Annex 5.1

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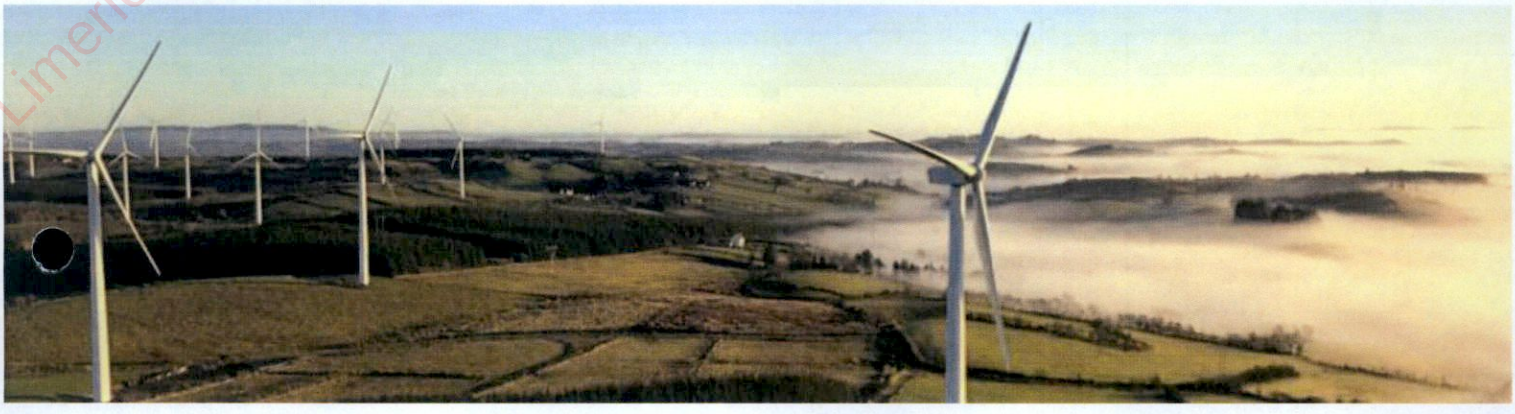

ANNEX 5.1 BASELINE BIRD SURVEY REPORT

Knockastanna Wind Farm

Prepared for: SSE Renewables Generation Ireland Limited

Limerick City & County Council
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1.0 Introduction

1.1 Background

SLR was commissioned by SSE Renewables Generation Ireland Limited to provide a summary of the pre- and post-construction ornithological surveys undertaken at the currently operational Knockastanna Wind Farm and their findings. To provide context, the planning history of the wind farm is summarised below.

A planning application was submitted to Limerick County Council (LCC) in June 2001[1]. This was refused in September 2002. A request for further information was made in the same month and again, permission was refused in November 2002.

One of the reasons for the refusals was in relation to birds:

"It is considered that the proposed development will result in an unacceptable level of risk of displacement and loss of habitat to the hen harrier, (a rare species listed in Appendix A of Birds Directive), which is to be found in the area, notwithstanding the mitigation measures put forward by the applicant. It is considered that the proposed development would consequently be contrary to the proper planning and sustainable development of the area."

Subsequently, the developer successfully appealed to An Bord Pleanála (ABP), stating the refusal decision was based on a hen harrier report commissioned by LCC that was deficient and inaccurate.

Although planning permission for the wind farm was granted in July 2003[2], construction did not start until January 2008 and the wind farm did not become fully operational until March 2009. Planning permission for the operational wind farm will cease in 2023 when decommissioning is due to commence.

Additional planning permission is currently being sought to continue the operation of the wind farm for a further 15 years, extending the wind farm's operational lifespan.

1.2 Site Description

The wind farm is located in a c.43.3 ha parcel of land (the 'Site') in northeast County Limerick; approximately 6 km north of the village of Doon, c. 10 km northeast of the village of Cappamore, and c. 29 km east of Limerick city. The Site is situated approximately 500 m from the administrative boundary between the local authorities of Limerick City & County Council and Tipperary County Council.

The wind farm comprises 4 no. wind turbines and all associated ancillary infrastructure including turbine foundations, crane hardstandings, access tracks, underground electricity cables and electrical switch room. The wind farm is connected to the national electricity grid, at Cappamore, via c. 11 km of overhead electricity line.

The turbines constructed have a maximum tip height of 99.95 m, a hub height of 64.7 m and a rotor diameter of 70.5 m.

The Site comprises a sloping area with wet heath and upland blanket bog habitats at its southern summit, grading into areas dominated by improved agricultural grassland and scrub habitats at its northern base. The Site rises from approximately 230 m ordnance datum (OD) in the north to 444 m OD in the south.

The Site and surrounding environment are typical of an upland landscape with extensive tracts of commercial forestry plantations dominating the surrounding undulating, landscape. Other agricultural activities in the wider environs of the Site tend to be extensive (i.e. non-intensive) cattle and sheep enterprises.

[1] LCC planning register reference 01/1385
[2] ABP reference PL 13.130938

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1.3 Scope of Work

Survey work at the Site to inform the original Environmental Impact Statement (EIS)[3] was undertaken in May 2001, which consisted of a walkover with particular attention given to hen harriers *Circus cyaneus*.

No official bird survey work was undertaken from 2001 to 2003, but a local ornithologist who lives very close to the Site monitored the local birds in the area in this period[4].

The scope of the survey work from 2003 onwards was based on planning condition no. 4 as set out in the permission granted by ABP, which stated that:

"Prior to commencement of development, the developer shall agree with the planning authority a protocol for annual reports on the impacts of the wind farm on wildbirds in the vicinity, with particular reference to the hen harrier and red grouse. These reports shall be submitted on an agreed date annually for as long as the wind farm is operational."

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The reason for this condition was:

"To allow full monitoring of the ecological impact of the proposed development, with particular reference to species scheduled under the Wildlife Act and the EU Habitats and Birds Directives".

In 2006 the National Parks and Wildlife Service (NPWS) wrote to the developer stating the following pre-construction monitoring protocol for birds was to be followed:

- *Monitoring of hen harrier usage of the site to be carried out using the Madders (2002)[5] methodology.*
- *Any observations of merlin Falco columbarius to be recorded in detail as part of the Vantage Point survey for hen harrier.*
- *Monitoring for meadow pipits Anthus pratensis and skylarks Alauda arvensis (prey species for hen harrier and merlin) to be carried out using Common Bird Census (CBS) transect methods through the areas where the turbines will be/have been constructed during the breeding season (April-July inclusive).*
- *Monitoring for red grouse Lagopus lagopus hibernicus to be carried out using standard methods in consultation with the NPWS.*
- *Monitoring of hen harrier, red grouse and merlin usage of the site to be carried out during the pre-construction phase by an independent, qualified or experienced ornithologist.*
- *The above monitoring requirements to be carried out during a pre-construction year. The requirements for further monitoring to be agreed with NPWS, following submission of the pre-construction monitoring results to NPWS, before the end of January 2007.*
- *An alternative method for monitoring grouse, which is less invasive and less costly than using trained dogs, is currently under consideration by the NPWS, hence the requirement for further consultation above. The ornithological surveyor to contact NPWS for information on this prior to survey for red grouse.*

In a letter to the developer (dated 22 June 2007), the NPWS confirmed that they were satisfied with scope of the surveys employed in 2006-2007 and stated they were to be repeated for every year of operation thereafter. These surveys and the methodologies are summarised in Table 1-1.

[3] Ventus. (2001). Knockastanna Wind Farm EIS.
[4] Oliver, G. and Penn, G. (2017). Bird Survey of Knockastanna Wind Farm, Doon, Co. Limerick, February – August 2017.
[5] Madders, M. (2002). Method statement for vantage point watches. In: Survey methods to assess windfarm impacts on upland bird communities. Scottish Natural Heritage.

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Table 1-1
Scope of Ornithological Survey Work Pre- and Post-Construction from 2006-2019

Survey Type(s)	Summary Methodology
Flight activity surveys	VP surveys were based on the Madders (2002)[5] methodology, requiring 6 hours of monthly surveys at each of the two VPs between April and July[6]. The two VP locations were considered to provide sufficient coverage of the Site and surrounding area. The VP locations used in 2008 and 2009 differed from those used in all other survey years, and indeed from each other.
Hinterland surveys for breeding hen harrier	Surveys within 5 km of the Site (the hinterland) were also employed to assess breeding occupancy of hen harriers near the Site following NPWS guidance and in the same time period as the flight activity surveys. This involved a combination of transects and VP surveys undertaken in suitable nesting and foraging habitats, as well as in known breeding areas. Collective knowledge of hen harriers in the survey area increased from 2010 onwards owing to other surveyors.
Countryside Bird Survey	A CBS was used following the methodology used by BirdWatch Ireland[7]. This involved walking two transects over the Site, once between early April to mid-May and then again from mid-May to late June. The transects and precise methodology used in 2008 and 2009 differed from all other survey years.
Red grouse tape lure survey	The methodology employed was that of the national red grouse survey[8] carried out by BirdWatch Ireland from 2006 – 2008. A single visit was undertaken between December to March where a tape lure was used to elicit a response from grouse present. A walked transect was also used to search for red grouse signs, such as droppings or feathers. The implementation of the survey in 2008 and 2009 differed from all other survey years.

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[6] If successful breeding of hen harriers was demonstrated on or close to the Site, surveys were extended to August.
[7] Coombes, R. H., O. Crowe, L. Lysaght, J. O'Halloran, O. O'Sullivan, H. J. Wilson. 2006. Countryside Bird Survey Report 1998-2005. BirdWatch Ireland, Wicklow.
[8] Cummins, S., Bleasdale, A., Douglas, C., Newton, S., O'Halloran, J. & Wilson, H.J. (2010) The status of Red Grouse in Ireland and the effects of land use, habitat and habitat quality on their distribution. Irish Wildlife Manuals, No. 50. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.

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1.4 Purpose of this Report

This report outlines the surveys undertaken and methods used for pre- and post-construction monitoring at the operational Knockastanna Wind Farm with the primary focus on the time period between 2006 and 2019[9]. No surveys were completed in 2020 and 2021 because of the COVID pandemic; Limerick County Council area aware of this. A survey is going ahead in 2022 however the results were not available at the time of writing.

The report goes on to summarise the field data obtained and provides descriptions of the legal and conservation status of the species recorded. The assessment of impacts resulting from the proposed extension of wind farm operation and the development of mitigation and enhancement measures, if required, are beyond the scope of this report and will be covered in a separate Environmental Impact Assessment Report (EIAR) in due course.

The survey methodologies described in this report predate those recommended by current NatureScot guidance[10], which represents current industry best practice in Ireland. Nevertheless, every effort has been made to present the results of the pre- and post-construction monitoring in a way that can be used to inform impact assessment according to current guidance.

Note that current NatureScot guidance states that data up to five years old should be used impact assessment of onshore wind farms. In this case, older data have been presented based on consultation with the Department of Housing, Local Government and Heritage[11].

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[9] No other dedicated ornithological surveys were carried out at the Site. An ecological walkover only was conducted in 2001 and other surveys represented opportunistic sightings that did not follow any official methodologies.

[10] NatureScot (2017). *Recommended Bird Survey Methods to Inform Impact Assessment of Onshore Wind Farms V2.* NatureScot, Inverness.

[11] Letter received on 2 July 2021; reference G Pre00180/2021

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2.0 Survey Methodology

2.1 Information and Data Sources

Information on then pre- and post-construction monitoring undertaken at the Site was compiled from the following data sources[12]:

- Ventus. (2001). Knockastanna Wind Farm EIS.
- Biosphere Environmental Services. (2001). Proposed Wind Farm Development at Knockastanna, Doon, Co. Limerick: Review of Hen Harrier in Area and Assessment of Potential Impacts by Wind Farm on Hen Harriers. Prepared for Limerick County Council.
- Oliver, G .(2007). Bird survey of proposed windfarm site at Knockastanna, Doon, Co. Limerick, May 2006 - May 2007.
- Fehily Timoney and Company (2008). Breeding Season Bird Monitoring at Knockastanna Wind Farm, Co Limerick, 2008.
- Fehily Timoney and Company (2009). Breeding Season Bird Monitoring at Knockastanna Wind Farm, Co Limerick.
- Oliver, G. and Penn, G. (2010). Bird Survey of Knockastanna Wind Farm, Doon, Co. Limerick, March – August 2010.
- Oliver, G. and Penn, G. (2011). Bird Survey of Knockastanna Wind Farm, Doon, Co. Limerick, March – August 2011.
- Oliver, G. and Penn, G. (2012). Bird Survey of Knockastanna Wind Farm, Doon, Co. Limerick, March – August 2012.
- Oliver, G. and Penn, G. (2014). Bird Survey of Knockastanna Wind Farm, Doon, Co. Limerick, April 2013 – August 2014.
- Oliver, G. and Penn, G. (2014). Bird Survey of Knockastanna Wind Farm, Doon, Co. Limerick, March – August 2014.
- Oliver, G. and Penn, G. (2015). Bird Survey of Knockastanna Wind Farm, Doon, Co. Limerick, February – August 2015.
- Oliver, G. and Penn, G. (2016). Bird Survey of Knockastanna Wind Farm, Doon, Co. Limerick, March – August 2016.
- Oliver, G. and Penn, G. (2017). Bird Survey of Knockastanna Wind Farm, Doon, Co. Limerick, February – August 2017.
- Oliver, G. and Penn, G. (2018). Bird Survey of Knockastanna Wind Farm, Doon, Co. Limerick, February – August 2018.
- Oliver, G. and Penn, G. (2019). Bird Survey of Knockastanna Wind Farm, Doon, Co. Limerick, February – August 2019.

[12] Note the pre- and post-construction monitoring reports carried out by Oliver and FTC are freely available on the LCC website.

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In addition, the websites of the National Parks and Wildlife Service (NPWS) www.npws.ie and the National Biodiversity Data Centre (NBDC) http://maps.biodiversityireland.ie/#/Map were also accessed for information on sites designated for nature conservation in the vicinity of the Site.

2.2 Survey Areas, Dates and Personnel

Details of survey dates and times (where available) are provided in the pre- and post-construction monitoring reports provided to LCC (see Section 2.1). The ornithological survey areas were as described in Table 1-1 and maps for each survey are provided in the freely available reports on the LCC website. A summary of the personnel and the survey areas are provided below for each time period.

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2.2.1 Pre-construction Surveys (2006-2007)

Surveys were undertaken by Geoff Oliver and Brian Porter, who both are experienced ornithologists.

2.2.2 Surveys During Construction (2008)

Surveys in 2008 were undertaken by Fehily Timoney and Company (FTC; surveyor names not provided).

2.2.3 Post-construction Surveys (2009-2019)

Surveys in 2009 were undertaken by FTC (surveyor names not provided). All remaining surveys between 2010 and 2019 were undertaken by Geoff Oliver and Gyr Penn. Gyr is an experienced ornithologist who lives very near to the Site and has a wealth of local avian knowledge.

2.3 Flight Activity Surveys

The VP locations used changed between surveyors: those used in 2006-2007 were different to those used in 2008, which were also different to those used in 2009. In 2010-2019, the same VP locations were used as in 2006-2007. No viewshed analysis was undertaken in a GIS, but an estimation of the extent of the area of visibility was made in the field in 2006 and was shown to completely cover the Site and a large buffer area surrounding it[13].

A total of 378 hours (minimum[14]) of flight activity surveys were conducted from each of the two VP locations between 2006-2019 (mean of 29.1 hours/year), as summarised in Table 2-1. This equates to six hours of survey per VP location per month between April to July or April to August, depending on whether a successful breeding attempt was made on or close to the Site.

In 2006, initial scoping surveys were undertaken in May and so official VP surveys did not commence until June. In 2007, surveys were only undertaken in April and May to make up for the shortfall in survey effort in 2006; however, no additional surveys were commissioned for 2007.

In 2008-2009, surveys were only undertaken between April to July (inclusive). For all subsequent years, surveys were undertaken between April to August (inclusive).

To avoid double-counting birds, surveys were generally not undertaken simultaneously from both VPs. However, in 2008-2009, surveyors conducted surveys from both VPs at the same time for all months but June 2008.

[13] The VP locations used by Oliver were located outside of the Site whereas those used by FTC were located within the Site.

[14] Some surveys were continued for longer than the standard 3 hours per survey, as weather conditions hindered visibility. In such cases, they were continued until 3 hours of survey effort in periods of acceptable visibility had been completed. The 'minimum' number of hours refers to the total survey effort carried out in acceptable weather conditions.

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VP watches aimed to quantify the flight activity of primary target species (as defined in Section ?) within the Site. The main purpose of the watches were to collect data that will enable estimates to be made of:

- The time spent flying over the Site (flights were classified as 'on' vs. 'off-site');
- The relative use by birds of different parts of the Site (including the behaviour of the bird); and
- The proportion of flying time spent within the upper and lower risk height limits as determined by the rotor diameter and rotor hub height.

For each primary target species observation, the following details were recorded:

- Time of observation;
- Duration of flying bout;
- Species, age and sex (where determinable); and
- Time spent within each height band.

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Taking into account the dimensions of the constructed turbines, the height bands used were:

- 1 = <10 m (below potential collision height)
- 2 = 10-100 m (includes potential collision heights of 29.75 – 100.25 m, as well as a c.20 m buffer below the lower tip height to allow for inaccuracies in height estimation)
- 3 = >100 m (above potential collision heights)

Current NatureScot guidance states that a summary of observations of secondary target species should be recorded at the end of each five-minute period during VP watches to provide an index of flight activity for secondary target species within the Site. As the flight activity surveys followed different guidance, such a summary was not provided. Similarly, the data collected on each secondary species was not always consistently or clearly presented. However, an attempt to summarise the observations of secondary target species has been made in an attempt to align the monitoring results with this current best-practice technique.

Data collected on secondary species generally included:

- Species, ages and sex (where determinable);
- Number of birds observed; and
- The proportion of flying time spent within the upper and lower risk height limits as determined by the rotor diameter and rotor hub height.

2.3.1 Target Species

Primary target species for the VP surveys were first defined by NPWS in 2006 for the purposes of pre- and post-construction monitoring. However, information collected on additional secondary species during VP surveys has been summarised where available. These are species whose current legal and/or conservation status and vulnerability to impacts caused by wind turbines as defined in current NatureScot guidance[6] that could warrant assessment in a separate ES. Recording of secondary species was subsidiary to primary target species.

Primary Target Species

The two primary target species as defined by NPWS included:

- Hen harrier
- Merlin

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Secondary Target Species

Additional Annex I [15]and/or red-listed[16] species that were recorded during VP surveys included:

- Peregrine falcon *Falco peregrinus*
- Short-eared owl *Asio flammeus*
- Golden plover *Pluvialis apricaria*
- White-tailed eagle *Haliaeetus albicilla*
- Curlew *Numenius arquata*
- Kestrel *Falco tinnunculus*
- Snipe *Gallinago gallinago*

Other species that were recorded during VP surveys that are not annex I and/or red-listed species included:

- Sparrowhawk *Accipiter nisus*
- Buzzard *Buteo buteo*

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[15] Under EC Birds Directive 2009/147/EC
[16] Gilbert, G., Stanbury, A. and Lewis, L. (2021). Birds of Conservation Concern in Ireland. Irish Birds 43: 1–22.

Table 2-1
VP Surveys undertaken at Knockastanna Wind Farm 2006-2019

VP Number	Easting, northing (ITM): 2006-2007 and 2010-2019 surveys	Easting, northing (ITM): 2008 surveys	Easting, northing (ITM): 2009 surveys	Minimum[17] hours of Survey Completed													
				2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2015	2017	2018	2019
1	583754, 657243	Between 585502, 656878 and 585510, 656821[18]	585507, 656877	18	12	24	24	30	30	30	30	30	30	30	30	30	30
2	586053, 658643	585603, 656719	586121, 656258	18	12	24	24	30	30	30	30	30	30	30	30	30	30

[17] In some instances, VP watches greater than 3 hours were employed where weather conditions were unsuitable for survey. In such cases, watches were extended to ensure 3 hours of survey in acceptable weather conditions were available.
[18] The surveyor moved between two locations within a watch.

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2.4 Hinterland Surveys

Surveys for breeding hen harrier were undertaken within a 5 km radius of the Site, which involved visits to suitable habitat and known breeding areas. This consisted of four days of surveys in the early-season (April to early May) and one day in the late-season in July, to look for fledged juveniles at active nest sites using short VP watches.

Positive evidence of breeding in the early part of the season was defined by some form of territorial behaviour e.g. a food pass, aggressive behaviour and carrying nest material. In well-known territories, the presence of a male and a female in the territory was regarded as evidence of occupation.

The following criteria were used to classify hen harrier breeding status in Table 2-2 below.

Note that the exact criteria used to define breeding status initially followed that used by the first national survey for hen harriers[19] as 'confirmed', 'probable' and 'possible' from 2006 to 2014. From 2015 onwards and following the criteria outlined in the 2015 national survey for hen harriers[20], breeding status was simplified to 'confirmed' and 'possible'.

Table 2-2
Classification of hen harrier breeding status

Breeding status	Behaviours, evidence and/or activities observed
Confirmed breeding	Food pass observed
	Adult carrying prey
	Recently fledged young
	Agitated behaviour or calls given by adults
	Direct evidence of a nest (eggs or chicks seen, chicks heard, used nest, or eggshells found)
	Courtship or display behaviour involving both a male and female noted on two visits separated by at least a week
	A pair seen visiting a probable nest site on two visits separated by at least a week
	Nest building or carrying nest material
Possible breeding	Courtship or display behaviour involving both a male and female noted on only 1 visit

[19] Norriss, D.W., Marsh, J., McMahon, D. & Oliver, G.A. (2002). A national survey of breeding hen harriers *Circus cyaneus* in Ireland 1998-2000. Irish Birds 7: 1–10.
[20] Ruddock, M., Mee, A., Lusby, J., Nagle, A., O'Neill, S. & O'Toole, L. (2016). The 2015 National Survey of Breeding Hen Harrier in Ireland. Irish Wildlife Manuals, No. 93. National Parks and Wildlife Service, Department of the Arts, Heritage and the Gaeltacht, Ireland.

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Breeding status	Behaviours, evidence and/or activities observed
	Only one bird is ever seen (e.g. displaying male seen twice but no female seen)
	A pair seen visiting a probable nest site on only one visit
	Pair or female seen in possible nesting habitat between mid-May and end of June
Seen	Single male, female or pair (outside mid-May and June) observed with no evidence of breeding behaviour
Not seen	Area of suitable breeding habitat with no observations of hen harriers

2.5 Red Grouse Surveys

Red grouse surveys were conducted from 2007 onwards. A single visit was undertaken between December to March where a tape lure was used to elicit a response from any grouse present. This involved playing a short (approximately 30 seconds in duration) grouse call using a cassette player or megaphone. A walked transect was also used on the same day to search for red grouse signs, such as droppings or feathers.

2.6 Countryside Bird Surveys

This survey involved walking two approximately parallel transects over the site, simultaneously by two fieldworkers, recording all bird species heard or seen within 250 m of the transect line according to CBS methodology[7]. Surveys were undertaken once between early April to mid-May and then again from mid-May to late June.

2.7 Survey Limitations

2.7.1 Survey Effort

As the 2006 surveys were not started in time, the remaining survey effort was completed in 2007. This means that one year's worth of survey effort was spread over 2006 and 2007. No additional surveys for 2007 were conducted.

No ornithological surveys were completed in 2020 due to restrictions from covid-19. No survey results were available for 2021 at the time of writing this report.

2.7.2 Flight Activity Surveys

The VP locations used in 2006-2007 and 2010-2019 were markedly different to those used in 2008 and 2009. Crucially, those used in 2008 and 2009 were inside the Site and so surveyor presence could have disturbed target species usage of the Site. Similarly, in 2008-2009, surveyors conducted surveys from both VPs at the same time for all months but June 2008 and so bird behaviour could have been affected by surveyor presence.

Between 2008 – 2010, no secondary species were recorded. It is not clear from the reports whether this is due to an absence of secondary species, or more likely, that only results for primary species were reported.

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2.7.3 Hinterland Surveys

Knowledge of hen harriers within the 5 km radius of the Site increased considerably from 2010 onwards, as additional surveys were undertaken in the area by researchers from University College Cork and other ecological consultants for nearby wind farms. Consequently, the improvement in the local knowledge effectively increased the level of hinterland survey effort, as a network of local knowledge could be relied on to better target surveys.

2.7.4 Red Grouse Surveys

While it has been stated in previous monitoring reports that the surveys were carried out according to standard NPWS methodology, the implementation of the survey did not appear to be carried out in a consistent fashion between years. For example, the number of locations where the tape lure was played was not consistent. Similarly, in 2009 and 2010, walkovers were carried out only with no tape lure component. Transects did not follow the same path and differed in length between years. Similarly, the tape lure component was often completed first and then followed up with a separate transect for surveys carried out in 2011 onwards. The 2008 survey differed in that the tape-lure survey was played as part of the transect survey.

2.7.5 Countryside Bird Survey

The transects used between different surveyors were not the same: the same transects were followed in 2010-2019 as in 2006-2007. Roughly the same transects were followed in 2008, albeit they were of a shorter length (1 km vs. 1.6 km). In 2009, the location of the transects employed differed markedly from other years, with transects 1 and 2 following roughly the same path.

There is no indication that the CBS transect direction was randomised between surveys and so time of day and altitude were confounded with transect direction.

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3.0 Survey Results

3.1 Desktop Results

3.1.1 Hen Harrier Survey Data Pre-2006

The following text is a summary of local hen harrier knowledge adapted from an account compiled by a local ornithologist[21], who moved to nearby Curraghafoil, Doon, in 1998 and who has been involved in official bird surveys at the Site in some form since 2006 to 2019.

Between 1968-1972, hen harrier nesting was judged to have probably occurred within the 10 km grid square overlapping the Site according to the Bird Atlas survey[22]. However, no hen harrier nesting was recorded in the same grid square between 1988-1991[23].

Local residents were aware of hen harriers at the Site in 1993 and the location was listed as suitable habitat for hen harriers in the first national survey in 1998[19], although the Site itself did not form part of the national survey.

In 2000, seven sightings were made of harriers at the Site.[24]

During a walkover survey in 2001 made to inform the EIS, hen harriers were recorded, but no details of the number of birds recorded or how they were using the Site were provided[3]. Local residents had recorded harriers at the Site on ten occasions in the same year.

Between 2003-2006, any breeding attempts within or nearby the Site observed by local residents were confirmed with the Local Conservation Ranger. A nest was located 200 m from the Site boundary in 2003, which produced three fledglings. In 2004, a territorial pair was recorded within the Site, but breeding was not confirmed. In 2005, a nest was recorded in the middle of the Site, but it failed early in the breeding season.

3.1.2 Natura 2000 Sites

The Slievefelim to Silvermines Mountains SPA (site code 004165) overlaps with the Site boundary. This is the only Special Protection Area (SPA) located within 15 km[25] of the Site. It is designated for a permanent population of hen harrier. This SPA This SPA was designated in March 2007.

3.2 Flight Activity Surveys

3.2.1 Primary Target Species

A summary of flight activity by species is presented below.

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[21] Oliver, G. and Penn, G. (2010). Bird Survey of Knockastanna Wind Farm, Doon, Co. Limerick, March – August 2010.
[22] Sharrock, J.T.R. (1976). The Atlas of breeding Birds in Britain and Ireland: 1968-1972.
[23] Gibbons, D.W., Reid, J.B. and Chapman, R.A. (1993). The New Atlas of Breeding Birds in Britain and Ireland: 1988-1991
[24] Biosphere Environmental Services. (2001). Proposed Wind Farm Development at Knockastanna, Doon, Co. Limerick: Review of Hen Harrier in Area and Assessment of Potential Impacts by Wind Farm on Hen Harriers. Prepared for Limerick County Council.
[25] 15 km is the distance typically applied when considering wildfowl ranging from roost sites to foraging sites.

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Hen harrier

Between 2003[26] and 2019, 162 hen harrier flights were apparently recorded during VP surveys within the Site (86 were made between 2006 to 2019). Of these, a minimum[27] of 9% flights were at potential collision heights (PCH).

The highest total number of sightings in the Site was made in 2003 and then in 2006, as shown in Figure 1. Since 2006, less than ten hen harrier sightings per year have been made within the Site, with the number of sightings staying roughly the same with a mean of 4 sightings made per year between 2007-2019.

Hen harriers were recorded foraging within the Site every year since 2003.

Before wind farm construction (2003 to 2007 inclusive), hen harriers either bred or occupied territories within in the Site. During construction and post-construction (2008 to 2019 inclusive), no evidence of hen harrier breeding was recorded for 92% of surveys undertaken. Only in 2017 was there evidence of an occupied territory within the Site, but no breeding was confirmed.

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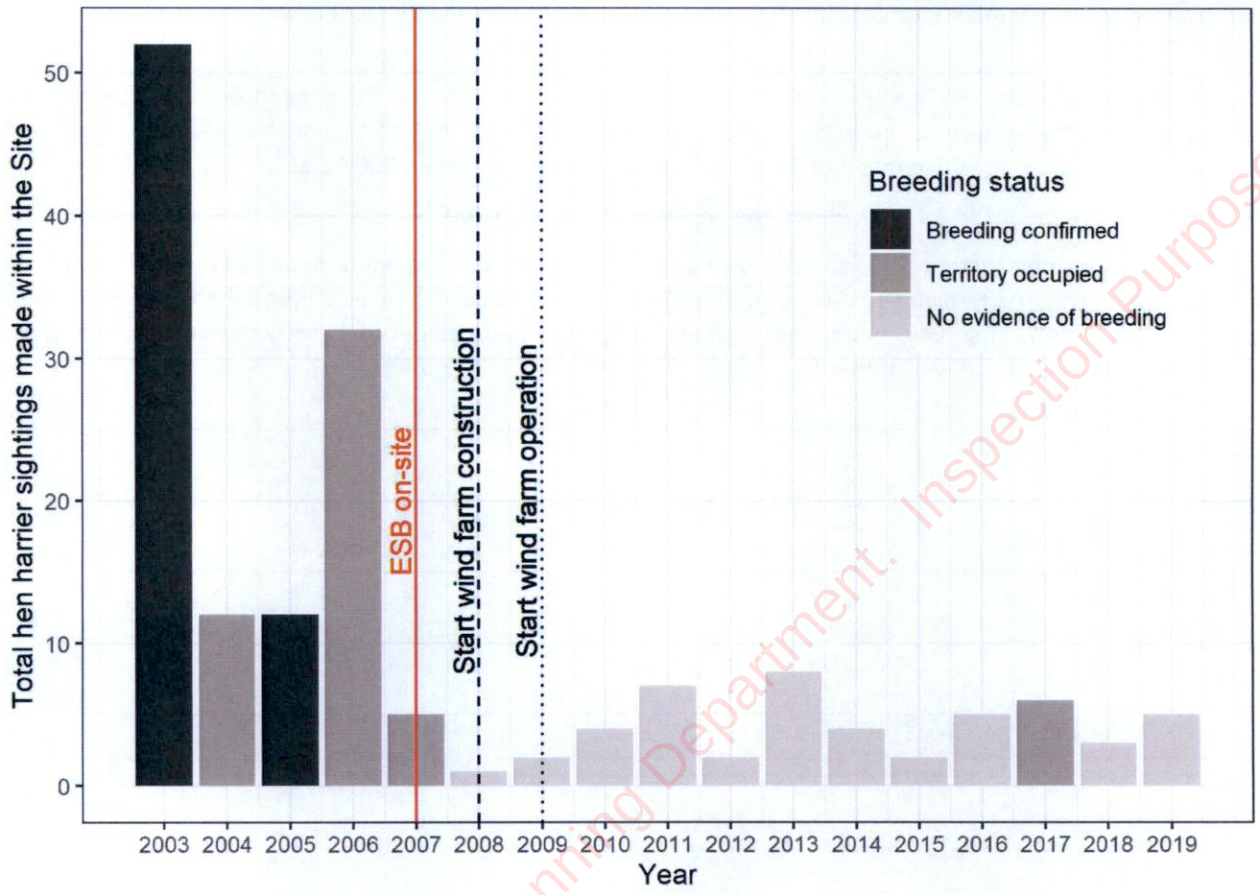
[26] Note the number of hen harrier sightings made at the Site prior to 2006 were supplied by a local ornithologist from his personal observations

[27] The information presented in the original reports was not always presented clearly, so the relevant information from the 2006-2007 and 2010-2011 reports could not be obtained. Consequently, a minimum figure has been presented.

Figure 1
Total hen harrier sightings made within the Site between 2003-2019



Merlin

No merlin were recorded during VP surveys between 2006-2019 and no there was no other conclusive evidence of merlin being present within the Site. The only reference to merlin within the monitoring reports is of a possible merlin 'kill' in February 2007, suspected to be a female blackbird *Turdus merula*.

3.2.2 Secondary Target Species

Secondary species recorded during VP surveys are summarised in Table 3-1 below. Nine species were recorded with kestrels recorded the most consistently throughout the survey period (in 9 out of 11 years where secondary species were recorded[28]) and the most frequently (73 flight lines over the total survey period).

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[28] Secondary species were not recorded in 2008-2010 inclusive.

Table 3-1
Secondary Species Summary Combined 2006 to 2019

Species	Number of years where species recorded	Combined number of flight lines recorded	Max number of birds recorded in any single sighting	Comments
Peregrine falcon	2	2	2	Recorded in 2012 and 2017
Short-eared owl	1	1	1	Recorded in 2011
Golden plover	1	1	15	Recorded in 2014
White-tailed eagle	1	3	1	Recorded in 2017
Curlew	1	1	1	Recorded in 2006
Kestrel	11	73	4	Recorded every year
Snipe	1	1	1	Recorded in 2006
Sparrowhawk	7	12	1	Recorded every year from 2012 onwards apart from 2016
Buzzard	4	7	2	First recorded in 2015, then 2017 onwards.

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3.3 Hinterland Surveys

The total number of occupied hen harrier territories recorded in the 5 km surrounding the wind farm is shown in Figure 2 below. The total number of hen harriers in this area recorded pre-2010 is likely to be an underestimate, and effective survey effort increased in 2010. The number of occupied territories within 5 km of the Site has remained roughly the same from 2010 to 2019 between a minimum of five and a maximum of seven territories recorded. This corresponds to a mean of 5.8 occupied hen harrier territories per year, with an average of 1.6 successful nests yielding 2.5 chicks.

This productivity rate compares favourably with the latest results for hen harrier surveys carried out for the Slievefelim to Silvermines SPA[29] by NPWS. The overall mean number of chicks fledged per confirmed pair is 0.5 ± 1 SD for the Slievefelim to Silvermines Mountains SPA[30], which is lower than the rates reported by the hinterland monitoring surveys.

[29] NPWS (2021). Conservation Objectives Supporting Document: Breeding Hen Harrier. Circulation Draft. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.
[30] Calculated based upon annual monitoring made between 2017 – 2020.

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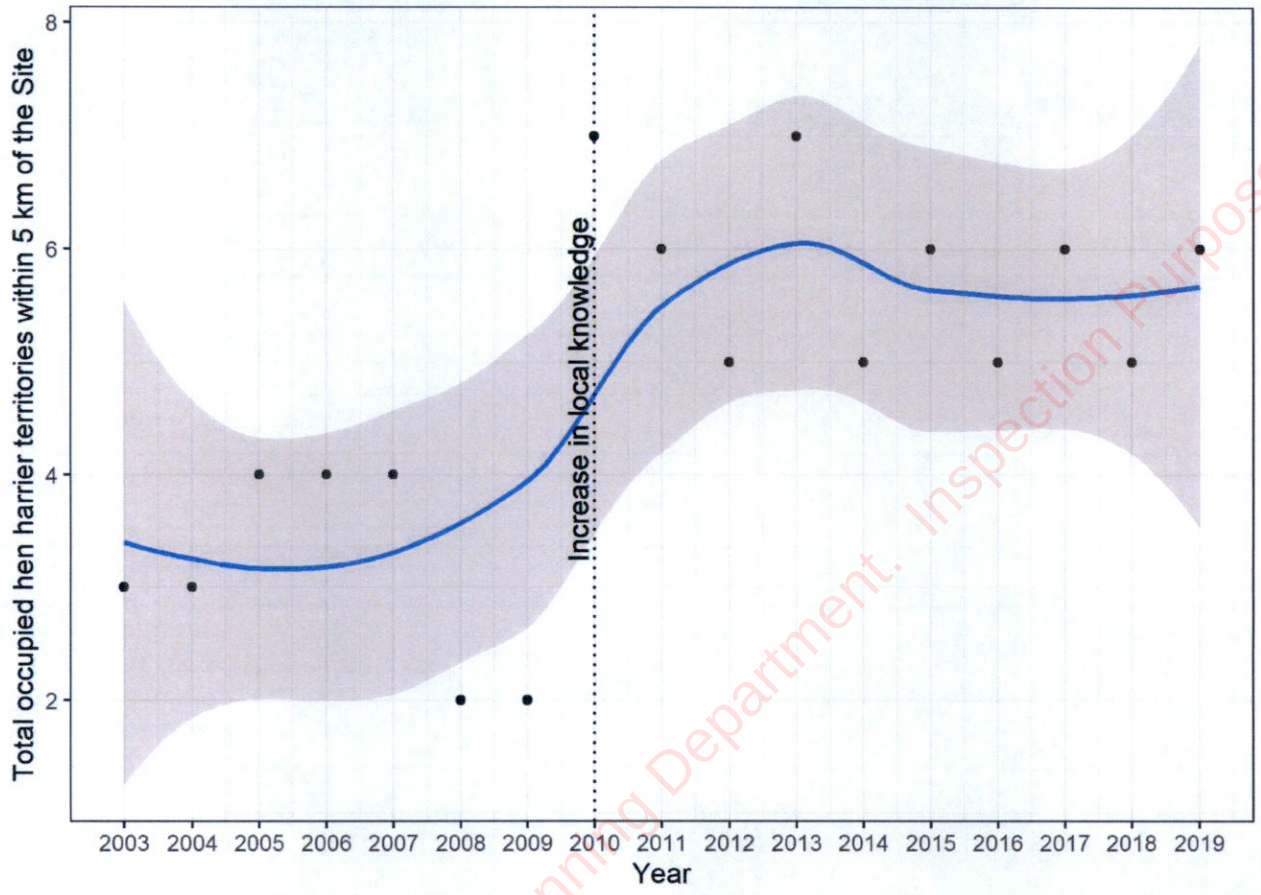
Figure 2
Total occupied hen harrier territories within 5 km of the Site between 2003-2019[31]



3.4 Red Grouse Surveys

Surveys showed that red grouse have been consistently recorded within the Site by dedicated surveys since 2007. Although they have not been sighted in every year (Figure 3), other signs of their presence were typically present. For example, pellets/latrines were recorded in 2007, 2015 and 2019. They were also recorded as incidental records during CBS surveys (see Section 3.5.1). The only years where no presence was detected at all was in 2011 and 2014.

It is likely that one to two pairs maintain a permanent presence within the Site. The only possible recorded breeding attempt recorded was made in 2017, but this was not confirmed.

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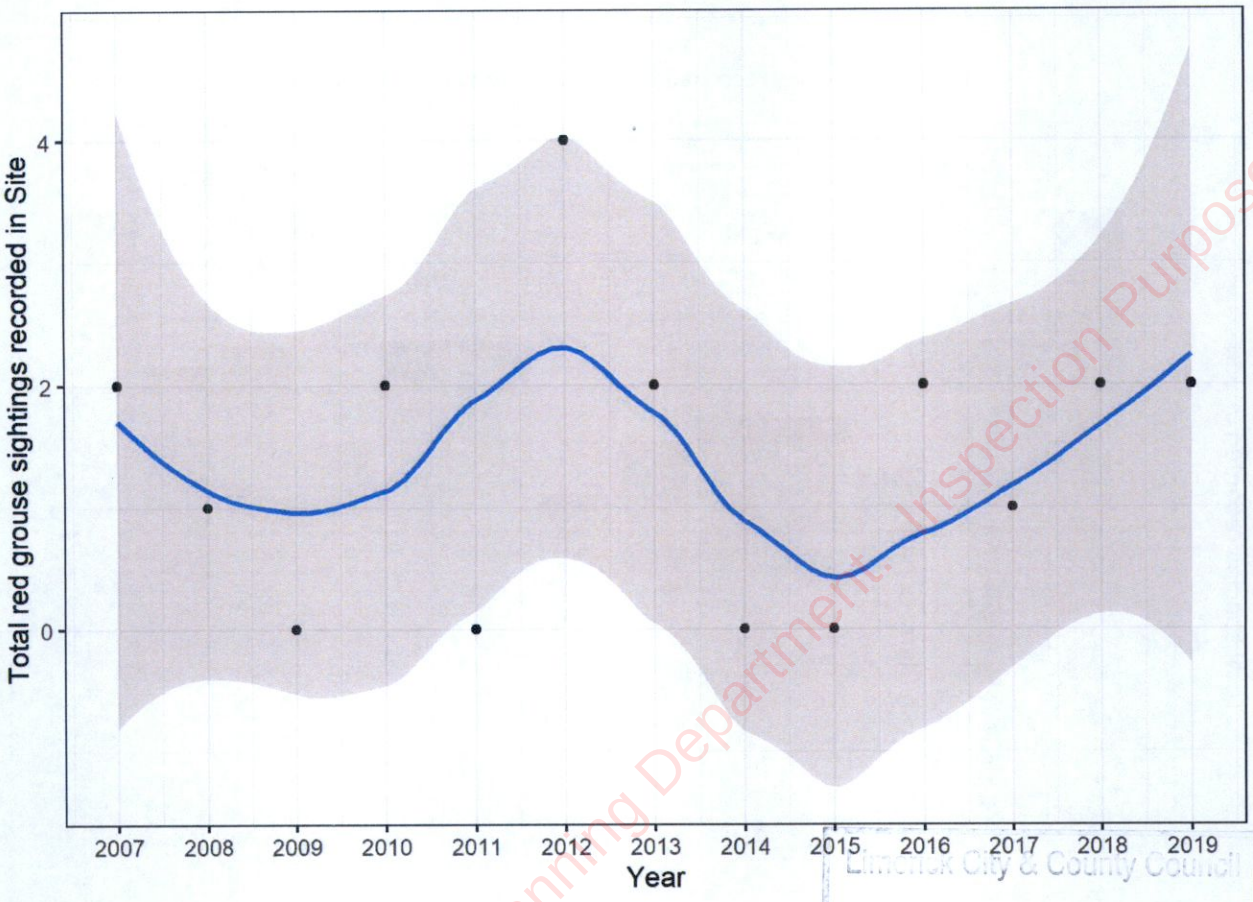
[31] A loess smoother has been fitted with grey shading representing 1 standard error (s.e.). Note that survey effort effectively increased in 2010 onwards, as more areas within the 5 km buffer were surveyed by other surveyors for different projects, resulting in a greater level of local knowledge.

Figure 3
Number of red grouse sightings recorded by red grouse survey between 2007 to 2019[32]



3.4.1 Incidental Records of Other Species

Snipe were recorded in 2007, 2010, 2015, 2018 and 2019 in low numbers, and a single golden plover was recorded in 2019.

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3.5 Countryside Bird Surveys

Between 2006 to 2019, 44 species of birds were recorded. Of these, one was listed under Annex I of the EU Birds Directives (hen harrier), three are currently red-listed on the current Birds of Conservation Concern in Ireland (BoCCI[33]) scheme (meadow pipit, red grouse and snipe) and ten are amber-listed on the same (willow warbler *Phylloscopus trochilus*, skylark, goldcrest *Regulus regulus*, hen harrier, linnet *Carduelis cannabina*, greenfinch *Carduelis chloris*, barn swallow *Hirundo rustica*, spotted flycatcher *Muscicapa striata*, starling *Sturnus vulgaris* and northern wheatear *Oenanthe oenanthe*). All other species are green-listed.

Over the 2006-2019[34] survey period, a mean of 21 species and 87 individual birds per year were recorded. Species richness was highest in the Site in 2008, as shown in Figure 4. Since 2009, species richness has stayed

[32] A loess smoother has been fitted with grey shading representing 1 standard error (s.e.).
[33] Gilbert, G., Stanbury, A. and Lewis, L. (2021). Birds of Conservation Concern in Ireland 4: 2020–2026. Irish Birds 43: 1–22
[34] Note that the survey in 2006 and 2007 was spread over the two years.

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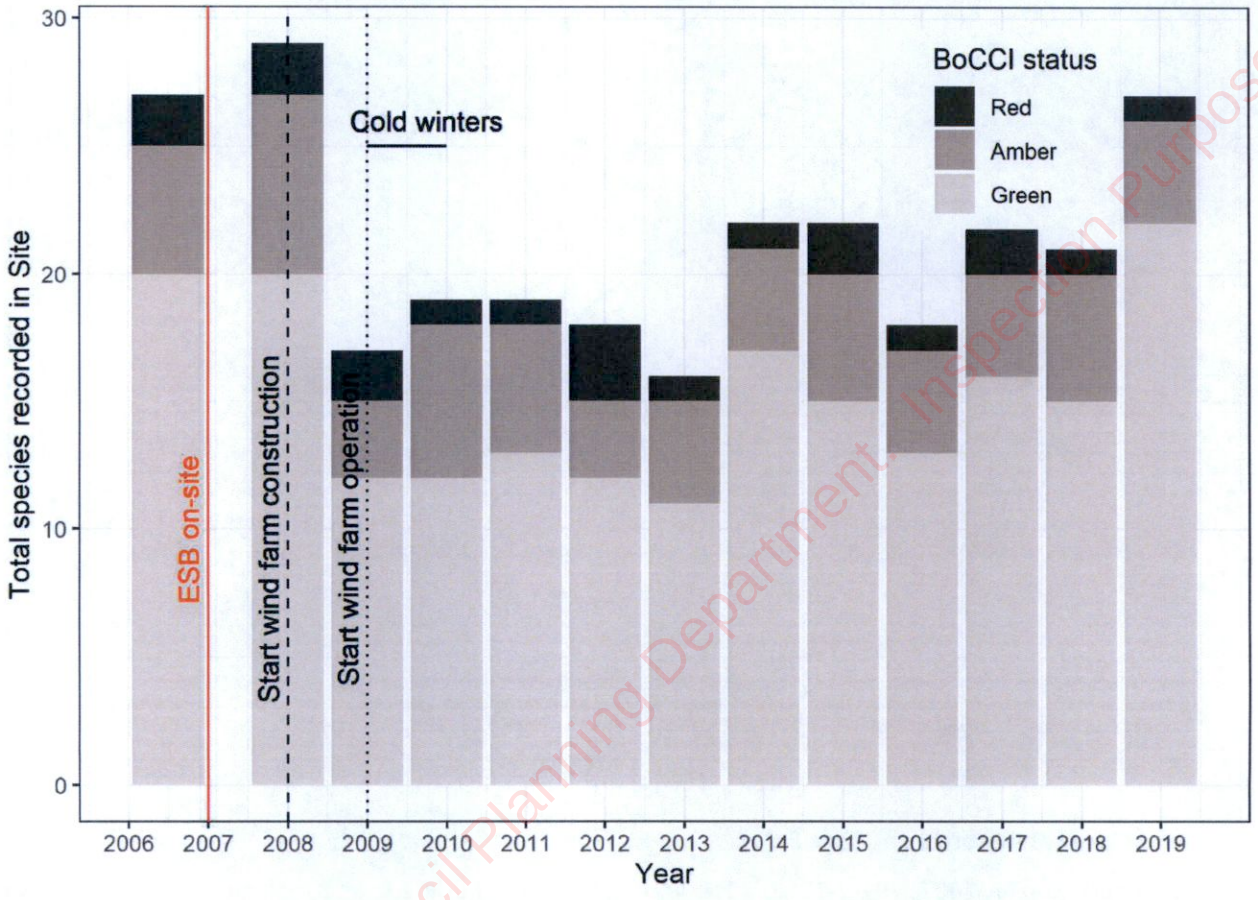
approximately the same, with an increase in species richness in 2019 comparable to 2008 levels. The composition of red-listed, amber-listed and green-listed species has stayed roughly the same.

Figure 4
Number of species recorded by CBS between 2006/7 to 2019[35]



The numbers of meadow pipit and skylark are shown in Figure 5 below. Meadow pipits are the most abundant of all passerines recorded within the Site. The number of meadow pipits was highest in 2011 at 49.5 birds (mean of the early and late survey periods) but has fluctuated up and down across the survey period. Since 2010, at least 30 meadow pipits have been recorded in the Site per year.

The number of skylarks was highest in 2008 at 32 birds (mean of the early and late survey periods) but numbers dropped in 2009 to below ten individuals per year and numbers remained relatively stable ever since.

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[35] Note that the CBS was spread over 2006 and 2007, so has been plotted in between those two years here.

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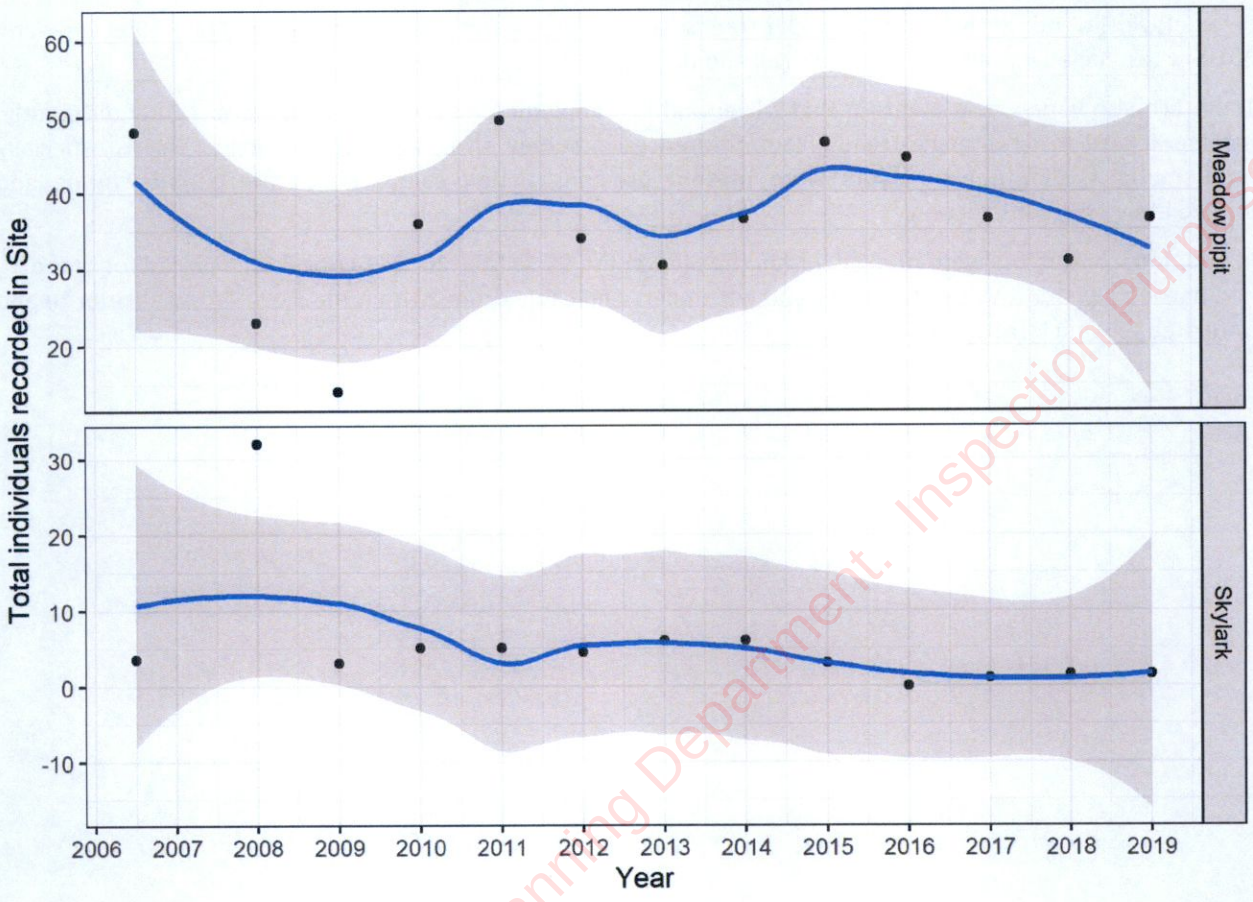
Figure 5
Number of hen harrier prey species recorded by CBS between 2006/7 to 2019[36]



3.5.1 Incidental Records of Other Species

Red grouse were recorded in 2007, 2008, 2009, 2012, 2015, 2017 and 2019.

3.6 Reported collisions

No dedicated surveys for fatalities were conducted. No fatalities as a result of turbine collision were reported during the course of other surveys.

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[36] A loess smoother has been fitted with grey shading representing 1 standard error (s.e.). Note that the CBS was spread over 2006 and 2007, so has been plotted in between those two years here. Numbers reported are the mean of the early and late season surveys.

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3.7 Additional information to aid interpretation of baseline results

The monitoring carried out lacked a Before-After-Control-Impact design, which makes it difficult to disentangle ornithological trends at the Site from wider trends, such as the exceptionally cold winter of late 2009 and early 2010, which negatively affected bird survival and therefore abundance across Ireland[37].

There are also various confounds in that Oliver and FTC implemented the suite of surveys slightly differently, making it hard to disentangle trends from differences in survey effort and methodology. This is especially problematic as different surveyors were present pre-construction compared to the periods during and immediately post-construction.

In addition, contractors were present within the Site on the 9th of May 2007 (a critical time period for breeding hen harriers) where they erected poles and left trailers and cable drums within the Site[4]. This was prior to and unrelated to wind farm construction.

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[37] Madden, B. & Lovatt, J. 2016. Recovery of breeding birds Skylark *Alauda arvensis*, Wren *Troglodytes troglodytes*, Stonechat *Saxicola torquatus* and Meadow Pipit *Anthus pratensis* after the extreme cold winters of 2009/10 and 2011/12 at Bellacorrick cutaway bog, County Mayo. Irish Birds 9. 505-507.

4.0 Summary and Conclusions

A range of ornithology surveys were carried out at Site between 2006 to 2019. These were:

- Flight activity (VP) surveys;
- Hinterland surveys for breeding hen harrier;
- Red grouse surveys; and
- Countryside Bird Surveys.

The following primary target species was recorded during flight activity surveys:

- Hen harrier

This species was recorded flying over the Site 86 times, although usage of the Site was confined to foraging with no confirmed breeding recorded between 2006 to 2019, but a territory was occupied in 2006, 2007 and 2017.

No merlin were recorded during any ornithological surveys carried out.

Other secondary species recorded included:

- Peregrine falcon
- Short-eared owl
- Golden plover
- White-tailed eagle
- Curlew
- Kestrel
- Snipe
- Buzzard
- Sparrowhawk

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Kestrel were the most frequently recorded secondary species, with regular flights recorded in the Site consistently across the entire survey period.

Hinterland surveys have consistently recorded between 5 to 7 occupied hen harrier territories per year in the 5 km surrounding the Site between 2010-2019 (when survey effort was comparable). The productivity rates (number of chicks fledged per confirmed nest) are slightly higher than those reported for the Slievefelim to Silvermines SPA.

Red grouse surveys have consistently recorded a few birds present at the Site since 2007. Numbers have remained roughly stable and no confirmed breeding attempts have been recorded.

The results from the CBS show that meadow pipits and skylark numbers have remained roughly stable at the Site, with the occasional fluctuations in numbers. Of the two, meadow pipits have remained more abundant and represent an important possible source of prey for foraging hen harriers.

Incidental records were made of other species of conservation concern including:

- Golden plover;
- Snipe; and
- Red grouse.

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While no dedicated fatality searches were conducted, there were no collisions reported during any of the other surveys.

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APPENDIX 01

Legal and Conservation Status of Target Species Recorded

Table A1-1 summarises the legal and conservation status of the primary and secondary target species recorded during the range of ornithological surveys mentioned previously.

Table A1-1
Legal and Conservation Status of Target Species

Species	Legal & Conservation Status in Ireland
Hen harrier	WA; BoCCI4 Amber
Peregrine falcon	WA; Annex 1; BoCCI4 Green
Short-eared owl	WA; Annex 1; BoCCI4 Amber
Golden plover	WA; Annex 1; BoCCI4 Red
White-tailed eagle	WA; Annex 1; BoCCI4 Red
Curlew	WA; BoCCI4 Red
Kestrel	WA; BoCCI4 Red
Red grouse	WA; BoCCI4 Red
Snipe	WA; BoCCI4 Red
Meadow pipit	WA; BoCCI4 Red
Skylark	WA; BoCCI4 Amber
Buzzard	WA; BoCCI4 Green
Sparrowhawk	WA; BoCCI4 Green
Key	**WA - the species is afforded general protection by the Wildlife Acts 2000 (as amended);** **Annex 1 – the species is listed in Annex 1 of the EC Birds Directive; and** **BoCCI4 status (green, amber or red) – indicates the current Birds of Conservation Concern in Ireland[4] status category.**

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Annex 5.2

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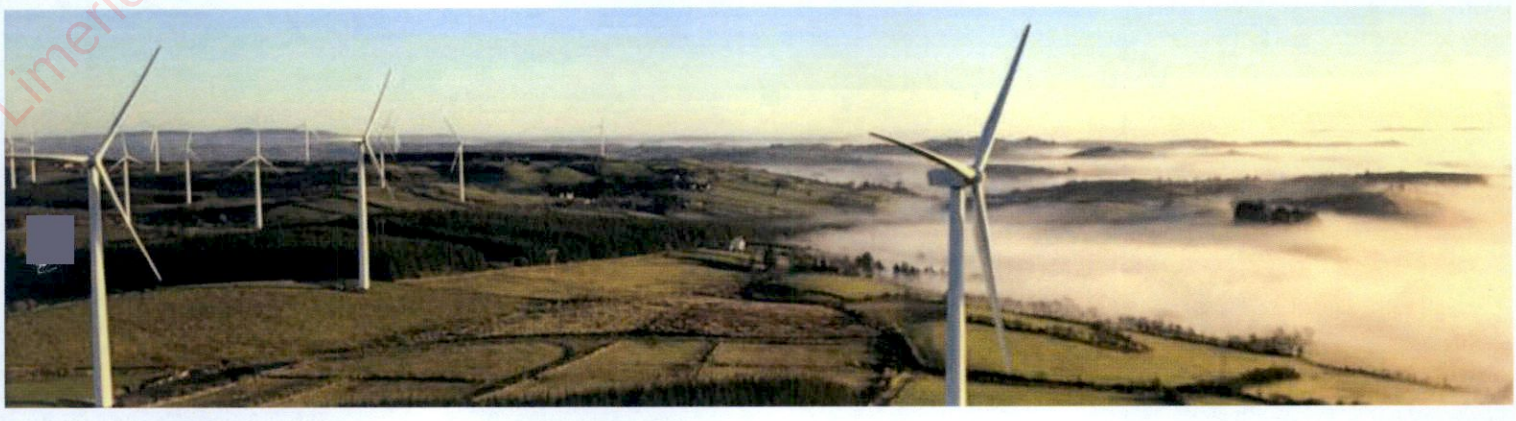

ANNEX 5.2

BAT SURVEY REPORT

Knockastanna Wind Farm

Prepared for: SSE Renewables Generation Ireland Limited

Limerick City & County Council

0 0 JUN 2022

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SLR Ref: 501.00482.00001
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SLR

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Appendix 1: Criteria for Assessing Habitat Risk for Bats

Appendix 2: Collision Risk, Relative Abundance and Overall Population Vulnerability of Bat Species in Scotland

Appendix 3: Summary of Ecobat Output for High Collision Risk Species

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1.0 Introduction

1.1 Background

SSE Renewables Generation Ireland Limited (the applicant) is applying to Limerick City and County Council (LCCC) for extended planning permission at the currently operational Knockastanna Wind Farm.

Planning permission **(An Bord Pleanála (hereafter referred to as 'ABP') reference PL 13.130938)** for the operational wind farm will cease in 2023 when decommissioning is due to commence. Additional planning permission is currently being sought to continue the operation of the wind farm for a further 15 years, extending the wind **farm's operational lifespa**n.

The applicant has appointed SLR Consulting Limited (SLR) to undertake a range of environmental studies on the site to inform a report (Environmental Impact Assessment (EIA)) for the proposed development. This report provides the results of surveys for bats, carried out between May and September 2021.

1.2 Site Description

The wind farm is located in a c.43.3 **ha parcel of land (the 'Site') in north**-east County Limerick; approximately 6 km north of the village of Doon, c. 10 km northeast of the village of Cappamore, and c. 29 km west of Limerick city. The Site is situated approximately 500 m from the administrative boundary between the local authorities of Limerick City & County Council and Tipperary County Council.

The wind farm comprises 4 no. wind turbines and all associated ancillary infrastructure including turbine foundations, crane hardstandings, access tracks, underground electricity cables and electrical switch room. The wind farm is connected to the national electricity grid, at Cappamore, via c. 11 km of overhead electricity line.

The turbines constructed have a maximum tip height of 99.95 m, a hub height of 64.7 m and a rotor diameter of 70.5 m.

The Site comprises a sloping area with wet heath and upland blanket bog habitats at its southern summit, grading into areas dominated by improved agricultural grassland and scrub habitats at its northern base. The Site rises from approximately 230 m ordnance datum (OD) in the north to 444 m OD in the south.

The Site and surrounding environment are typical of an upland landscape with extensive tracts of commercial forestry plantations dominating the surrounding undulating, landscape. Other agricultural activities in the wider environs of the Site tend to be extensive (but non-intensive) cattle and sheep enterprises.

Habitats pertaining to bats include hedgerows and treelines, which border the north and northwest of the Site, forest edges to the southeast and southwest of the Site (c.80 m and 140 m separation distance) and the Curraghafoil stream (EPA code 25Q05), which runs along the western boundary in the south of the Site.

1.3 Scope of study

The aims of the surveys were to:

- determine the bat assemblage using the site, the level of bat activity and its spatial and temporal distribution, identify any key commuting or foraging habitat features, and identify any roosts which could be affected by the proposals; and

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- provide baseline data to inform the wind farm design process, inform the Environmental Impact Assessment (EIA), and identify the need for any mitigation and compensation measures (if required).

The survey methodology was designed in accordance with current wind farm specific guidelines[1]. This methodology, while Scottish, has been adopted in Ireland as an industry standard.

This report presents the baseline findings of the bat surveys. The assessment of impacts resulting from the extended presence of the wind farm and the subsequent application of the mitigation hierarchy is beyond the scope of this report and is presented separately within Chapter 8 of the EIA Report.

1.4 Relevant Legislation

1.4.1 Irish Legislation

In the Republic of Ireland, under Schedule 5 of the Wildlife Acts 1976 to 2019, all bat species and their roosts are protected by law. It is an offence to disturb bats or their roosts without the appropriate licence (from the National Parks and Wildlife Service (NPWS)). This Act was further strengthened by the Wildlife Amendment Act, 2000.

1.4.2 E.U. Legislation

Under the EU Habitats Directive 1992 (EEC 92/43), member states of the European Union must identify habitats of national importance and priority species of flora and fauna. These habitats are designated as Special Areas of Conservation (SAC).

All species of bat in Ireland receive strict protection under the Habitats Directive. This prohibits deliberate disturbance of bat species (particularly during the periods of breeding, nursing, and hibernation), as well as the deterioration and/or destruction of roosts.

All bat species in Ireland receive strict protection under Annex IV of the Habitats Directive. Lesser horseshoe bat also receives additional protection under Annex II species (Priority Species). Annex II species require the designation of SACs specifically for their protection.

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1.4.3 International Legislation

Ireland has ratified two international wildlife laws pertaining to bats:

a) The Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention, 1982) – part of this convention stipulates that all bat species and their habitats are to be conserved.

b) The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention 1979, Enacted 1983). This was instigated to protect migrant species across all European boundaries.

[1] Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation. Available online at: https://www.nature.scot/sites/default/files/2019-01/Bats%20and%20onshore%20wind%20turbines%20-%20survey%2C%20assessment%20and%20mitigation.pdf [Last Accessed January 2022]

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1.5 Relevant Guidance Documents

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

- 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.
- 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
- National Roads Authority (2006) Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes
- Kelleher, C. & Marnell, F. (2006) Bat Mitigation Guidelines for Ireland. Irish Wildlife Manuals, No. 25. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

1.5.1 Relevant Wind Farm Guidance Documents

A number of guidance documents have been produced to date on the potential impact of wind turbines on bats. As such, this report draws from these in order to outline relevant recommendations and mitigation measures.

The following wind farm specific guidance documents were consulted:

- Bats and onshore wind turbines: Survey, Assessment and Mitigations. Nature Scot (formerly Scottish Natural Heritage 'SNH'). August 2021.
- UNEP/EUROBATS: Guideline for consideration of bats in wind farm projects, Publication Series No. 3.
- Natural England Technical Information Note TIN051: Bats and onshore wind turbines – Interim Report
- Guide to Turbines and Wind Farms. Bat Conservation Ireland 2012.
- Guidance on Bat Surveys, Assessment & Mitigation for Onshore Wind Turbine Developments. NIEA, Natural Environment Division, August 13th 2021.

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2.0 Methodology

2.1 Desk Study

A data search was conducted on 23/12/2021 to collate existing information from the footprint of the Site and surrounding area. Information on bat activity, roosts and features that may be used by bats for foraging, commuting, and/or roosting. The data search comprised the following information sources:

- Designated sites within a 15 km radius of the Site for which bats are a qualifying interest (https://www.npws.ie/protected-sites);
- Bat records within 10 km of the Site from Bat Conservation Ireland (BCI) (received on 23/02/2022);
- National Biodiversity Data Centre website was also used to search for records of bats within a 10 km grid square covering the Site and surrounding area (R85).
- Ordnance Survey Ireland (OSI) mapping and aerial photography of the Site and surrounds;
- Review of bat survey data from Ecological Impact Assessments from proposed and permitted developments within the wider environs of the Site.
- Records of lesser horseshoe bat within 10 km of the Site from the NPWS lesser horseshoe bat database (https://www.npws.ie);
- Records of caves within 10 km of the Site from the Cave Database for the Republic of Ireland, complied by Trinity College (http://www.ubss.org.uk/search_irishcaves.php);

2.1.1 Bat Landscapes

The bat landscape suitability (Lundy *et al.*, 2011) index spans from 0 to 100, with 0 indicating landscapes considered least favourable for bats and 100 indicating landscapes considered most favourable for bats, in terms of habitats present.

The degree of favourability ranges from 0 – 100, with 0 being least favourable and 100 most favourable for bats.

It is important to note that the model is only based on records held on the Bat Conservation Ireland database. As such, the index is high-level and should not be used in lieu of site surveys.

2.1.2 Designated Sites

A search was made for designated sites within 10 km of the Site boundary. These included SACs, and Natural Heritage Areas (NHAs), or Proposed Natural Heritage Areas (pNHAs).

NHAs are areas considered important for habitats, or for species whose habitat needs protection. Under the Wildlife Amendment Act (2000), NHAs are legally protected from damage. Not all pNHAs have been statutorily proposed or designated. However, these sites are of significance for wildlife and habitats. All pNHAs are subject to limited protection in the form of agri-environmental farm planning schemes, NPWS approval prior to afforestation grants on pNHA lands and recognition of ecological value of pNHAs by Planning and Licencing authorities. Both NHAs and pNHAs may be designated due to the presence of bats, and it is important to establish if there is potential for ecological/landscape connectivity between such sites and the proposed development site.

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2.2 Field Survey Methodology and Rationale

The field survey methodology was designed with reference to current bats and onshore wind turbines guidance. Where the methodology deviated from the guidelines, a rationale has been provided.

2.2.1 Survey Area

The survey area was designed to take into account the survey requirements set out in the current bats and onshore wind turbines guidance[2].

The static bat detector surveys sampled the four turbine locations. The survey area boundary and static detector locations are shown in **Figure 1**.

2.2.2 Activity Survey – Static Bat Detector Survey

Four static bat detectors (Anabat Swift full spectrum detectors) were deployed at the four turbine locations in spring (late May-early June), summer (late July – early August) and autumn (late August-early September) 2021, to record bat activity over a period of 15-20 nights per season. The dates of deployment are outlined in Table 2-2.

The locations of each static detector are shown in **Figure 1** and described in more detail in Table 2-1.

Detectors were deployed with microphones attached to wooden stakes approximately 1m above ground level (see Plate 1), facing approximately north with detectors programmed to record from half an hour before sunset until half an hour after sunrise on each night.

Table 2-1 Static Bat Detector Locations

Sample Point	Co-ordinates (Lat, Long)	Description
T2	52.66059723, -8.211051213	Rank acid grassland. Dominated by Juncus with heather sp., bog cotton, eared willow, cuckoo flower, bilberry.
T3	52.65913302, -8.208824977	Rank acid grassland. Dominated by Juncus with heather sp., bog cotton, eared willow, cuckoo flower, bilberry.
T4	52.65768828, -8.206641646	Rank acid grassland. Dominated by Juncus with heather sp., bog cotton, eared willow, cuckoo flower, bilberry.
T5	52.65623049, -8.204463665	Rank acid grassland. Dominated by Juncus with heather sp., bog cotton, eared willow, cuckoo flower, bilberry.

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[2] https://www.nature.scot/doc/bats-and-onshore-wind-turbines-survey-assessment-and-mitigation

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Plate 1 Example of static bat detector setup

Weather Data and Survey Dates

The Nature Scot (2021) guidelines[3] state that 10 nights of data per season should be collected, within appropriate weather conditions, specifically with a dusk temperature of 10°C or above, ground level wind speed of 5m/s or lower, and no rain or very light rain. These guidelines are for Scotland, and for Ireland guidelines BCI (2012)[4] state that dusk temperatures should be 7°C or above. The guidelines also state that surveys should aim for 10 consecutive nights, but in practice weather conditions may preclude this, particularly early or late in the year and in more northerly latitudes. The guidelines also go on to say that in practice, particularly in more northerly latitudes, there will be limitations on the number of suitable nights and some surveys may need to take place over longer periods which sample a range of conditions. In such cases, the survey period should be planned and justified by the ecologist and the effect on bat behaviours considered taking account of weather forecasts.

The deployment of detectors was targeted for periods where the weather forecast indicated the best possible chance for suitable weather conditions. The detectors were then deployed for a period of 15-20 nights during each season to maximise the chances of obtaining 10 nights of data during optimal weather conditions.

Temperature, rainfall and wind speed data was collected from a weather station (Davis Vantage Vue Wireless) installed at the site, which takes readings every 30 minutes.

The average nightly temperature used to assess the suitability of temperature and only those over 7°C are used in the analysis.

For wind, an average per night was determined. Since the duration of the night-time period varies over the course of the monitoring period, a simplifying protocol was applied to most efficiently undertake data analysis. This process, which is not considered likely to have significantly affected the results, involved assuming the same

[3] https://www.nature.scot/doc/bats-and-onshore-wind-turbines-survey-assessment-and-mitigation
[4] https://www.batconservationireland.org/wp-content/uploads/2013/09/BCIreland-Wind-Farm-Turbine-Survey-Guidelines-Version-2-8.pdf

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sunset and sunrise time for each day in each deployment, with the longest possible night-time period within each month used in the analysis, with an additional 30 minutes added prior to sunset and after sunrise to account for periods of twilight. This period was then used to work out the average nightly wind speed. If the average was less than 5m/s the night was considered suitable for use in analysis.

For the purposes of this assessment, light rain has been classified as total nightly rainfall less than 2mm and/or less than 1mm of rainfall in any one-hour period throughout the night. The same protocol for determining night length across deployments was used as described above.

As the weather station failed to make any readings in Spring, a precautionary approach has been taken, such that all the successful recording nights will be used for the analysis. Although the detectors were deployed for 15 nights each in spring, bad weather meant bat activity was absent from 20th – 22nd. A total of 12 nights for spring were used in the analysis. 15 nights were analysed for summer and autumn, all passing the weather requirements set out in the guidelines.

The dates used in the analysis, along with details of the weather conditions on those dates, are detailed in Table 2-2.

Table 2-2 Survey Dates and Weather Conditions

Survey Nights Used for Analysis	Sunset - Sunrise	*Temperature at Sunset °C	Nightly Average Wind Speed (m/s)	*Total Rainfall (mm)
Spring session - deployment dates: 18th May – 1st June 2021 Sample locations: T2, T3, T4, T5, (4 sample points)				
18th May 2021	21:29 – 05:31	10	2.2	0.300
19th May 2021	21:31 – 05:30	12	2.5	6.400
23rd May 2021	21:37 – 05:25	8	2.2	2.2
24th May 2021	21:38 – 05:23	11	5.0	1.4
25th May 2021	21:39 – 05:22	11	2.4	1.9
26th May 2021	21:41 – 05:21	14	3.3	0.3
27th May 2021	21:42 – 05:20	11	2.6	8.9
29th May 2021	21:45 – 05:18	13	1.2	0
30th May 2021	21:46 – 05:17	17	3.0	0

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Survey Nights Used for Analysis	Sunset - Sunrise	*Temperature at Sunset °C	Nightly Average Wind Speed (m/s)	*Total Rainfall (mm)
31st May 2021	21:47 – 05:16	14	4.0	0
1st June 2021	21:48 – 05:16	12	4.0	0.2
Summer session - deployment dates: 16th July – 30th July 2021 Sample locations: T2, T3, T4, T5 (4 sample points)				
16th July 2021	21:49 – 05:31	19.7	0.89	Nil
17th July 2021	21:48 – 05:33	20.6	0.54	Nil
18th July 2021	21:47 – 05:34	20.9	0.97	Nil
19th July 2021	21:46 - 05:35	20.6	0.73	Nil
20th July 2021	21:44 - 05:37	21.4	0.93	Nil
21st July 2021	21:43 - 05:38	21.0	1.98	Nil
22nd July 2021	21:42 - 05:40	21.4	1.88	Nil
23rd July 2021	21:40 - 05:41	18.5	1.57	Nil
24th July 2021	21:39 - 05:43	17.3	1.56	Nil
25th July 2021	21:37 - 05:44	19.8	0.56	Nil
26th July 2021	21:36 - 05:46	15.2	0.77	1.2
27th July 2021	21:34 - 05:47	12.8	2.37	2
28th July 2021	21:33 - 05:49	11.3	2.25	Nil
29th July 2021	21:31 - 05:50	11.7	2.97	1
30th July 2021	21:30 - 05:52	12.2	1.82	0.6

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Survey Nights Used for Analysis	Sunset - Sunrise	*Temperature at Sunset °C	Nightly Average Wind Speed (m/s)	*Total Rainfall (mm)
Autumn session - deployment dates: 31st August – 19th September 2021 Sample locations: T2, T3, T4, T5 (4 sample points)				
31st August 2021	20:24 – 06:45	11.4	1.35	Nil
1st September 2021	20:22 – 06:47	13.1	1.52	Nil
2nd September 2021	20:20 – 06:48	12.7	0.98	Nil
3rd September 2021	20:17 - 06:50	13.3	0.91	Nil
4th September 2021	20:15 - 06:52	14.4	2.18	Nil
5th September 2021	20:13 – 06:53	15.3	2.66	Nil
6th September 2021	20:10 – 06:55	18.6	1.26	Nil
7th September 2021	20:08 – 06:57	20.3	2.03	0.4
10th September 2021	20:01 - 07:02	13.3	2.18	1.0
11th September 2021	19:58 – 07:03	11.9	0.96	Nil
12th September 2021	19:56 – 07:05	11.8	2.28	Nil
13th September 2021	19:54 – 07:07	14.2	2.12	0.4
15th	19:49 –	11.9	1.12	Nil

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Survey Nights Used for Analysis	Sunset - Sunrise	*Temperature at Sunset °C	Nightly Average Wind Speed (m/s)	*Total Rainfall (mm)
September 2021	07:10			
17th September 2021	19:44 – 07:13	13.3	0.38	Nil
19th September 2021	19:39 – 07:17	11.3	1.33	0.4

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2.3 Bat Sonogram Analysis

Bat calls were analysed in full spectrum format using Kaleidoscope Pro (version 5.1.3) software. An auto identification filter within Kaleidoscope Pro was used initially to assign calls to likely species, using a Bats of Europe filter (version 5.1.0). It should be noted that Kaleidoscope Pro filters only give an estimate of the bat activity in a dataset. Faint or poor-quality bat sonograms can occasionally be missed if they are rejected by the noise filter. However, this is considered unlikely to affect the results significantly. Kaleidoscope Pro will also only attribute one species label to a sound file, even if more than one bat species was present. All files were manually checked to confirm identification, using call parameters within Russ (2012)5. Where multiple species were recorded in one file these were detected manually and were separately labelled so that they could be counted as separate bat passes for each species recorded. Files assigned by the filter as being Noise were also checked manually, to ensure no faint calls were missed.

For the comparison of results a quantity called a "bat pass" has been created. For data analysis purposes, the term bat pass has been used. A bat pass is a series of two or more calls which can be attributed to a bat species, and **represents a single bat flying towards, and away from the detector's microphone. In some instances, a bat pass is** a clear series of up to 40 calls, while for others, just two bat calls may be registered. Each is logged as a single bat pass (of the microphone). This is why the bat pass count can be used as a general measure of bat activity, but not an indicator of bat numbers; the bat pass count would be the same if 100 bats flew past the microphone once in one night or one bat flew past the microphone 100 times in one night.

Although Kaleidoscope Bats of Europe 5.1.0 attempts to filter bat data for Myotis species, for the purposes of this report, data have been collectively assigned to the Myotis genus. This is because, for this report, the focus is high risk species. All of the Myotis species which occur in the study area are considered to be at low risk of impacts from wind turbines according to Nature Scot et al. (2021) guidelines, therefore speciation was not considered necessary here.

2.4 Survey Personnel

Owen Twomey undertook the habitat assessment for bat roosting potential and deployed the static detectors at the start of the spring monitoring period. Static detectors were subsequently collected and re-deployed by Aisling

[5] Russ, J. (2012) British Bat calls. A Guide to Species Identification. Pelagic Publishing, Exeter.

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Kinsella BSc (Hons) MSc.

Owen Twomey BSc (Hons) PgDip - Owen is Senior Field Ecologist with SLR. Owen holds a BSc (Hons) Environmental Science with a major in Zoology and a Postgraduate Diploma (PgDip) in Ecological Assessment from University College Cork. **Owen has worked in ecological consultancy since 2016. Owen's specialist areas are in Geographical** Information Systems (GIS), habitat survey, mapping and classification. Owen also has an excellent understanding and experience in mammal survey and invasive species survey. Owen has prepared ecological reports for a wide range of diverse projects during his career.

Aisling Kinsella BSc (Hons) MSc - Aisling is a Senior Field Ecologist with SLR and has worked in ecological consultancy since 2020. Aisling holds a BSc (Hons) in Environmental Science with a major in Zoology from University College Cork and an MSc in Wildlife Management and Conservation from University College Dublin. Her experience to date has included ECoW on a range of infrastructure developments, habitat assessments, mammal, bird and bat surveys. Aisling has helped prepare EIAR Biodiversity chapters and AA screening reports for a range of different projects as well as bird survey reports for onshore wind developments.

Emma Clarke wrote the report. Emma is an ecologist with 2-3 years of experience working within Ecological Consultancy. She has worked on a wide range of projects, from housing developments to mineral extraction sites, wind farms and linear infrastructure projects. She has experience of field surveys in relation to bats, great crested newts, reptiles, badgers, dormice, otters, and water vole. She also carries out habitat surveys (Phase 1 and UK Hab), and scoping surveys for protected species. Emma preforms data analysis, desk studies and writes reports including PEAs and contributes towards EcIAs. Specialist surveys Emma can complete include tree climbing roost inspections. Emma has also preformed monitoring in relation to mitigation for bats, GCN and badger. She has carried out Ecological Clerk of Works duties on several projects, ensuring that method of works are undertaken correctly. Emma is a member of her local Amphibian and Reptile Group and volunteers when possible.

This report was reviewed by Nicola Faulks. Nicola has over 16 years of experience in the environmental sector as an ecological consultant. Undertaking baseline surveys, collation of data and assessment of potential impacts due to development and post construction monitoring. She has worked on a diverse range of projects including ecological impact assessments both in the UK and abroad, including Bosnia, Croatia, Guinea, Sri Lanka and Georgia. **Nicola's proven skills include Ecological Due Diligence reviews** and advice; planning, undertaking and supervision of ecological baseline surveys, preparation of EcIAs; writing, agreeing and overseeing the implementation of HMPs and ongoing monitoring during construction and operation. Sectors of experience include power production (wind and hydro) and transmission line; residential; and conservation (marine and terrestrial).

2.5 Ecobat - Assessment of Relative Bat Activity Levels

In accordance with current guidelines, the relative level of bat activity recorded during the static detector surveys was analysed through the use of the secure online tool *Ecobat*[6], initially designed by the University of Exeter and now hosted and developed by the Mammal Society[7]. *Ecobat* compares data entered by the user with bat survey information collected from similar areas at the same time of year and (where possible) in comparable weather conditions. *Ecobat* generates a percentile rank for each night of activity and provides a numerical way of interpreting the relative levels of bat activity recorded at a site with other sites across the same regions or across Ireland as a whole.

[6] http://www.mammal.org.uk/science-research/ecostat/

[7] Lintott, P. R., Davison, S., Breda, J., Kubasiewicz, L., Dowse, D., Daisley, J. & Mathews, F. (2018). Ecobat: An online resou rce to facilitate transparent, evidence-based interpretation of bat activity data. *Ecology and Evolution* 8(2): 935-941.

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The static bat detector survey data was entered into the *Ecobat* tool and relative levels of activity were determined by comparison with a reference data set including records from within 30 days of each survey date and within 100km of the survey location. The dataset was compared against 3,895 records.

Only bat presence data is captured by *Ecobat*. The tool does not capture nights or sample points where no bat activity is recorded, such that the output statistics and percentiles relate only to those nights where bats were recorded.

For each night where bat activity was recorded, *Ecobat* reports the percentile (and associated confidence limits) of the night of data against the reference range. For example, data reported as being within the 80th percentile means that 80% of the nights within the reference range have less than or equal to the number of bat passes than the night being analysed.

The guidelines[8] define bat activity levels on a particular night as:

- 0 - 20th percentile – low;
- 21st - 40th percentile – low to moderate;
- 41st – 60th percentile – moderate;
- 61st – 80th percentile – moderate to high; and
- 81st – 100th percentile – high.

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2.6 Survey Limitations

2.6.1 Failed Recordings

Table 2-3 gives details of the failed recordings throughout the survey period.

Table 2-3 - Failed Recordings

Detector location	Failed Dates	Fault
T2	20th – 23rd May (Spring)	Poor weather
T3	19th May – 1st June (Spring)	Cattle tampering with equipment – noise files 19th to 21st and none afterwards
T4	20th – 22nd May (Spring)	Poor weather
T4	19th September (Autumn)	Electronic fault – problem with detector booting up
T5	20th – 24th May (Spring)	Poor weather

During the spring deployment, T3 only recorded for 4 nights from the 18th to 21st May. The surveyor collecting the detector notes that the microphone was lying in vegetation when collected, knocked over possibly by cattle or

[8] https://www.nature.scot/doc/bats-and-onshore-wind-turbines-survey-assessment-and-mitigation

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goats. Due to the significant amount of noise recorded with a lack of bats (one **Nathusius'** pipistrelle is recorded on the 18th), it is thought that the detector was tampered with very early on and therefore the data is not representative of the bat activity levels for the four nights it did record. Only the first night has been used in the analysis, due to the amount of data collected overall for the site this is not thought to significantly affect the results of the survey. 3 out of four detector locations did work and they were all situated in similar habitat types and, thus, are representative of the overall activity across the site.

During the spring deployment, detectors at T2, T4, and T5 experienced a period following the 20th whereby only noise files were picked up and no bats recorded. Weather data collect from a nearby station shows constant rain throughout this night. Heavy rainfall and wind makes navigation and foraging difficult and, thus, bats may forage closer to roosts on those nights. No roosts were recorded on or near the site and, thus, bat activity on these nights was low or absent. These nights will be excluded from the analysis.

At T4 during the autumn deployment the detector did not record on the 19th, this was due to a fault with the detector booting up/ an electronic fault. Only one night of data was missed and it this will not significantly affect the outcomes of this report.

The guidelines[1] specify the spring season as April and May. The detectors were left out for 15 nights at the end of May (as conditions earlier in the season were too cold). To capture sufficient nights that met the appropriate weather conditions criteria, the spring sample was extended into the beginning of June. This survey window is considered appropriate for the geographical location and climate.

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3.0 Results

3.1 Desk Study

A search on the National Biodiversity Data Centre's (NBDC) website, of the 10 km grid square which covers the Site (R85) found two records of bats:

Table 3-1 Records of bat species within 10km (NBDC, 2021)

Species	Date of Record	Location in relation to Site
Daubenton's bat (*Myotis daubentonii*)	20th August 2014	5.2 km southwest of the Site
Soprano pipistrelle (*Pipistrellus pygmaeus*)	23rd September 2008	1.4 km southeast of the Site

Data was received from Bat Conservation Ireland on 23/02/2022. The results of this are presented in Table 3-2 below.

Table 3-2 Records of bat species within 10km (Bat Conservation Ireland, 2022)

X (ITM)	Y (ITM)	Species	Distance from Nearest Turbine (km)
Roosts			
578952	649032	*Pipistrellus pygmaeus*	10.14km
576952	655032	Unidentified bat	8.94km
576952	654032	Unidentified bat	9.13km
Transects			
581552	651832	Unidentified bat, *Myotis daubentonii*	6.82km
579652	651532	*Myotis daubentonii*, Unidentified bat	7.92km
577952	650532	*Myotis daubentonii*, Unidentified bat	9.90km
Ad-Hoc Observations			
578657	678734	*Pipistrellus pygmaeus*	23.26km
577659	647843	*Pipistrellus pygmaeus*, *Pipistrellus pipistrellus* (45kHz), *Myotis daubentonii*	11.98km
587030	654903	*Pipistrellus pygmaeus*	1.41km

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X (ITM)	Y (ITM)	Species	Distance from Nearest Turbine (km)
577495	651505	*Pipistrellus pipistrellus* (45kHz), *Nyctalus leisleri*, *Myotis daubentonii*, *Myotis* spp.	*9.79km*
580052	664511	*Pipistrellus pygmaeus*, *Nyctalus leisleri*, *Myotis mystacinus/brandtii*, *Pipistrellus pipistrellus* (45kHz)	*9.89km*
577906	650643	*Pipistrellus pipistrellus* (45kHz), *Pipistrellus pygmaeus*, *Pipistrellus* spp. (45kHz/55kHz), *Nyctalus leisleri*, Myotis spp.	*9.85km*
592451	653532	*Pipistrellus pipistrellus* (45kHz), *Pipistrellus pygmaeus*, *Nyctalus leisleri*	*6.80km*
590179	664826	*Pipistrellus pipistrellus* (45kHz)	*9.34km*
577906	650643	*Nyctalus leisleri*	*9.85km*
577452	651432	*Pipistrellus pygmaeus*, *Myotis daubentonii*, Unidentified bat	*9.79km*
579752	651632	*Pipistrellus pipistrellus* (45kHz), *Myotis daubentonii*, *Pipistrellus* spp. (45kHz/55kHz), Unidentified bat	*7.84km*
592390	653510	*Pipistrellus pipistrellus* (45kHz), *Pipistrellus pygmaeus*	*6.77km*
594267	658338	*Pipistrellus pipistrellus* (45kHz), *Nyctalus leisleri*	*8.39km*
594597	662928	*Pipistrellus pipistrellus* (45kHz), *Pipistrellus pygmaeus*, Unidentified bat	*10.73km*
579652	649532	*Pipistrellus pipistrellus* (45kHz), *Nyctalus leisleri*	*9.27km*

Of the three roost records yielded, the closest is 8.94km west of the nearest turbine (T2). This is outside of the core sustenance zone (CSZ) of bat species in Ireland. As such, no impact on this roost is envisaged.

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3.2 Automated Bat Activity Survey

3.2.1 All Species Summary

Five species and one species group were recorded:

- *Pipistrellus pipistrellus* - Common pipistrelle;
- *Pipistrellus pygmaeus* – Soprano pipistrelle;
- *Pipistrellus nathusii* – **Nathusius' pipistrelle;**
- *Nyctalus leisleri* – **Leisler's bat;**
- *Plecotus auritus* – Brown long-eared bat; and
- *Myotis spp* – Bat of the *Myotis* genus.

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Spatial Distribution

Table 3-3 reports the maximum, median and mean bat passes per night at each location, for all species combined, across all seasons combined. It shows that:

A total of 3,895 bat passes were recorded by the four static bat detectors over the full monitoring period during spring, summer and autumn 2021. Detector location T5 recorded the highest level of activity with a mean of approximately 15 bat passes per night of recording, showing that there was the most constantly high level of activity in this area. The lowest mean passes per night were recorded at T2 and T4 (both 7 passes per night). T3 has the second highest mean bat passes per night (11 passes per night). The highest number of bat passes recorded at any one location on one night was 304 (at location T5, on 17th July 2021).

Table 3-3 Summary of Results per Sample Location Across All Seasons

Detector Ref.	Survey Nights Included Within Analysis	Total Bat Passes: All Species	Maximum Bat Activity (Bat Passes per Night)[a]	Median Bat Passes per Night	Mean Bat Passes per Night
T2	40	816	54	4	7
T3	29	1154	159	3	11
T4	33	649	70	3	7
T5	31	1276	304	2	15

a = highest number of bat passes recorded on any one night.

Temporal Distribution

A summary of the results per survey season is provided in Table 3-4, to illustrate any seasonal variation.

Bat activity was highest in summer, with mean passes per night at 15 and with a median of 4. The lowest level of activity was in spring, with a mean of 3 calls per night, and a median of 1. Autumn had mean passes per night at 5 and with a median of 3.

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Table 3-4 Summary of Results per Season Across All Sample Locations

Season	Survey Nights Included Within Analysis	Total Bat Passes: All Species	Maximum Bat Activity (Bat Passes per Night)[a]	Median Bat Passes per Night	Mean Bat Passes per Night
Spring	11	111	15	1	3
Summer	16	2899	304	4	15
Autumn	16	883	54	3	5

a = highest number of bat passes recorded on any one night.

3.2.2 Activity Surveys – Static Bat Detector Survey – High Collision Risk Species

High collision risk species in Ireland, as adapted from current guidelines are:

- Common pipistrelle
- Soprano pipistrelle
- **Nathusius'** pipistrelle
- **Leisler's bat**

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All four high collision-risk species were recorded at the site. Below each species recorded throughout the automated bat activity survey has been further analysed with reference to their spatial and temporal distributions.

Common Pipistrelle (High Collision Risk Species)

Spatial distribution

A summary of the common pipistrelle activity results per sample location is provided in Table 3-5 to illustrate any spatial variation within the Site. It reports the maximum, median and mean bat passes per night at each location, for common pipistrelles, across all seasons combined.

- A total of 1455 common pipistrelle passes were recorded at all locations over the monitoring period.
- Most common pipistrelle activity (based on the mean and median) was recorded at location T3.
- The lowest level of activity was recorded at location T4 (based on the mean and median).
- The highest number of common pipistrelle passes in one night was also recorded at T3 with 159 passes recorded on the 20th July 2021. The detector at location T5 also records its highest number of common pipistrelle passes during the monitoring period on the 20th of July 2021, logging 129 passes.
- Most variable activity (based on a large difference between mean and median) was recorded at sample location T5.

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Table 3-5 Common Pipistrelle Passes per Sample Location Across All Seasons

Detector Ref.	Survey Nights Included Within Analysis	Total Bat Passes: Common Pipistrelle	Maximum Bat Activity (Bat Passes per Night)[a]	Median Bat Passes per Night	Mean Bat Passes per Night
T2	30	300	54	9	10
T3	25	534	159	13	21
T4	20	194	70	5	10
T5	19	427	129	4	22
a = highest number of bat passes recorded on any one night.					

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Temporal distribution

A summary of the common pipistrelle activity results per survey season is provided in Table 3-6. Table 3-6 reports the maximum, median and mean bat passes per night at all locations, for common pipistrelles, for each survey season. It shows that:

- Common pipistrelle activity was recorded at all detector locations and during all three survey seasons.
- The highest activity was during summer (based on mean and median).
- Lowest level of common pipistrelle activity was during spring (based on mean and median).
- Most variable common pipistrelle activity (based on a large difference between mean and median) was recorded during summer.

Table 3-6 Summary of Common Pipistrelle Activity Results per Season Across All Sample Locations

Season	Maximum Bat Activity (Bat Passes per Night)[a]	Median Bat Passes per Night	Mean Bat Passes per Night
Spring	10	2	3
Summer	159	13	24
Autumn	54	6	9

3.2.3 Soprano Pipistrelle (High Collision Risk Species)

Spatial distribution

A summary of the soprano pipistrelle activity results per sample location is provided in Table 3-7 to illustrate any spatial variation within the Site. It reports the maximum, median and mean bat passes per night at each location, for common pipistrelles, across all seasons combined.

- A total of 1116 soprano pipistrelle passes were recorded at all locations over the monitoring period.
- Most soprano pipistrelle activity (based on the mean and median) was recorded at location T5.
- Least activity was recorded at location T4 (based on the mean and median).

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- The highest number of soprano pipistrelle passes in one night was also recorded at T5 with 304 passes recorded on the 17th July 2021.
- Most variable activity (based on a large difference between mean and median) was recorded at sample location T5.

Table 3-7 Soprano Pipistrelle Passes per Sample Location Across All Seasons

Detector Ref.	Survey Nights Included Within Analysis	Total Bat Passes: Soprano Pipistrelle	Maximum Bat Activity (Bat Passes per Night)[a]	Median Bat Passes per Night	Mean Bat Passes per Night
T2	30	247	44	6	8
T3	24	227	73	4	9
T4	19	106	31	4	6
T5	18	536	304	3	30

a = highest number of bat passes recorded on any one night.

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Temporal distribution

A summary of the soprano pipistrelle activity results per survey season is provided in Table 3-8. Table 3-8 reports the maximum, median and mean bat passes per night at all locations, for common pipistrelles, for each survey season. It shows that:

- Soprano pipistrelle activity was recorded at all detector locations and during all three survey seasons.
- The highest activity was during summer (based on mean and median).
- Lowest soprano pipistrelle activity was during spring (based on mean and median).
- Most variable soprano pipistrelle activity (based on a large difference between mean and median) was recorded during summer.

Table 3-8 Summary of Soprano Pipistrelle Activity Results per Season Across All Sample Locations

Season	Maximum Bat Activity (Bat Passes per Night)	Median Bat Passes per Night	Mean Bat Passes per Night
Spring	1	1	1
Summer	304	6	20
Autumn	17	3	4

3.2.4 Nathusius' Pipistrelle (High Collision Risk Species)

Spatial distribution

A summary of the **Nathusius'** pipistrelle activity results per sample location is provided in Table 3-9 to illustrate any spatial variation within the Site. It reports the maximum, median and mean bat passes per night at each

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location, for common pipistrelles, across all seasons combined.

- A total of 111 **Nathusius' pipistrelle** passes were recorded at all locations over the monitoring period.
- Most **Nathusius' pipistrelle** activity (based on the mean and median) was recorded at location T5.
- Least activity was recorded at location T2 (based on the mean and median).
- The highest number of **Nathusius' pipistrelle** passes in one night was also recorded at T4 with 17 passes recorded on the 20th July 2021.
- Most variable activity (based on a large difference between mean and median) was recorded at sample locations T4 and T5.

Table 3-9 Nathusius' Pipistrelle Passes per Sample Location Across All Seasons

Detector Ref.	Survey Nights Included Within Analysis	Total Bat Passes: Nathusius' Pipistrelle	Maximum Bat Activity (Bat Passes per Night)[a]	Median Bat Passes per Night	Mean Bat Passes per Night
T2	8	12	3	1	2
T3	10	30	10	2	3
T4	12	35	17	1	3
T5	7	34	13	3	5

a = highest number of bat passes recorded on any one night.

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Temporal distribution

A summary of the **Nathusius'** pipistrelle activity results per survey season is provided in Table 3-10. Table 3-10 reports the maximum, median and mean bat passes per night at all locations, for **Nathusius'** pipistrelles, for each survey season. It shows that:

- **Nathusius'** pipistrelle activity was recorded at all detector locations and during all three survey seasons.
- The highest activity was during summer (based on mean and median).
- Lowest **Nathusius'** pipistrelle activity was during autumn (based on mean and median).
- The variance in **Nathusius'** pipistrelle activity (based on a large difference between mean and median) was equal across all three survey seasons.

Table 3-10 Summary of Nathusius' Pipistrelle Activity Results per Season Across All Sample Locations

Season	Maximum Bat Activity (Bat Passes per Night)	Median Bat Passes per Night	Mean Bat Passes per Night
Spring	4	1	2
Summer	17	3	4
Autumn	3	1	1

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3.2.5 Leisler's bat (High Collision Risk Species)

Spatial distribution

A summary of the Leisler's bat activity results per sample location is provided in Table 3-11 to illustrate any spatial variation within the Site. It reports the maximum, median and mean bat passes per night at each location, for **Leisler's bat, across all seasons combined.**

- A total of 909 **Leisler's bat passes were recorded at all locations over the monitoring period.**
- **Most Leisler's bat** activity (based on the mean and median) was recorded at location T4.
- Least activity was recorded at location T2 (based on the mean and median).
- **The highest number of Leisler's bat** passes in one night was also recorded at T5 with 68 passes recorded on the 25th July 2021.
- Most variable activity (based on a large difference between mean and median) was recorded at sample location T3.

Table 3-11 Leisler's Bat Passes per Sample Location Across All Seasons

Detector Ref.	Survey Nights Included Within Analysis	Total Bat Passes: Leisler's Bat	Maximum Bat Activity (Bat Passes per Night)[a]	Median Bat Passes per Night	Mean Bat Passes per Night
T2	25	130	33	3	5
T3	21	241	62	5	24
T4	25	279	63	3	11
T5	23	259	68	5	11

a = highest number of bat passes recorded on any one night.

Temporal distribution

A summary of the **Leisler's bat** activity results per survey season is provided in Table 3-12. Table 3-12 reports the maximum, median and mean bat passes per night at all locations, for **Leisler's bat**, for each survey season. It shows that:

- **Leisler's bat** activity was recorded at all detector locations and during all three survey seasons.
- The highest activity was during summer (based on mean and median).
- Lowest **Leisler's bat** activity was during spring (based on mean and median).
- Most variable **Leisler's bat** activity (based on a large difference between mean and median) was recorded during summer.

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Table 3-12 Summary of Leisler's Bat Activity Results per Season Across All Sample Locations

Season	Maximum Bat Activity (Bat Passes per Night)	Median Bat Passes per Night	Mean Bat Passes per Night
Spring	15	2	4
Summer	68	5	15
Autumn	42	3	6

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3.3 Ecobat

Ecobat compares the inputted data set with a reference range to provide a numerical way of interpreting the relative levels of bat activity recorded at a site with other sites across the same region, in this case with data within 100 km of the site, consisting of 648 records. The full Ecobat output can be provided upon request; refer to Appendix 3 which includes selected parts in Appendix Tables A3-1 to A3-4 detailing the percentile statistics generated from Ecobat for those nights where bats were recorded, for each of the high collision-risk species recorded.

Table 3-13 summarises the main points from the *Ecobat* outputs and Chart 3-1 illustrates the differences in bat activity at each detector location for each species.

Table 3-13 Median percentile bat activity level (on nights when bats were recorded) by location

Species	Collision Risk	Low	Low-moderate	Moderate	Moderate-high	High
Brown long-eared bat	Low	T3 T4 T5	T2	N/A	N/A	N/A
Common pipistrelle	High	N/A	N/A	T4 T5	T2 T3	N/A
Leisler's bat	High	N/A	N/A	T2 T3 T4 T5	N/A	N/A
Nathusius' pipistrelle	High	T2 T3 T4	N/A	T5	N/A	N/A
Soprano pipistrelle	High	N/A	N/A	T3 T4 T5	T2	N/A
Myotis group	Low	T2 T4 T5	T3	N/A	N/A	N/A

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No detector location yielded high activity levels. Two detector locations yielded moderate-high activity, namely T2 (common pipistrelle, soprano pipistrelle), and T3 (common pipistrelle). All four detector locations yielded **moderate activity, namely T2 (Leisler's bat), T3 (Leisler's bat, soprano pipistrelle), T4 (common pipistrelle, Leisler's bat, soprano pipistrelle), and T5 (common pipistrelle, Leisler's bat, Nathusius' pipistrelle, soprano** pipistrelle).

Of the four high collision-risk species, only common pipistrelle and soprano pipistrelle had moderate-high levels of activity recorded.

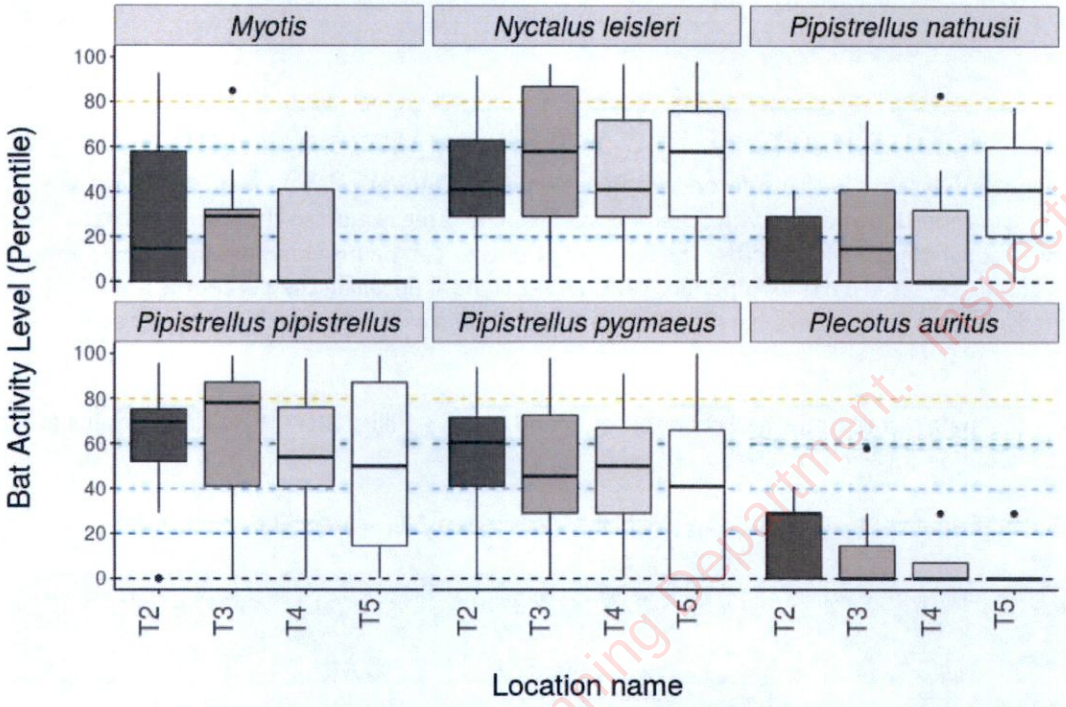

Chart 3-1 Differences in activity between static detector locations, split by species and location[9].

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4.0 Discussion and Conclusions

4.1 General Findings – All Bat Species

The desk study and field survey has confirmed that:

- **The habitat at the site constitutes 'low risk' bat habitat as defined within** Nature Scot guidelines (2021).
- There are no known roosts at the site, with the nearest record 8.94km west of the closest turbine. This is outside of the core sustenance zone (CSZ) of species in Ireland. The CSZ refers to the area surrounding a communal bat roost within which habitat availability and quality will have a significant influence on the resilience and conservation status of the colony using the roost.
- The desk-based data search found that five species have been recorded within 10km of the Site: common

[9] The centre line indicates the median activity level whereas the box represents the interquartile range (the spread of the middle 50% of nights of activity).

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pipistrelle, soprano pipistrelle, Daubenton's bat, whiskered bat and Leisler's bat.

- The field survey also confirmed the presence of five species of bat and one genus, namely common pipistrelle, soprano pipistrelle, **Nathusius' pipistrelle, Leisler's bat** and brown long-eared bat.
- Locations T3 and T5 had the highest level of activity for all bat species across all seasons.
- Location T2 and T4 had the lowest levels of activity for all bat species across all seasons.
- Highest levels of bat activity were recorded in summer, across all locations.

4.2 High Collision Risk Species

High collision risk species in Ireland, as defined by current guidelines, are detailed in **Appendix 2**. The potential collision risk for each species is based upon the behaviour and ecology of each species, e.g its flight high, foraging strategy and so on; combined with current evidence of casualty rates in the UK and the rest of Europe relating to collision and barotrauma on wind farms.

Table 4-1 presents the collision risk for bat species recorded over the survey period (adapted from Wray et al., 2010).

Table 4-1 Collision risk for bat species recorded (adapted from Wray et al., 2010).

Low collision risk	Medium collision risk	High collision risk
Brown long-eared bat	N/A	Common pipistrelle
Myotis species		Soprano pipistrelle
		Nathusius' pipistrelle
		Leisler's bat

Of the species recorded on Site, four are assessed to be high collision-risk species: common pipistrelle, soprano **pipistrelle, Nathusius' pipistrelle, and Leisler's bat**; and two are assessed as low collision-risk species: brown long-eared bat and Myotis.

Relative abundance (common, rarer or rarest species) is combined with the collision risk of a species to indicate the potential vulnerability of populations of Irish bat species (see **Appendix 2**). Common pipistrelle and soprano pipistrelle are classified as being common and having a medium population vulnerability in Ireland. **Leisler's bat and Nathusius' pipistrelle are classified as rarest and, thus, have a high** population vulnerability.

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4.3 Ecobat

4.3.1 Leisler's bat

On nights where Leisler's bat were recorded, the level of activity most frequently recorded represents **'moderate'** bat activity when compared against records from a similar date in a similar geographic location in *Ecobat*.

Of the nights sampled, 9.8% represented high bat activity, 6.9% represented moderate to high bat activity, 12.3% represented moderate bat activity, 6.9% represented low to moderate activity, 10.3% represented low activity and 53.9% recorded nil activity.

Overall, it is concluded that the level of Leisler's bat activity at the Site is moderate. This is because most of the survey nights recorded moderate levels of bat activity (12.3% of total survey nights), the small reference range notwithstanding.

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4.3.2 Common pipistrelle

On nights where common pipistrelle were recorded, the level of activity most frequently represents 'moderate-**high**' bat activity levels when compared against records from a similar date in a similar geographic location in *Ecobat*.

Of the nights sampled, 12.3% represented high bat activity, 13.2% represented moderate to high bat activity, 10.3% represented moderate bat activity, 2.9% represented low to moderate activity, 7.4% represented low activity and 53.9% recorded nil activity.

Overall, it is concluded that the level of common pipistrelle activity at the Site is moderate-high (13.2% of survey nights), with the majority of survey nights recording nil activity (53.9% of survey nights).

4.3.3 Soprano pipistrelle

On nights where soprano pipistrelle were recorded, the level of activity **most frequently represents 'moderate'** bat activity levels when compared against records from a similar date in a similar geographic location in *Ecobat*.

Of the nights sampled, 5.9% represented high bat activity, 12.3% represented moderate to high bat activity, 11.8% represented moderate bat activity, 3.4% represented low to moderate activity, 11.3% represented low activity and 55.4% recorded nil activity.

Overall, it is concluded that the level of soprano pipistrelle activity at the Site is moderate-high (12.3% of survey nights), with the majority of survey nights recording nil activity (55.4% of survey nights).

4.3.4 Nathusius' pipistrelle

On nights where **Nathusius'** pipistrelle were recorded, the level of activity most frequently represents **'low'** bat activity levels when compared against records from a similar date in a similar geographic location in *Ecobat*.

Of the nights sampled, 0.5% represented high bat activity, 2.0% represented moderate to high bat activity, 3.9% represented moderate bat activity, 2.5% represented low to moderate activity, 9.3% represented low activity and 81.9% recorded nil activity.

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Overall, it is concluded that the level of **Nathusius'** pipistrelle activity at the Site is low (9.3% of survey nights), with the majority of survey nights recording nil activity (81.9%).

4.3.5 Other Bat Species

While brown long-eared bat, and *Myotis* species were also recorded, these species are at low risk of collision with turbines due to their flight and foraging behaviour[10].

They were all recorded at much lower frequencies than the species outlined above and, therefore, the Site does not represent important foraging habitats for them, making them unlikely to be negatively affected by any loss of habitat through wind farm construction or decommissioning.

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[10] Rodrigues, L., Bach, M.-J., Dubourg-**Savage, B., Karapandža, D., Kovac˘, T., Kervyn**, J., Dekker, A., Kepel, P., Bach, J., Collins, C., Harbusch, C., Park, K., Micevski, B. and Minderman, J., 2015. Guidelines for Consideration of Bats in Wind Farm Projects – Revision 2014. EUROBATS Publication Series No. 6 (English Version). UNEP/EUROBATS Secretariat, Bonn.

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5.0 References

Altringham, J. (2003) British Bats The New Naturalist Series 93. Harper Collins.

Aughney, T., Kelleher, C., & Mullen, D. (2008): Bat Survey Guidelines, Traditional Farm Buildings Scheme. Heritage Council, Kilkenny.

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

Bat Conservation Ireland, (2010). Guidance notes for Planners, Engineers, Architects, and Developers. Bristol University. (2019,). *The Bats of Britain*. Retrieved from Bristol University: http://www.bio.bris.ac.uk/research/bats/britishbats/

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

CIEEM (2019) Guidelines for Ecological Impact Assessment. The Institute for Ecology and Environmental Management.

Collins (2016). *Bat Surveys: Good Practice Guidelines* publication [3RD Edition], Bat Conservation Trust, UK.

Council of the European Communities (1992). Council Directive (92/43/EEC) of 21 May 1992 on the Conservation of natural habitats and of wild fauna and flora. *Official Journal of the European Communities* **L215, 85-90 [Habitats** Directive].

EPA, 2017. Guidelines **on the Information to be contained in Environmental Impact Assessment Reports - Draft 2017.** Environmental Protection Agency, Ireland.

Hundt, L. (2012). *Bat Surveys: Good Practice Guidelines*, 2nd Edition, Bat Conservation Trust Kelleher, C. & Marnell, F. (2006).

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

Lundy MG, Aughney T, Montgomery WI, Roche N (2011). *Landscape conservation for Irish bats & species specific roosting characteristics*. Bat Conservation Ireland.

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

Mitchell-Jones, A.J. & McLeish, A.P. (2004). *Bat Workers Manual*. 3rd edition. Joint Nature Conservation Committee.

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

National Roads Authority (2006) - *Guidelines for the Treatment of Bats During the Construction of National Road Schemes* NRA (2009).

Guidelines for the Assessment of Ecological Impacts of National Road Schemes Rev. 2. National Roads Authority. NRA (2008).

NRA Guidelines on Ecological Surveying Techniques for Protected Flora and Fauna on National Road Schemes). National Roads Authority. NRA (2008).

NPWS (2008). *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*. Brunswick Press Ltd.

Peaks in bat activity at turbines and the implications for mitigating the impact of wind energy developments on bats. Richardson, S. et al. (2021). Nature.

Roche, N., Aughney, T., Marnelle, F. and Lundy, M. (2014). Irish Bats in the 21st Century. Bat Conservation Ireland.

Rodrigues, L. *et al* (2015): Guidelines for **consideration of bats in wind farm projects - Revision 2014. EUROBATS** Publication Series No. 6 (English Version). UNEP/ EUROBATS Secretariat, Bonn, Germany, 133 pp.

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Russ (2021) British Bat Calls: A Guide to Species Identification. Pelagic Publishing.

Nature Scot (2021). Bats and onshore wind turbines: survey, assessment and mitigation.

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

Wildlife Act (1976) pp 1-209. Dublin: Government Publications.

Wildlife Amendment Act (2000). Dublin: Government Publications.

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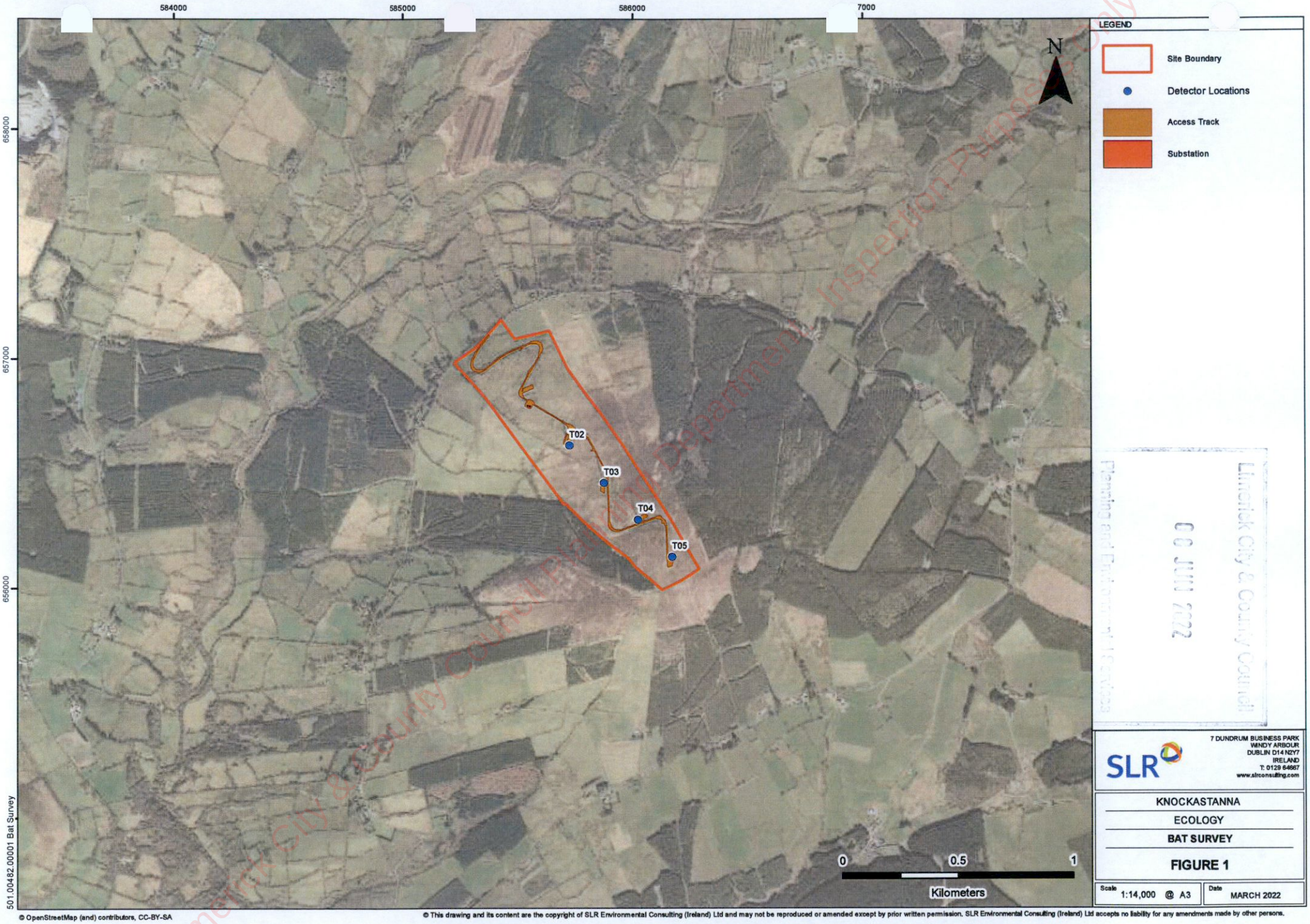

LEGEND

- Site Boundary
- Detector Locations
- Access Track
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FIGURE 1

Scale 1:14,000 @ A3

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501.00482.00001 Bat Survey

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APPENDICES

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APPENDIX 1

Criteria for Assessing Habitat Risk for Bats

Habitat Risk	Description
Low	Small number of potential roost features, of low quality. Low quality foraging habitat that could be used by small numbers of foraging bats. Isolated site not connected to the wider landscape by prominent linear features.
Moderate	Buildings, trees or other structures with moderate-high potential as roost sites on or near the site. Habitat could be used extensively by foraging bats. Site is connected to the wider landscape by linear features such as scrub, tree lines and streams.
High	Numerous suitable buildings, trees (particularly mature ancient woodland) or other structures with moderate-high potential as roost sites on or near the site, and/or confirmed roosts present close to or on the site. Extensive and diverse habitat mosaic of high quality for foraging bats. Site is connected to the wider landscape by a network of strong linear features such as rivers, blocks of woodland and mature hedgerows. At/near edge of range and/or on an important flyway. Close to key roost and/or swarming site.

Table taken from current Nature Scot (2021) guidelines.

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APPENDIX 2

Collision Risk, Relative Abundance and Overall Population Vulnerability of Bat Species in Scotland

Yellow = low population vulnerability

Beige = medium population vulnerability

Red = high population vulnerability

Relative abundance	Scotland	Collision risk		
		Low collision risk	Medium collision risk	High collision risk
	Common species			Common pipistrelle Soprano pipistrelle
	Rarer species	Brown long eared bat Daubenton's bat Natterer's bat		
	Rarest species	Whiskered bat Brandt's bat		Nathusius pipistrelle Noctule bat Leisler's bat

Table taken from current Nature Scot (2021) guidelines.

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APPENDIX 3

Summary of Ecobat Output for High Collision Risk Species

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Table A3 1 Leisler's Bat: Summary of Ecobat Outputs, by Detector, Compared with Sites within 100 km

Location	Species/Species Group	Median Percentile[11]	95% CIs[12]	Max Percentile	Nights Recorded	No. of Records Compared Against
T2	*Nyctalus leisleri*	41	39.5 - 60.5	92	25	94
T3	*Nyctalus leisleri*	58	57.5 - 84	97	21	94
T4	*Nyctalus leisleri*	41	45.5 - 69	97	25	94
T5	*Nyctalus leisleri*	58	52.5 - 76	98	23	94

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Table A3 2 Common Pipistrelle: Summary of Ecobat Outputs, by Detector, Compared with Sites within 100 km

Location	Species/Species Group	Median Percentile	95% CIs	Max Percentile	Nights Recorded	No. of Records Compared Against
T2	*Pipistrellus pipistrellus*	70	62.5 - 74	96	30	94
T3	*Pipistrellus pipistrellus*	78	62 - 84.5	99	25	94
T4	*Pipistrellus pipistrellus*	54	54 - 74	98	20	94
T5	*Pipistrellus pipistrellus*	50	54.5 - 89.5	99	19	94

Table A3 3 Soprano Pipistrelle: Summary of Ecobat Outputs, by Detector, Compared with Sites within 100 km

Location	Species/Species Group	Median Percentile	95% CIs	Max Percentile	Nights Recorded	No. of Records Compared Against
T2	*Pipistrellus pygmaeus*	61	58.5 - 73	94	30	91

[11] Median percentiles and Confidence Intervals (CIs) are calculated from the nights where bat activity was recorded only (i.e. it does not include nights where no bat activity was recorded).

[12] 28Activity level of the median number of bat passes recorded per night, from the nights where bat activity was recorded only, determined by percentile from reference range within Ecobat, using the following parameters: 0-20th percentile=low, 21st-40th percentile=low/mod, 41st-60th percentile = mod, 61st-80th percentile = mod/high, 81st – 100th percentile = high.

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Location	Species/Species Group	Median Percentile	95% CIs	Max Percentile	Nights Recorded	No. of Records Compared Against
T3	*Pipistrellus pygmaeus*	46	49.5 - 71.5	98	24	91
T4	*Pipistrellus pygmaeus*	50	43.5 - 67	91	19	91
T5	*Pipistrellus pygmaeus*	41	45.5 - 83.5	100	18	91

Table A3 4 Nathusius' Pipistrelle: Summary of Ecobat Outputs, by Detector, Compared with Sites within 100 km

Location	Species/Species Group	Median Percentile	95% CIs	Max Percentile	Nights Recorded	No. of Records Compared Against
T2	*Pipistrellus nathusii*	0	29 - 29	41	8	37
T3	*Pipistrellus nathusii*	15	29 - 72	72	10	37
T4	*Pipistrellus nathusii*	0	29 - 62	83	12	37
T5	*Pipistrellus nathusii*	41	41 - 70	78	7	37

The full *Ecobat* report (7 pages) can be provided upon request.

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NOTTINGHAM
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STIRLING
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WORCESTER
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Limerick City & County Council
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Planning & Commercial Services

Limerick City & County Council Planning Department. Inspection Purposes Only!

Annex 5.3

Limerick City & County Council Planning Department. Inspection Purposes Only!

Limerick City & County Council
0 8 JUN 2022
Planning and Environmental Services