging along gable of dormer bungalow.

22:27 hrs Leisler's bat commuted through survey area from an east to north-west direction.

22:28 hrs Common pipistrelle foraging along gable of dormer bungalow.

22:36 hrs Common pipistrelle foraging along gable of dormer bungalow.

22:49 hrs Leisler's bat commuted through survey area from a an east to north-west direction.

22:54 hrs Common pipistrelle foraging in field to rear of dormer bungalow.

Surveyor 2

22:10 hrs Common pipistrelle foraging in yard briefly.

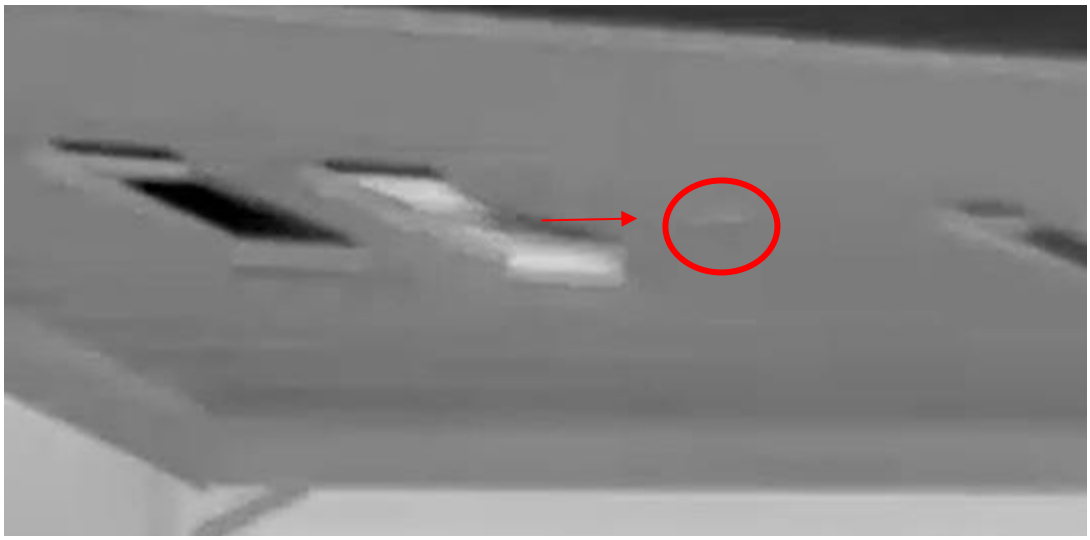
22:32 hrs A single soprano pipistrelle was recorded foraging in the yard for a total of 2 minutes.

22:43 hrs Common pipistrelle commuting through yard.

22:49 hrs Leisler's bat commuted through survey area from a an east to north-west direction.

23:09 hrs Common pipistrelle commuting through yard.

No bats were recorded, during the walking transects, along Castle Street, Upper Dargle Road, St. Cronan's Road and Dwyer Park. The majority of bat activity recorded was to the west of the proposed development site in adjacent fields not part of the proposed development. This bat activity was primarily common pipistrelles with some Leisler's bats foraging and commuting activity.



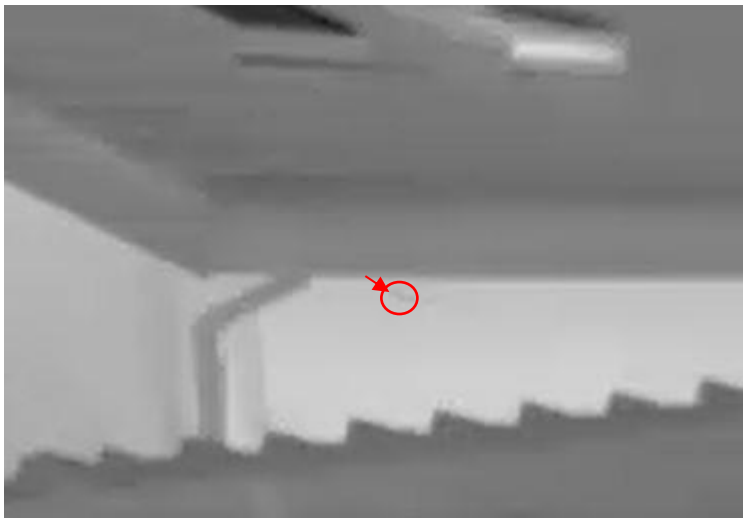


Plate 6a, b, c: Thermal Imagery filming of dormer bungalow - Emerging common pipistrelles (Red Arrows – direction) from dormer window and facia of dormer bungalow window.

3.2.1.2 Dawn Survey 25/5/2021

Surveyor 1 surveyed the unoccupied bungalow and Surveyor 2 was located in Section B of the yard. No bats were recorded roosting in these buildings during the Dawn Survey.

Surveyor 1

04:00 hrs Common pipistrelle commuted to the rear of the bungalow in a easterly direction.

04:09 hrs Leisler's bat commuted through survey area from a west to east direction.

04:35 hrs Common pipistrelle foraging in the yard adjacent to the bungalow and then commuted past the bungalow in a easterly direction.

Surveyor 2

03:42 hrs Soprano pipistrelle commuted through the yard towards the fields to the rear of the proposed development site.

03:59 hrs Two common pipistrelles commuted through the yard towards the fields to the rear of the proposed development site.

04:08 hrs Two Leisler's bat were recorded commuting through the survey area in a north-easterly direction.

3.2.1.3 Dusk Survey 8/6/2021

Surveyor 2

22:15 hrs Common pipistrelle commuted through the yard from the rear of the site.

22:31 hrs Common pipistrelle foraging in yard for approximately 2 minutes before commuting away.

22:35 hrs Common pipistrelle commuted through the yard.

22:37 hrs Common pipistrelle commuted through the yard.

Surveyor 3

21:44 hrs Common pipistrelle commuted through the yard from the rear of the site.

21:45 hrs Common pipistrelle commuted through the yard.

21:52 hrs Leisler's bat commuting in a southerly direction through the survey area.

21:54 hrs Leisler's bat briefly foraging over hear before commuting away.

22:24 hrs Leisler's bat commuting in a southerly direction through the survey area.

22:26 hrs Leisler's bat commuting in a southerly direction through the survey area.

3.2.2 Passive Static Bat Detector Survey

The following tables provides details with regards to the static units deployed during the bat survey. Six static units were deployed for an array of nights. Five static units were located within buildings and the purpose of these was to document bat species potentially entering the buildings and therefore roosting within the buildings. It should be noted that some bat species produce loud bat echolocation calls which can travel long distances and therefore, due to the open doorways, these calls can be recorded on the static units located inside the buildings even if the bats are not roosting within the building (e.g. *Pipistrellus* species and Leisler's bats). In a confined space, if calls of the quieter echolocating bats are recorded, then it is more likely that such bat species are roosting or entering the buildings. The structure and the shape of the species echolocation calls can also provide clues as to whether the individual bat is flying within the building (e.g. *Myotis* bats produced a longer FM call when inside a confined space compared to outside a building). In addition, the time stamp of the echolocation calls were examined to determine if bats are only briefly entering during the night or are returning at dawn and emerging the following dusk.

Due to the large array of buildings located in this proposed development site, static units were rotated in the building to ensure that all were surveyed by a static unit for at least one night. Due to the fact that the dormer bungalow was occupied, a static unit was not placed inside this building.

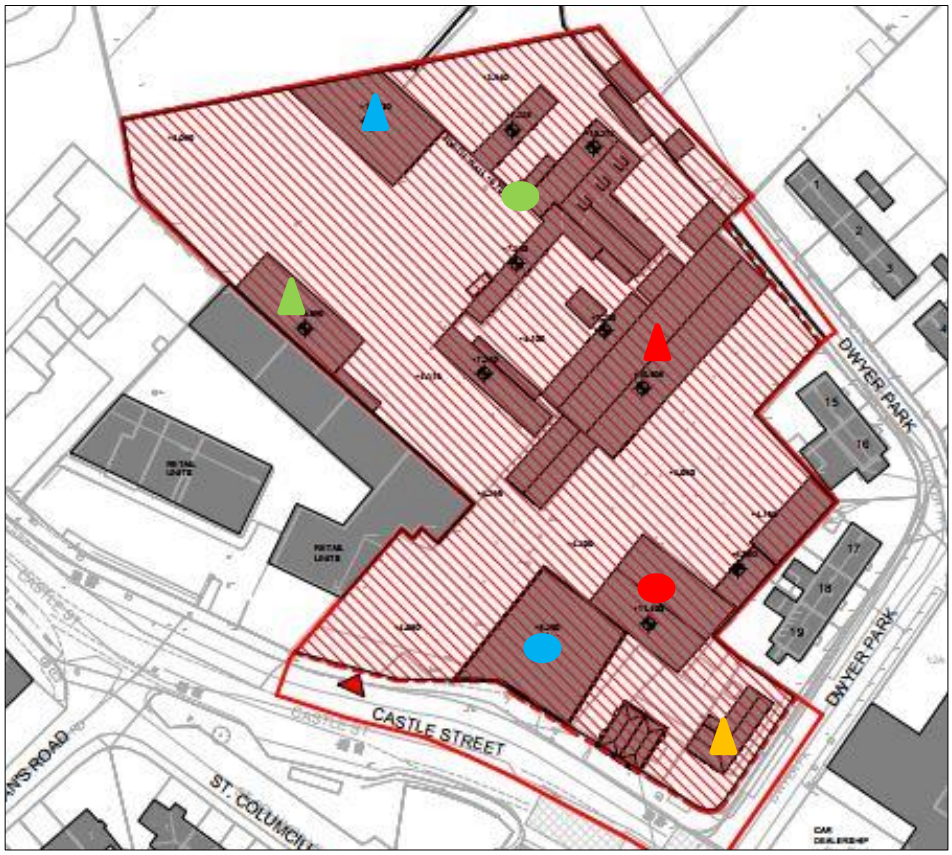


Figure 5: Buildings within the proposed development area: Castle Street, Bray, Co. Wicklow (Source: Enviroguide Consulting).

A total of two species of bat was recorded during the static surveillance: common pipistrelle and Leisler's bat and this was primarily on the static unit located on the wall between the yard and the occupied dormer bungalow. The static units confirm that there were no bats roosting in the buildings surveyed (i.e. the buildings associated with the form Heiton Buckley site and the unoccupied bungalow). These results confirm that dusk and dawn results which also indicated that the buildings mentioned above are not used as roosting sites for local bat populations.

Table 8: Results of Static Bat Detectors deployed during Static Bat Detector Surveys.

Static Code	Location Description	Survey Period	Results
SM4 Unit 6	On wall between yard and dormer bungalow (Green Circle)	4/6/2021 to 9/6/2021 (5 nights)	Leisler's bat – Low level Common pipistrelle – Low to Medium level
SM4 Unit 7	Large Corrugated Shed (Red Triangle)	4/6/2021 to 9/6/2021 (5 nights)	Leisler's bat – 2 passes on one night (calls are indicative of commuting bats external to the building)
SM4 Unit 8	Office building (Red Circle)	5/6/2021 to 9/6/2021 (4 nights)	No bats recorded
SM4 Unit 8	Office Building – front section (Blue Circle)	4/6/2021 to 5/6/2021 (1 night)	No bats recorded
Mini 12	Corrugate shed (Blue Triangle)	5/6/2021 to 9/6/2021 (4 nights)	No bats recorded
Mini 11	Corrugated shed (Red Triangle)	5/6/2021 to 9/6/2021 (4 nights)	No bats recorded
Mini 12	Open shed (Green Triangle)	4/6/2021 to 5/6/2021 (1 night)	No bats recorded
Mini 11	Attic of unoccupied bungalow (Orange Triangle)	4/6/2021 to 5/6/2021 (1 night)	No bats recorded

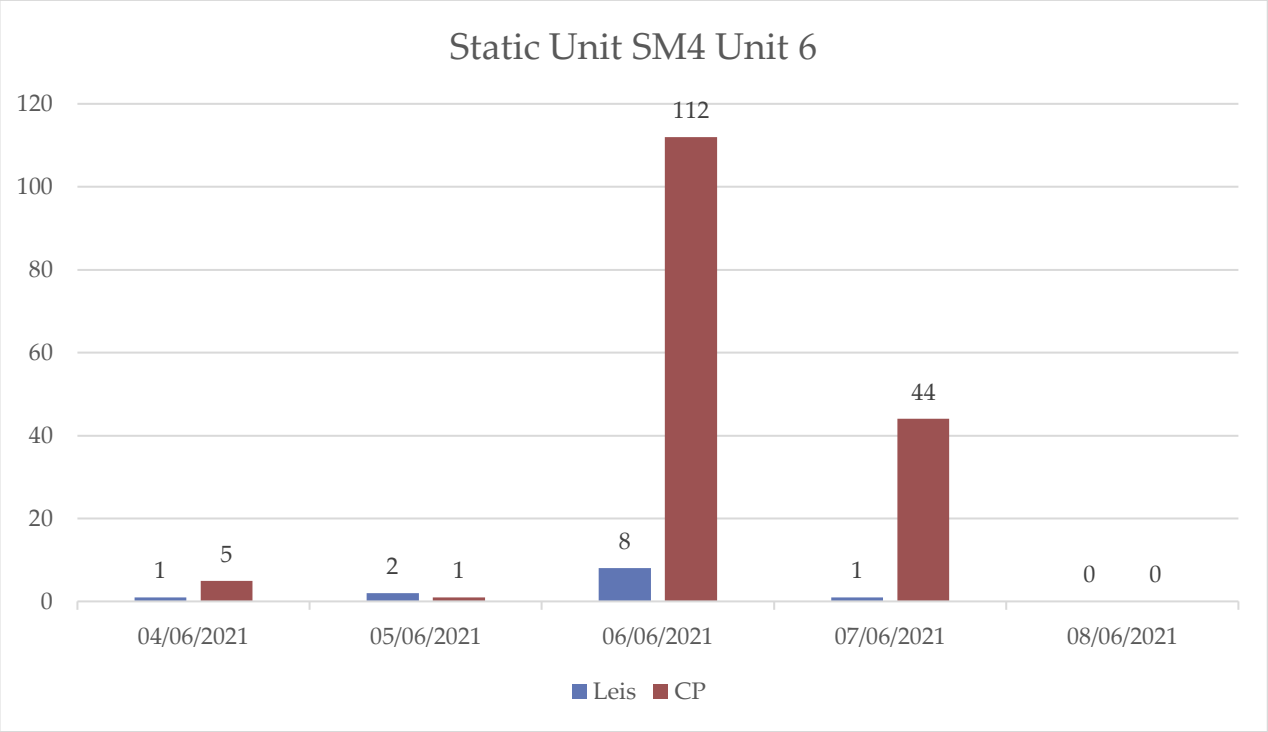


Figure 6: Static surveillance results for each bat species recorded.

As a general guide, activity level is determined by the author as follows: Low = <10 bat passes/hr; Medium = >10 - <50 bat passes/hr; High = >50 bat passes/hr). At this time of the year, 6 hours per night are available to foraging bats (22:00 hrs to 04:00 hrs).

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.

Over the course of the surveillance period, a Medium level of common pipistrelle bat activity was recorded on one night only (6/6/2021) while a Low level was recorded on the four other nights of surveillance. A Low level of bat activity was recorded for Leisler's bat for the entire surveillance period. No soprano pipistrelles were recorded on the static units. Therefore the level of bat activity recorded on the static units is considered to be a low level and supports that the proposed development site is not an important area for local bat populations.

3.2.3 Bat Survey Results Summary

- A total three species of bat was recorded during the wide array of bat surveys undertaken for this proposed development: common pipistrelle, soprano pipistrelle and Leisler's bats.
- Common pipistrelles was the most frequently recorded bat species while soprano pipistrelle were only recorded on two occasions.
- A small common pipistrelle roost (2 individuals) was recorded in the occupied dormer bungalow. It is likely that this is a Day Roost.
- No other bat roosts were recorded in any of the remaining buildings or stone walls.
- The are no tall vegetation deemed suitable as Potential Bat Roosts (PBRs).
- The bat activity recorded within the proposed development site is primarily associated with commuting bats. A low level of foraging was recorded.
- The proposed development site is a small survey area with little habitat considered to be suitable for foraging and commuting bats.

3.2.4 Previous Bat Surveys

The author completed a bat survey for lands to the east of the proposed development site in 2020 (Bat Eco Services, 2020). The bat survey documented a number of common pipistrelle roosts in trees and buildings which are likely to be the source of common pipistrelle bat activity during the current bat survey.

This survey also documented that the local bat activity north of the River Dargle within the environs of Bray, Co. Wicklow is associated with the lands east of the proposed development site and with the River Dargle particularly in the People's Park along the river where there is no street lighting. Little or no bat activity was recorded along Castle Street and to the west of this area during the 2020 bat survey. The bat activity was confined primarily to the lands associated with the old golf course, Rathmichael Stream and the River Dargle.

3.3 Desktop Review

3.3.1 Bat Conservation Ireland Database

There were no bat records within a 1km radius of the proposed development on the Bat Conservation Ireland database. The search was widened to 10km and this dataset consists of 96 bat records (23 roost records, 7 transect records and 66 ad hoc bat detector records. The number of records for each species is as follows:

Lesser horseshoe bat	0 records;
Common pipistrelle	60 records;
Soprano pipistrelle	53 records;
Pipistrellus species	7 records;
Leisler's bat	57 records;
Myotis species	10 records;
Daubenton's bat	17 records;
Natterer's bat	10 records;
Whiskered bat	9 records;
Brown long-eared bat	31 records and
Nathusius' pipistrelle	6 records.

3.3.2 Bat Conservation Ireland Bat Landscape Favourability Model

Figure 7 depicts the BCIreland Bat Landscape Favourability Model (Lundy *et al.,* 2011) for all bat species (individual species values are presented in Section 9). The county is divided into 5km squares and the darker the shading of the square, the higher favourability of the 5km square for bats. This GIS layer is hosted on the NBDC website www.biodiversityireland.ie. The proposed development site is approximately location in the Blue Box. The western 5km square has a high favourability for bats and the eastern square has a medium-high favourability for bats.

Figure 7: Bat Landscape Favourability Model (All Bats) (Source: NBDC).

3.4 Survey Effort, Constraints & Survey Assessment

The following table details any Survey Constraints encountered and a summary of Scientific Assessment completed.

Table 9: Survey Effort, Constraints & Survey Assessment Results.

Category	Discussion
Timing of surveys **Surveying meets Collins, 2016 guidelines.**	Summer bat survey: 4th to 10th June 2021
Survey Type Full suite of surveys completed to ensure sufficient information was collated for bat assessment. Surveys completed according Collins, 2016 guidelines.	Bat Survey Duties Completed (Indicated by red shading) Tree PBR Survey ● — Daytime Building Inspection ● Static Detector Survey ● — Daytime Bridge Inspection ● Dusk Bat Survey ● — Dawn Bat Survey ● Walking Transect ● — Driving Transect ○ Trapping/Mist Netting ○ — IR Camcorder filming ● Endoscope Inspection ● — Other (Thermal Imagery) ●
Weather conditions	Suitable for bat surveys.
Survey Constraints	No internal access to dormer bungalow due to the fact that this was occupied.
Survey effort Daytime – 3 hrs Bat surveys – 19 hrs Static surveillance – 175 hrs TOTAL = 197 hrs	Summer bat survey: Daytime inspection – 3 hrs Dusk Surveys (x2, 2 surveyors) – 8 hrs Dawn Surveys (x1, 2 surveyors) – 4 hrs IR Filming (x2) – 4 hrs Thermal Imagery Filming (x1) – 2 hrs Walking Transects (x1, 1 surveyor) – 1 hrs Static Surveillance (x5 units, 5 nights) – 175 hrs
Extent of survey area	Summer bat survey: proposed development area and local road network
Equipment	Full suite of bat survey equipment as list under Section 2. All in good working order.

The extent of the surveys undertaken has achieved to determine:

- Presence / absence of bat within the survey area;
- A bat species list for the survey area;
- Extent and pattern of usage by bats within the survey area.

It is therefore deemed that the Scientific Assessment completed according Colins, 2016 and is Appropriate in order to completed the aims of the bat survey.

4. Bat Ecological Evaluation

4.1 Bat Species Recorded & Sensitivity

A total three species of bat was recorded during the wide array of bat surveys undertaken for this proposed development: common pipistrelle, soprano pipistrelle and Leisler's bats.

Common pipistrelles was the most frequently recorded bat species while soprano pipistrelle were only recorded on two occasions. Leisler's bats were generally recorded commuting through the survey area.

A small common pipistrelle roost (2 individuals) was recorded in the occupied dormer bungalow. It is likely that this is a Day Roost. According to Figure 20 of Marnell *et al.* (2022), the conservation significance of this roost is deemed to be Low - "Small numbers of common species. Not a maternity roost". A low to medium level of bat activity was recorded for this species of bat within the proposed development site.

No other bat roosts were recorded in any of the remaining buildings or stone walls.

The are no tall vegetation deemed suitable as Potential Bat Roosts (PBRs).

The bat activity recorded within the proposed development site during dusk and dawn surveys was primarily associated with commuting bats. A low level of foraging was recorded.

The static surveillance only recorded bat activity for two bat species: common pipistrelle and Leisler's bats and this was in Low to Medium levels of bat activity.

The proposed development site is a small survey area with little habitat considered to be suitable for foraging and commuting bats. Overall the bat activity level recorded during surveys is considered to be Low. The level of bat activity and the number of bat encounters do not indicate that the proposed development site is an important area for local bat populations.

This is also in consideration of previous bat survey work undertaken by Bat Eco Services which indicated that the there is greater bat activity levels associated with lands east (old golf course) and north-east (Rathmichael Stream) of the proposed development site and with the River Dargle (particularly the People's Park due to the lack of street lighting). Therefore it is deemed that the bat activity levels recorded during this survey are due to local bat populations in vicinity of more suitable foraging, roosting and commuting habitat located in the areas named above.

Leisler's bat

- Leisler's bat is an Annex IV bat species under the EU Habitats Directive. The status of this bat species is listed as Least Concern. The national Leisler's bat population is considered to be significantly increasing trend (Aughney *et al.,* 2021).
- The modelled Core Area for Leisler's bats is a relatively large area that covers much of the island of Ireland (52,820km^2). The Bat Conservation Ireland Irish Landscape Model indicated that the Leisler's bat habitat preference has been difficult to define in Ireland. Habitat modelling for Ireland shows an association with riparian habitats and woodlands (Roche *et al.,* 2014). The landscape model emphasised that this is a species that cannot be defined by habitats preference at a local scale compared to other Irish bat species but that it is a landscape species and has a habitat preference at a scale of 20.5km.

Common pipistrelle

- Common pipistrelle is an Annex IV bat species under the EU Habitats Directive. The status of this bat species is listed as Least Concern. The national common pipistrelle population is considered to be significantly increasing trend (Aughney *et al.,* 2021).

- The modelled Core Area for common pipistrelle is a relatively large area that covers much of the island of Ireland (56,485km^2). The Bat Conservation Ireland Irish Landscape Model indicated that the Common pipistrelle selects areas with broadleaf woodland, riparian habitats and low density urbanization (<30%) (Roche *et al.,* 2014).

Soprano pipistrelle

- Soprano pipistrelle is an Annex IV bat species under the EU Habitats Directive. The status of this bat species is listed as Least Concern. The national soprano pipistrelle population is considered to be significantly increasing trend (Aughney *et al.,* 2021).
- The modelled Core Area for soprano pipistrelle is a relatively large area that covers much of the island of Ireland (62,020km^2). The Bat Conservation Ireland Irish Landscape Model indicated that the soprano pipistrelle selects areas with broadleaf woodland, riparian habitats and low density urbanisation (Roche *et al.,* 2014).

No Annex II bat species are known to occur in County Wicklow (i.e. lesser horseshoe bat) and were not recorded within the survey.

4.2 Bat Foraging Habitat & Commuting Routes

There is little suitable bat foraging and commuting habitat within the proposed development site. The bat activity recorded within the proposed development site is primarily due, by associated, with suitable bat habitat to the east of the survey area.

4.3 Zone of Influence – Bat Landscape Connectivity

The proposed development site is located in the urban zone of Bray, Co. Wicklow. The area to the north-west and west is primarily urban while the area to the east and along the River Dargle provide suitable commuting and foraging habitat for local bat populations. As a consequence there is landscape connectivity for local bat populations to move to and from the proposed development site.

4.4 Landscape Plan

The proposed landscape design statement states the following that may be of benefit for local bat populations:

"The scheme will be heavily planted, providing as much green areas as possible, enhancing biodiversity and carbon sequestration. Tree planting will frame the architecture within the context as well as providing green corridor routes throughout the site, allowing people feel closer to nature".

"There are a range of tree species being proposed throughout the site. Castle street will feature new street trees, helping to soften to streetscape and frame the architecture. There will be tree planting along the site boundary providing screening and privacy as well as a soft boundary edge. There will be a mix of courtyard trees planted on the podium level".

"There will be a net gain for biodiversity by planting native tree species, coupled with plants selected form a list of pollinator friendly species and maintained to increase the availability of flowering plants in the shoulder months. The site currently has little to no existing vegetation, and the proposed landscape plan aims to provide a "green pocket" in the area. The coastal planting mixes will allow for local biodiversity to thrive".

Figure 8a: Proposed tree planting (Source: Landscape Design Statement).

The North Garden is a potential location to provide an area of bat mitigation measures, particularly, in relation to the location of bat boxes.

The Red rectangle (Figure 8a) indicates the proposed location of bat tubes (to be inserted into the 4m boundary wall).

5. Assessment of Potential Impacts & Bat Mitigation Measures

The bat species diversity of the proposed development site is low since only 3 of the 8 resident bat species known for County Wicklow were recorded during the 2021 bat surveys. In addition, the level of bat activity within the proposed development site is considered to be Low to Medium for the bat species recorded during the bat surveys and static surveillance. Therefore, it is deemed that the proposed development site has Negligible geographic scale of importance for local bat populations.

5.1 Assessment of Potential Impact - Loss of bat roosts

There is a large array of buildings and structures located in the proposed development. Only a small Day Roost for common pipistrelles were recorded in the dormer bungalow during the bat surveys completed. Therefore the proposed development will result in the loss of this Day Roost.

A small common pipistrelle roost (2 individuals) was recorded in the occupied dormer bungalow. It is likely that this is a Day Roost. According Marnell *et al.* (2022), the conservation significance of this roost is deemed to be Low - "Small numbers of common species. Not a maternity roost". A low to medium level of bat activity was recorded for this species of bat within the proposed development site.

The Conservation Significance according to Marnell *et al.* (2022) determines the bat mitigation measures required. In relation to the Day Roost recorded for common pipistrelles, the mitigation requirement is "Flexibility over provision of bat boxes, access to new buildings etc. No conditions about timing or monitoring".

There are no tall vegetation within the proposed development site deemed suitable for roosting bats and therefore the clearance of vegetation will not impact on local bat populations.

5.2 Assessment of Potential Impact - Foraging & Commuting Habitats

There is little suitable habitat within the proposed development site suitable for foraging and commuting bats As a consequence this loss of vegetation will not impact on commuting and foraging habitat for local bat populations.

5.3 Assessment of Potential Impact - Construction & Operation of Residential Development

The construction of the proposed residential development will potentially increase the degree of light (both street and residential lighting) spilling onto the treelines adjacent to the survey area and boundaries of the proposed development site.

5.4 Overall Assessment of Potential Impact -

The proposed development would result in the following:

- Loss of Day Roost for common pipistrelle in dormer bungalow (Construction Impacts)
- An increase in human activity (noise and light levels) (Operational Impacts)

Therefore the impact assessment is as follows:

- Roost loss of common pipistrelle Day Roost are assessed as **Permanent Slight Negative Effects**
- Habitat loss (potential foraging/ commuting habitat) effects on all bat species are assessed as **Permanent Not Significant Negative Effects**.
- Disturbance and/or displacement effects on all bat species during the construction phase are assessed as **Short-term Slight Negative Effect**

- The operational impacts of the proposed development will likely be **Permanent** (as per the duration of the operation of the proposed development) **Slight Negative Effect** principally due to the increased lighting within the proposed development area.

5.5 Bat Mitigation Measures

In order to reduce the potential negative impact of the proposed development on local bat populations, the following mitigation measures are recommended to be fully implemented. The Bat Mitigation Guidelines (Marnell *et al.* (2022) are the principal guidance in relation to bat mitigation in Ireland and therefore for this report.

Bat mitigation measures are provided to provide alternative roosting (e.g. bat boxes) to mitigate for the loss of a Day Roost.

Additional mitigation measures are also made in relation to lighting (BCT guidelines, 2018) and landscaping to further reduce the potential impact of the proposed development.

5.5.1 Day Roost – Common Pipistrelle

A NPWS Derogation Licence is required for of the structure recorded as a roosting site for common pipistrelle bat (day roost). As a derogation licence is required for the loss of the bat roost, a draft derogation licence application is appended to this report. This is appended for information purposes, so that all information relevant to this impact is provided. The derogation licence application will not be submitted until prior to when construction is due to commence, if the proposed development is granted.

The following two questions are taken from the draft derogation licence application in order to provide information requested to allow NPWS to undertake an assessment of the licence application (Please see draft application form appended to the end of this report).

10. Please tick which reason below explains How this Application Qualifies under Regulation 54(2)(A-E) of the European Communities (Birds and Natural Habitats) Regulations:

a.	In the interests of protecting wild flora and fauna and conserving natural habitats	☒
b.	To prevent serious damage, in particular to crops, livestock, forests, fisheries and water and other types of property	☐
c.	In the interests of public health and public safety, or for other imperative reasons of overriding public interest, including those of a social or economic nature and beneficial consequences of primary importance for the environment	☐
d.	For the purpose of research and education, of re-populating and re-introducing these species and for the breeding operations necessary for these purposes, including artificial propagation of plants	☐
e.	To allow, under strictly supervised conditions, on a selective basis and to a limited extent, the taking or keeping of certain specimens of the species to the extent specified therein, which are referred to in the First Schedule	☐

The following table requires detailed information, which this bat survey report provides. Some of this information is presented as part of the table below while other sections within the report (as directed) are required to be consulted.

11. Report Checklist: Please append a detailed report to support this application and ensure that it contains the following information:

11.1	Explanation as to why the derogation licence sought is the only available option for works and no suitable alternative exists as per Regulation 54 of the European Communities (Birds and Natural Habitats) Regulations.	☒
	A common pipistrelle Day Roost was recorded in the dormer bungalow – to ensure that the demolition operation is undertaken in manner to prevent any harm to potential roosting bats, a derogation licence is required.	
11.2	Evidence that actions permitted by a derogation licence will not be detrimental to the maintenance of the populations of the species to which the Habitats Directive relates at a favourable conservation status in their natural range as is required under Section 54(2) of the European Communities (Birds and Natural Habitats) Regulations.	☒
	The following information provides evidence on the status of the national populations of the bat species listed, the conservation status of the roosts recorded and additional information relating to their conservation status. a) Common pipistrelle A common pipistrelle Day Roost was recorded roosting in dormer bungalow during thermal imagery filming as dusk. Individuals of this species were predominantly recorded commuting within the proposed development site. Previous bat surveys of lands adjacent to the proposed development site recorded additional common pipistrelle roosts in buildings and trees. The Day Roost in the dormer bungalow is smaller compared to other roosts recorded and therefore is considered to be less important. Common pipistrelle is an Annex IV bat species under the EU Habitats Directive. The status of this bat species is listed as Least Concern. The national common pipistrelle population is considered to be significantly increasing (Aughney *et al.,* 2021). The modelled Core Area for common pipistrelle is a relatively large area that covers much of the island of Ireland (56,485km^2). The Bat Conservation Ireland Irish Landscape Model indicated that the common pipistrelle selects areas with broadleaf woodland, riparian habitats and low density urbanization (<30%) (Roche *et al.,* 2014). Conservation Significance (Marnell *et. al.* (2022) of this roosts is “Small numbers of common species. Not a maternity roost”. The Conservation Significance according to Marnell *et. al.* (2022) results determines the bat mitigation measures required. In relation to the satellite roost recorded for common pipistrelles, the mitigation requirement is “Flexibility over provision of bat boxes, access to new buildings etc. No conditions about timing or monitoring”. Therefore it is considered that the loss of a day roost will not impact on the favourable conservation status in their natural range and will not have a detrimental effect on the local bat population of common pipistrelles.	
11.3	Details of any mitigation measures planned for the species affected by the derogation at the location, along with evidence that such mitigation has been successful elsewhere.	☒
	A summary of the proposed bat mitigation measures are provided as part of this table but these are described in greater detail as part of Section 5.	

	An important part of the bat mitigation measures is the procedure to remove the building to ensure that no bats are harmed in the process.	
11.4	As much information as possible to allow a decision to be made on this application.	☒
	Please consult Section 1.2.3 for information on effective bat mitigation measures. Details of bat mitigation measures are presented below in detail. Additional bat mitigation measures are described in relation to bat boxes, lighting and landscaping.	

5.5.2 Dormer Building Removal

It is important that the following steps are strictly adhered to in order to protect potential roosting common pipistrelle bats during the demolition process:

- Demolition of building will be undertaken outside the summer months of May to August to reduce the likelihood of bats being present.
- A bat specialist is required to supervise these works.

The procedure of supervision and surveying is as follows:

i) 1 week prior to removal undertake the following:
   a. Undertake a daytime inspection of the internal space of the building.
   b. Place static units in potentially likely roosting places within the internal space of the building and leave for a minimum of 5 nights surveillance.
   c. Undertake a dusk survey of the building to determine if bat are roosting within the building.

ii) Day 1
   a. Undertake a Dawn Survey to determine if bats are roosting within the building.
   b. Remove ½ of the roof tiles by hand under supervision of a bat specialists.
   c. Leave open over-night.

iii) Day 2
   a. Undertake a Dawn Survey to determine if bats are roosting within the building.
   b. Remove the remaining ½ of the roof tiles by hand under supervision of a bat specialists.

5.5.3 Bat Box Scheme

The Conservation Significance according to Marnell *et al.* (2022) results determines the bat mitigation measures required. In relation to the Day Roost recorded for common pipistrelles, the mitigation requirement is “Flexibility over provision of bat boxes, access to new buildings etc. No conditions about timing or monitoring”.

Therefore three sets of bat boxes are proposed as part of mitigation:

- Bat Box Scheme – summer bat boxes (general bat conservation measure);
- Bat Tubes – inserted into the external walls of the boundary of the proposed development (to mitigate for the loss of a common pipistrelle Day Roost);
- Rocket Bat Box – x2 to be erected in the North Garden (to mitigate for the loss of a common pipistrelle Day Roost).

Bat Box Scheme

- 6 summer bat boxes (Schwegler Woodcrete 1FF bat box or equivalent – source www.nhbs.com) to be erected on 4m wall boundary of the proposed development site.

These will be erected prior to the demolition of the dormer bungalow. Bat boxes scheme be sited carefully and this will be undertaken by a bat specialist with assistance from the contractor.

Bat Tubes

Eight bat tubes will be permanently incorporated into the boundary wall (Figure 8a). These bat tubes are designed to be built into the external walls of structures (located a minimum of 4m off the ground). These will be located in the boundary wall where there is no lighting and where there is proposed landscaping. Please see Appendices for details of this bat box design.

Rocket Bat Boxes

Erect two Rocket Bat Boxes along the boundary of the North Garden. Please see Appendices for details of this type of bat box.

5.5.4 Lighting Plan

Bats are light sensitive bats species, hence their nocturnal activities. The three bat species recorded commuting and foraging within the survey area are Light Tolerant or Semi-tolerant bat species. However, it is still important that strict lighting guidelines are required to reduce the potential impact of the proposed development on local bat populations as standard best practice.

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).

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

Any external lighting for the proposed development will strictly follow the above guidelines and these will be strictly implemented during construction and operation phase of the proposed development.

The horizontal illuminance map of the proposed lighting plan was examined as part of this assessment in relation to potential impact of light spillage on local bat populations is undertaken (Figure 9). This map indicates that the lighting has been designed to reduce spillage which will benefit nocturnal wildlife.

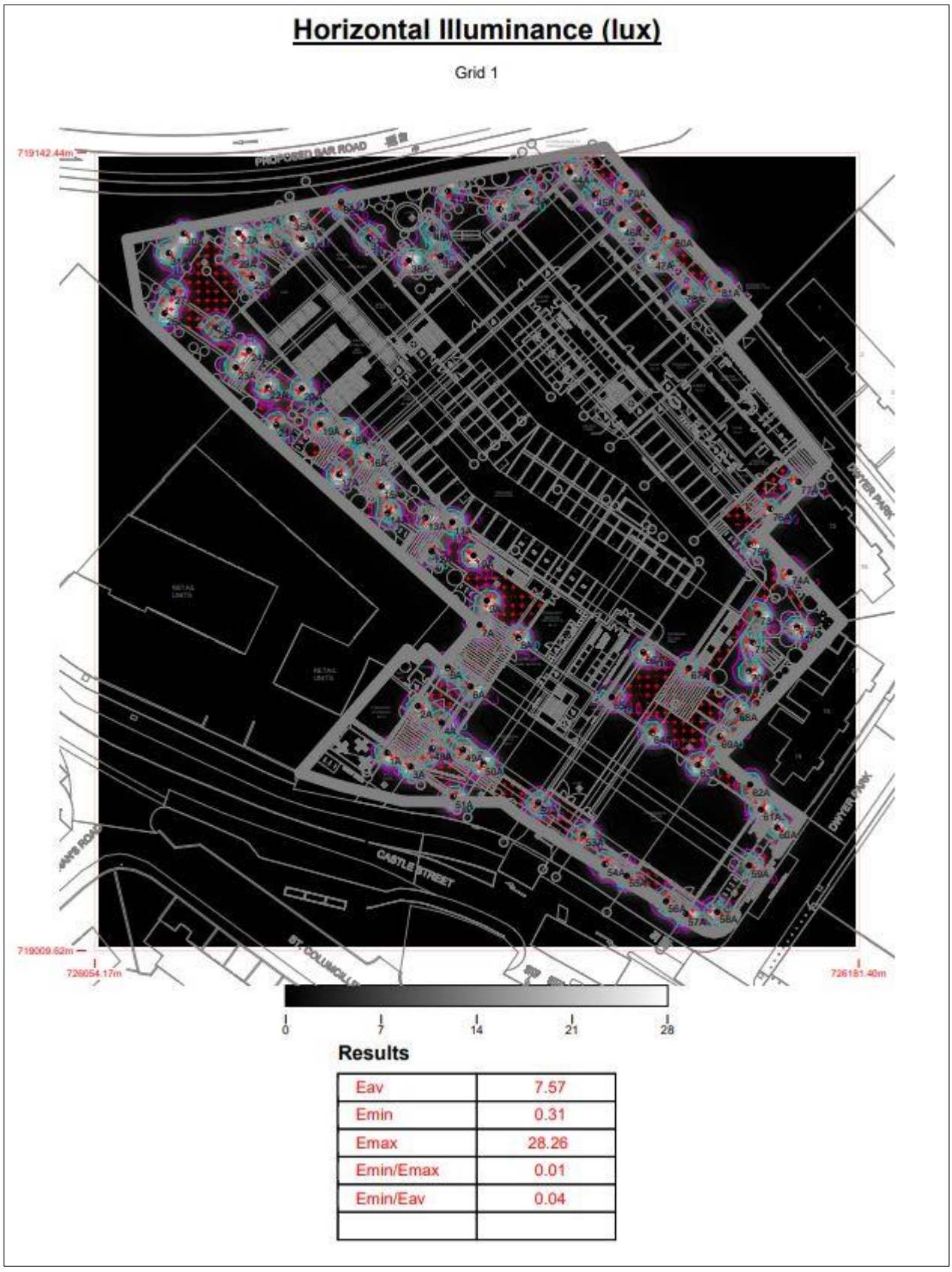


Figure 9: Horizontal illuminance map of proposed outdoor lighting plan (Source: External Lighting Report).

5.5.5 Removal of Remaining Buildings

Bats were not recorded roosting in any of the other buildings within the proposed development site. There are no bat mitigation measures required in relation to the removal of these buildings.

5.5.6 Landscape

It is recommended that two Rocket bat Boxes are erected in the North Garden. This area will remain a dark zone and is connected to the landscape to facilitate commuting and foraging bats.

It is recommended that the following two small tree species are also included in the tree planting mix: Rowan/Mountain Ash and Crab Apple.

The Bat Conservation Trust publication “Landscape and Urban Design for bats and biodiversity” (Gunnell *et al.,* 2012) was taken into consideration by the landscaping team.

5.5.7 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 boxes. Register bat box scheme with Bat Conservation Ireland. This should be undertaken for a minimum of 2 years.
- Monitoring of any other bat mitigation measures. All mitigation measures should be checked to determine their level of success to inform future mitigation. A full summer bat survey is recommended post-works.

If bat mitigation measures are strictly adhered to, the potential impact quality and significance of the proposed development will be reduced to **Permanent Not Significant Negative Effects**.

6. Survey Conclusions

A total three species of bat was recorded during the wide array of bat surveys undertaken for this proposed development: common pipistrelle, soprano pipistrelle and Leisler's bats. Common pipistrelles was the most frequently recorded bat species while soprano pipistrelle were only recorded on two occasions. Leisler's bats were generally recorded commuting through the survey area.

A small common pipistrelle roost (2 individuals) was recorded in the occupied dormer bungalow. It is likely that this is a Day Roost. A low to medium level of bat activity was recorded for this species of bat within the proposed development site. No other bat roosts were recorded in any of the remaining buildings or stone walls.

The are no tall vegetation deemed suitable as Potential Bat Roosts (PBRs).

The bat activity recorded within the proposed development site during dusk and dawn surveys was primarily associated with commuting bats. A low level of foraging was recorded. The static surveillance only recorded bat activity for two bat species: common pipistrelle and Leisler's bats and this was in Low to Medium levels of bat activity.

The proposed development site is a small survey area with little habitat considered to be suitable for foraging and commuting bats. Overall the bat activity level recorded during surveys is considered to be Low. The level of bat activity and the number of bat encounters do not indicate that the proposed development site is an important area for local bat populations.

The proposed development would result in the following:

- Loss of Day Roost for common pipistrelle in dormer bungalow (Construction Impacts)
- An increase in human activity (noise and light levels) (Operational Impacts)

Therefore the impact assessment is as follows:

- Roost loss of common pipistrelle Day Roost are assessed as **Permanent Slight Negative Effects**
- Habitat loss (potential foraging/ commuting habitat) effects on all bat species are assessed as **Permanent Not Significant Negative Effects**.
- Disturbance and/or displacement effects on all bat species during the construction phase are assessed as **Short-term Slight Negative Effect**
- The operational impacts of the proposed development will likely be **Permanent** (as per the duration of the operation of the proposed development) **Slight Negative Effect** principally due to the increased lighting within the proposed development area.

Bat mitigation measures are provided to provide alternative roosting (e.g. bat boxes) to mitigate for the loss of a Day Roost.

Additional mitigation measures are also made in relation to lighting and landscaping to further reduce the potential impact of the proposed development.

If bat mitigation measures are strictly adhered to, the potential impact quality and significance of the proposed development will be reduced to **Permanent Non Significant Negative Effect**.

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8. Appendices

8.1 Appendix 1 Bat Habitat & Commuting Route Classifications

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

Type of Hedgerow / Treeline	Code	Description / Bat Potential
Small Hedgerow	**SH**	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. 
Medium Hedgerow	**MH**	Hedgerow is approximately 1.5 to 3 m high. This type of hedgerow will provide foraging and commuting potential for bats. 
Sparse Treeline Hedgerow	**ST**	Hedgerow, low or medium in height, with individuals trees (where tree canopies, for the most part, do not touch).

		
Dense Treeline Hedgerow	**DT**	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. 

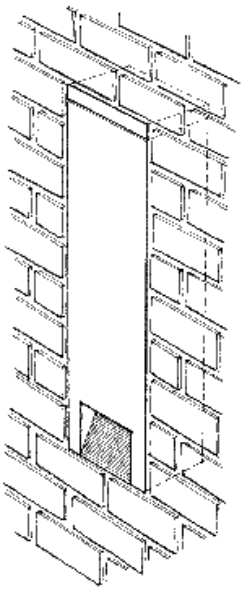
Table 1.B: Habitat Classification (Bat Conservation Ireland, 2015, based on Fossit, 2000)

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	

8.2 Appendix 2 – Bat Boxes

Summer Bat Boxes e.g. 1FF & 1F (Source: www.nhbs.com)

Bat Tubes (Source: www.nhbs.com)



www.nhbs.com

About this product

The 1FR Bat Tube is designed to be installed on the external walls of buildings, either flush or beneath a rendered surface. This makes it ideal for situations where you wish the box to be discrete as only the entrance hole will be visible. It can also be painted to match your building with an air permeable paint if desired.

The 1FR is specifically designed to meet the characteristic behavioural requirements of the types of bats that inhabit buildings. It has an integrated wooden panel onto which bats can cling and a ridged entrance slope which makes it easy for them to enter and leave the box safely. The design maintains excellent climatic conditions inside providing bats with a safe and stable environment in which to roost and it requires no maintenance because droppings fall out of the entrance ramp.

To allow access into existing cavities in buildings use the 2FR Bat Tube.

Specification

* Material: Woodcrete with integrated wooden panel
* Height: 47.5cm
* Width: 20cm
* Depth: 12.5cm
* Entrance dimensions: 15 x 9 x 2cm
* Weight: 9.8kg

Rocket Bat Box x2 units (mounted on 5m poles in a 1m x 1m 40 newtons concrete).

Source – Irish manufacturer = www.EireEcology.ie

8.3 Appendix 3 Bat Assessment Tables

Table 4.1 Guidelines for assessing the potential suitability of proposed development sites for bats, based on the presence of habitat features within the landscape, to be applied using professional judgement.

Suitability	Description Roosting habitats	Commuting and foraging habitats
Negligible	Negligible habitat features on site likely to be used by roosting bats.	Negligible habitat features on site likely to be used by commuting or foraging bats.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions[a] and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e. unlikely to be suitable for maternity or hibernation[b]). A tree of sufficient size and age to contain PRFs but with none seen from the ground or features seen with only very limited roosting potential.[c]	Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or unvegetated stream, but isolated, i.e. not very well connected to the surrounding landscape by other habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
Moderate	A structure or tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions[a] and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only – the assessments in this table are made irrespective of species conservation status, which is established after presence is confirmed).	Continuous habitat connected to the wider landscape that could be used by bats for commuting such as lines of trees and scrub or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water.
High	A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions[a] and surrounding habitat.	Continuous, high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines of trees and woodland edge. High-quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats such as broadleaved woodland, tree-lined watercourses and grazed parkland. Site is close to and connected to known roosts.

[a] For example, in terms of temperature, humidity, height above ground level, light levels or levels of disturbance.
[b] Evidence from the Netherlands shows mass swarming events of common pipistrelle bats in the autumn followed by mass hibernation in a diverse range of building types in urban environments (Korsten *et al.*, 2015). This phenomenon requires some research in the UK but ecologists should be aware of the potential for larger numbers of this species to be present during the autumn and winter in large buildings in highly urbanised environments.
[c] This system of categorisation aligns with BS 8596:2015 Surveying for bats in trees and woodland (BSI, 2015).

Figure A: Table 4.1 (p 35) Reproduced from Collins (2016).

(1) Conversion, modification, demolition or removal of buildings (including hotels, schools, hospitals, churches, commercial premises and derelict buildings) which are:

- agricultural buildings (e.g. farmhouses, barns and outbuildings) of traditional brick or stone construction and/or with exposed wooden beams;
- buildings with weather boarding and/or hanging tiles that are within 200m of woodland and/or water;
- pre-1960 detached buildings and structures within 200m of woodland and/or water;
- pre-1914 buildings within 400m of woodland and/or water;
- pre-1914 buildings with gable ends or slate roofs, regardless of location;
- located within, or immediately adjacent to woodland and/or immediately adjacent to water;
- Dutch barns or livestock buildings with a single skin roof and board-and-gap or Yorkshire boarding if, following a preliminary roost assessment, the site appears to be particularly suited to bats.

(2) Development affecting built structures:

- tunnels, mines, kilns, ice-houses, adits, military fortifications, air-raid shelters, cellars and similar underground ducts and structures; unused industrial chimneys that are unlined and brick/stone construction;
- bridge structures, aqueducts and viaducts (especially over water and wet ground).

(3) Floodlighting of:

- churches and listed buildings, green space (e.g. sports pitches) within 50m of woodland, water, field hedgerows or lines of trees with connectivity to woodland or water;
- any building meeting the criteria listed in (1) above.

(4) Felling, removal or lopping of:

- woodland;
- field hedgerows and/or lines of trees with connectivity to woodland or water bodies;
- old and veteran trees that are more than 100 years old;
- mature trees with obvious holes, cracks or cavities, or that are covered with mature ivy (including large dead trees).

(5) Proposals affecting water bodies:

- in or within 200m of rivers, streams, canals, lakes, reed beds or other aquatic habitats.

(6) Proposals located in or immediately adjacent to:

- quarries or gravel pits;
- natural cliff faces and rock outcrops with crevices or caves and swallets.

(7) Proposals for wind farm developments of multiple wind turbines and single wind turbines (depending on the size and location) (NE TIN 051 – undergoing updates at the time of writing).

(8) All proposals in sites where bats are known to be present[1]

This may include proposed development affecting any type of buildings, structures, feature or location.

Notes:

1. Where sites are of international importance to bats, they may be designated as SACs. Developers of large sites 5–10km away from such SACs may be required to undertake a HRA.

Figure B: Reproduced from Collins (2016) – page 13.

Table 2 Factors affecting the probability of bats being present.

Factors affecting the probability of a building being used by bats in summer	
Increased probability	Disused or little used; largely undisturbed
	Large roof void with unobstructed flying spaces
	Large dimension roof timbers with cracks, joints and holes
	Uneven roof covering with gaps, though not too draughty
	Entrances that bats can fly in through
	Hanging tiles or wood cladding, especially on south-facing walls
	Rural setting
	Close to woodland and/or water
	Pre-20th century or early 20th century construction
	Roof warmed by the sun
	Within the distribution area of horseshoe bats
Decreased probability	Highly urbanised area with few feeding places
	Small or cluttered roof void (esp. for brown long-eared bat)
	Heavily disturbed
	Modern construction with few gaps around soffits or eaves (but be aware these may be used by pipistrelles in particular)
	Prefabricated with steel and sheet materials
	Active industrial premises
	Roof shaded from the sun
Factors affecting the probability of trees being used by roosting bats	
Increased probability	In ancient woodland or parkland
	Large trees with complex growth form
	Species that typically form cavities, such as beech, willow, oak or ash
	Visible damage caused by rot, wind, lightning strike *etc.*
	Loose bark providing cavities
Decreased probability	Coniferous plantation with no specimen trees
	Young trees with simple growth form and little damage
Factors affecting the probability of underground sites being used by roosting bats	
Increased probability	Large enough to develop stable temperature in winter
	High humidity
	Undisturbed
	Close to woodland or water (but note that bats will also use upland sites)
	Many cracks and crevices suitable for bats
Decreased probability	Small and draughty
	Heavily disturbed
	In urbanised areas
	Smooth surfaces with few roosting opportunities

Figure C: Table 2 Reproduced from Marnell *et al.* (2022).

9. Bat Species Profile

9.1 Leisler's bat

Ireland's population is deemed of international importance and the paucity of knowledge of roosting sites, makes this species vulnerable. However, it is considered to be widespread across the island. The modelled Core Area for Leisler's bats is a relatively large area that covers much of the island of Ireland (52,820km^2). The Bat Conservation Ireland Irish Landscape Model indicated that the Leisler's bat habitat preference has been difficult to define in Ireland. Habitat modelling for Ireland shows an association with riparian habitats and woodlands (Roche *et al.,* 2014). The landscape model emphasised that this is a species that cannot be defined by habitats preference at a local scale compared to other Irish bat species but that it is a landscape species and has a habitat preference at a scale of 20.5km. In addition, of all Irish bat species, Leisler's bats have the most specific roosting requirements. It tends to select roosting habitat with areas of woodland and freshwater.

Irish Status	Near Threatened
European Status	Least Concern
Global Status	Least Concern
Irish Population Trend	2003-2013 ↑
Estimated Irish Population Size	73,000 to 130,000 (2007-2013) Ireland is considered the world stronghold for this species
Estimate Core Area (Lundy *et al. 2011)*	52,820 km^2

Taken from Roche *et al.,* 2014, Lysaght & Marnell, 2016 & Marnell *et al.*, 2019

The principal concerns for Leisler's bats are poorly known in Ireland but those that are relevant for this survey area are as follows:

- Selection of maternity sites is limited to specific habitats;
- Relative to the population estimates, the number of roost sites is poorly recorded;
- Tree felling, especially during autumn and winter months; and
- Increasing urbanisation.

9.2 Common pipistrelle

This species is generally considered to be the most common bat species in Ireland. The species is widespread and is found in all provinces. The modelled Core Area for common pipistrelles is a large area that covers much of the island of Ireland (56,485km^2) which covers primarily the east and south east of the area (Roche *et al.,* 2014). The Bat Conservation Ireland Irish Landscape Model indicated that the Common pipistrelle selects areas with broadleaf woodland, riparian habitats and low density urbanization (<30%) (Roche *et al.,* 2014).

Irish Status	Least Concern
European Status	Least Concern
Global Status	Least Concern
Irish Population Trend	2003-2013 ↑
Estimated Irish Population Size	1.2 to 2.8 million (2007-2012)
Estimate Core Area (km^2) (Lundy *et al. 2011)*	56,485

Taken from Roche *et al.,* 2014, Lysaght & Marnell, 2016 & Marnell *et al.*, 2019

Principal concerns for Common pipistrelles in Ireland that are relevant for this survey area are as follows:

- Lack of knowledge of roosting requirements
- This species has complex habitat requirements in the immediate vicinity of roosts. Therefore, careful site specific planning for this species is required in order to ensure all elements are maintained.

- Renovation or demolition of derelict buildings.
- Tree felling
- Increasing urbanisation (e.g. increase in lighting)

9.3 Soprano pipistrelle

This species is generally considered to be the second most common bat species in Ireland. The species is widespread and is found in all provinces, with particular concentration along the western seaboard. The modelled Core Area for soprano pipistrelle is a large area that covers much of the island of Ireland (62,020km^2). The Bat Conservation Ireland Irish Landscape Model indicated that the soprano pipistrelle selects areas with broadleaf woodland, riparian habitats and low density urbanisation (Roche *et al.,* 2014).

Irish Status	Least Concern
European Status	Least Concern
Global Status	Least Concern
Irish Population Trend	2003-2013 ↑
Estimated Irish Population Size	0.54 to 1.2 million (2007-2012)
Estimate Core Area (km^2) (Lundy *et al. 2011)*	62,020

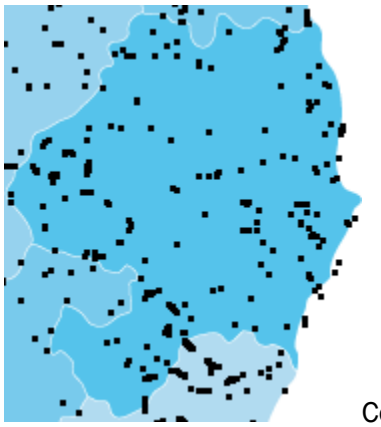
Taken from Roche *et al.,* 2014, Lysaght & Marnell, 2016 & Marnell *et al.*, 2019

Principal concerns for Soprano pipistrelles in Ireland that are relevant for this survey area are as follows:

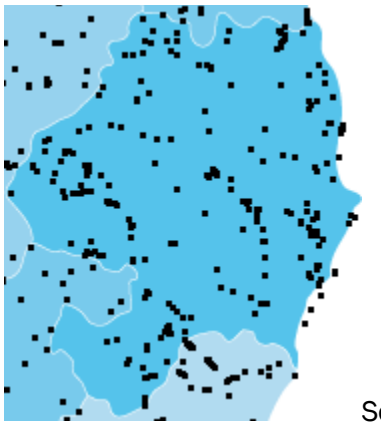
- Lack of knowledge of roosts;
- Renovation or demolition of structures;
- Tree felling; and
- Increasing urbanisation (e.g. increase in lighting).

9.4 Bat Conservation Ireland Bat Species Maps

Bat records for County Wicklow (Source: www.batconservationireland.org)

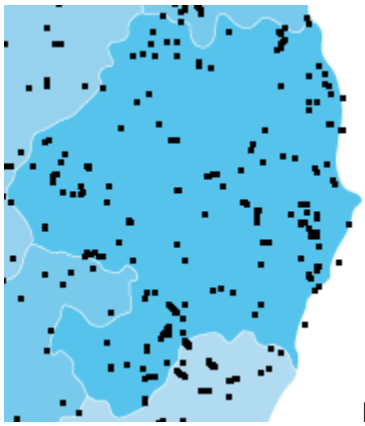


Common pipistrelle

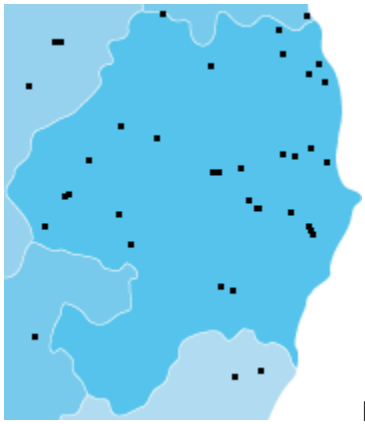


Soprano pipistrelle

Nathusius’ pipistrelle

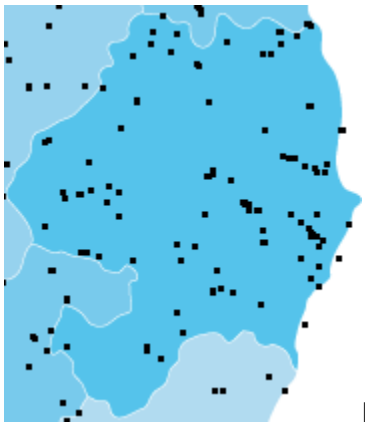


Leisler’s bat

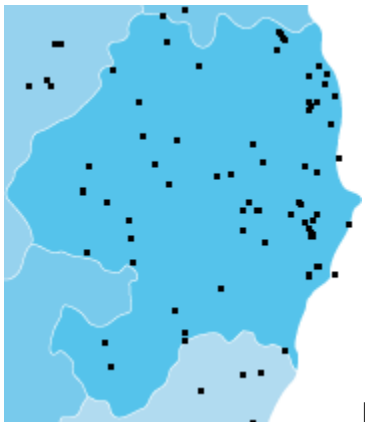


Natterer’s bat

Whiskered bat



Daubenton’s bat



Brown long-eared bat

9.5 Bat Conservation Ireland Bat Landscape Favourability Model

Table 1C: 5km Square Landscape Favourability value for individual bat species.

Bat species	Western 5km Square	Eastern 5km Square
Common pipistrelle	48-72% (High)	39-47% (Medium to High)
Soprano pipistrelle	46-64% (High)	46-64% (High)
Nathusius' pipistrelle	6-15% (Low to Medium)	16-29% (Medium)
Leisler's bat	47-71% (High)	38-46% (Medium to High)
Brown long-eared bat	50-79% (High)	39-49% (Medium to High)
Daubenton's bat	30-38% (Medium to High)	0-12% (Low)
Natterer's bat	49-75% (High)	27-36% (Medium)
Whiskered bat	32-44% (Medium to High)	10-20% (Medium)
Lesser horseshoe bat	5-13% (Low to Medium)	0-4% (Low)

An Roinn Tithíochta,
Rialtais Áitiúil agus Oidhreachta
Department of Housing,
Local Government and Heritage

Application for Derogation Licence

Under the European Communities (Birds and Natural Habitats) Regulations 2011 – 2021

Prepared by the Department of Housing, Local Government and Heritage

npws.ie

- This form is to be used by any person applying for a derogation licence under Regulation 54 or by the Minister under Regulation 54(A)
- Please ensure that you answer questions fully in order to avoid delays
- If you experience any problems filling in this form, please contact the Wildlife Licensing Unit;

Wildlife Licensing Unit,

Department of Housing, Local Government and Heritage

National Parks and Wildlife Service

Wildlife Licensing Unit, R. 2.03

90 North King Street

Smithfield

Dublin 7 D07 N7CV

Email: wildlifelicence@housing.gov.ie

Part A. The Applicant: Personal Details

These questions relate to the person responsible for any proposed works and who will be the **named licensee**. As the licensee you will be responsible for ensuring compliance with the licence and its conditions, even though you may employ another person to act on your behalf.

If this application is being submitted on behalf of a third party please also complete Part B below.

1. (a) Name of Applicant

Title (Mr/Mrs/Miss/Ms/Dr)	Forename(s)	Surname
(b) Address Line 1		
Address Line 2		
Town		
County		
Eircode		
(c) Contact number		
(d) Email address		
(e) Address where works are to be carried out if different from (b) above.		
Address Line 1		
Address Line 2		
Town		
County		
Eircode		

Part B. Details of Person Submitting Application on Behalf of Applicant/Licensee

Information relating to the person (e.g. ecologist) responsible for submitting the application on behalf of the applicant/licensee should be entered below:

1. (a) Name of Person/Ecologist

Title (Mr/Mrs/Miss/Ms/Dr)	Forename(s)	Surname
Dr	Tina	Aughney
(b) Company Name	Bat Eco Services	
Address Line 1	Ulex House, Drumheel	
Address Line 2	Lisduff	
Town	Virginia	
County	Cavan	
Eircode	A82XW62	
(c) Contact number	086 4049468	
(d) Email address	tina@batecoservices.com	
(e) Relationship to Applicant	Contracted bat specialist	

Part C. The Application

1. **Species of Animal:** Please indicate which species is affected by the proposed works:

- Bat ☒
- Otter ☐
- Kerry Slug ☐
- Natterjack Toad ☐
- Dolphin ☐
- Whale ☐
- Turtle ☐
- Porpoise ☐

2. Please detail the exact species (scientific name): Pipistrellus pipistrellus

3. Please provide the maximum number of individuals affected* 2 individuals

4. Please provide the maximum number of breeding or resting sites affected* 1

5. Please provide the maximum number of eggs to be taken* N/A

6. Please provide the maximum number of eggs to be destroyed* N/A

*If no figures can be provided for the maximum number of individuals, breeding sites, resting places and eggs to be covered by the derogation please provide reasons why.

.

7. **Species of Plant:** Please indicate which species is affected by the proposed works:

- Killarney Fern ☐
- Slender Naiad ☐
- Marsh Saxifrage ☐

8. If you previously received a derogation for any species of animal or plant please state licence number and confirm that you have made a return to NPWS on the numbers actually affected by that licence

This is the first licence application for this project.

Yes – numerous licenses have been received for other projects and returns have been completed for projects where works were undertaken.

9. **Proposed Dates for Works:** Please indicate the timeframe that you propose to carry out works. Dates set by NPWS may differ from dates proposed here.

Start Date:	TBC
End Date:	TBC

10. Please tick which reason below explains How this Application Qualifies under Regulation 54(2)(A-E) of the European Communities (Birds and Natural Habitats) Regulations:

f.	In the interests of protecting wild flora and fauna and conserving natural habitats	☒
g.	To prevent serious damage, in particular to crops, livestock, forests, fisheries and water and other types of property	☐
h.	In the interests of public health and public safety, or for other imperative reasons of overriding public interest, including those of a social or economic nature and beneficial consequences of primary importance for the environment	☐
i.	For the purpose of research and education, of re-populating and re-introducing these species and for the breeding operations necessary for these purposes, including artificial propagation of plants	☐
j.	To allow, under strictly supervised conditions, on a selective basis and to a limited extent, the taking or keeping of certain specimens of the species to the extent specified therein, which are referred to in the First Schedule	☐

11. Report Checklist: Please append a detailed report to support this application and ensure that it contains the following information:

11.1	Explanation as to why the derogation licence sought is the only available option for works and no suitable alternative exists as per Regulation 54 of the European Communities (Birds and Natural Habitats) Regulations.	☒
11.2	Evidence that actions permitted by a derogation licence will not be detrimental to the maintenance of the populations of the species to which the Habitats Directive relates at a favourable conservation status in their natural range as is required under Section 54(2) of the European Communities (Birds and Natural Habitats) Regulations.	☒
11.3	Details of any mitigation measures planned for the species affected by the derogation at the location, along with evidence that such mitigation has been successful elsewhere.	☒
11.4	As much information as possible to allow a decision to be made on this application.	☒

Part D. Declaration

I declare that all of the foregoing particulars are, to the best of my knowledge and belief, true and correct. I understand that the deliberate killing, injuring, capturing or disturbing of protected species, or damage or destruction of their breeding sites or resting places or the deliberate taking or destroying of eggs is an offence without a licence and that it is a legal requirement to comply with the conditions of any licence I may be granted following this application. I understand that NPWS may visit to check compliance with a licence.

Please note that under Regulation 5 of the European Communities (Birds and Natural Habitats) Regulations 2011-2021 an authorised officer may enter and inspect any land or premises for the purposes of performing any of his or her functions under these Regulations or for obtaining any information which he or she may require for such purposes.

Signature of the **Applicant** _____ Date _____

Name in **BLOCK LETTERS** Dr Tina Aughney

PRIVACY STATEMENT

Please note that under Data Protection legislation Department staff may only discuss licence applications with the applicant, and not with any third party. See Privacy Statement at www.npws.ie/licences

npws.ie

Department of Housing, Local Government and Heritage

An Roinn Tithíochta,
Rialtais Áitiúil agus Oidhreachta
Department of Housing,
Local Government and Heritage