

Appropriate Assessment Screening Report and Natura Impact Statement

Proposed Knockshanvo Wind Farm, Co. Clare



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1. INTRODUCTION

Background

MKO has been appointed by FuturEnergy Ireland Ltd to provide the information necessary to allow the competent authority to conduct an Article 6(3) Appropriate Assessment of the Proposed Development.

Screening for Appropriate Assessment is required under Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive). Where it cannot be excluded that a project or plan, either alone or in combination with other projects or plans, would have a significant effect on a European Site then same shall be subject to an appropriate assessment of its implications for the site in view of the site's conservation objectives. The current project is not directly connected with, or necessary for, the management of any European Site. Consequently, the project has been subject to the Appropriate Assessment Screening process.

This Natura Impact Statement (NIS) has been prepared in accordance with:

- European Commission's Assessment of Plans and Projects Significantly affecting Natura 2000 Sites.
- Methodological Guidance on the provisions of Article 6(3) and 6(4) of the Habitats Directive 92/43/EEC (EC, 2021)
- Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (EC, 2018)
- > Department of the Environment's Appropriate Assessment of Plans and Projects in Ireland -Guidance for Planning Authorities (DoEHLG, 2010)
- Appropriate Assessment Screening for Development Management. Office of the Planning Regulator, Dublin 7, Ireland OPR (2021).

11.1 Relevant Legislation

The main pieces of relevant legislation are as follows:

- The Habitats Directive 92/43/EEC.
- The Birds Directive 2009/147/EC.
- European Communities (Birds and Natural Habitats) Regulations 2011 2021.
- > Planning and Development Acts 2000 to 2022 PART XAB^{1.}

1.1.2 **Statement of Authority**

This report has been written by Rachel Walsh (BSc.) who has 4 years' experience in habitat and fauna surveying and has undertaken ecological impact assessment for a wide range of projects including renewable energy developments. This report was reviewed by Pat Roberts (BSc., MCIEEM). Pat has over 18 years' experience in ecological management and assessment.

 $^{^{1}}$ Natura 2000 sites are also referred to as European Sites in the Planning and Development Acts 2000 – 2022 and European Communities (Birds and Natural Habitats) Regulations 2011 – 2022 (Unofficial Consolidation-Updated to 28 July 2022).



1.1.3 **Definitions**

- Where the 'Proposed Development site' is referred to, this relates to the area containing all of the project components, i.e. Wind Farm Site and Grid Connection, as detailed in Section 3 below.
- > Where the 'Wind Farm Site' is referred to, this refers to turbines and associated foundations and hard-standing areas, meteorological mast, site entrance, junction accommodation works, access roads, temporary transition compound and upgrades to roads along the turbine delivery route, temporary construction compounds, temporary transition compound, 110kV electrical substation, underground cabling, borrow pits, site drainage, tree felling, amenity works and all ancillary works.
- Where 'Grid Connection' is referred to, this refers to the underground 110kV electrical cabling and all associated site development works connecting the Wind Farm Site to the existing Ardnacrusha 110kV electrical substation.
- Where the 'proposed transitional compound area' is referred to, this relates to the proposed transition compound site located to the south of the River Shannon, shown in Figure 1-1.
- > Where 'the study area' is referred to, this relates to the primary study area for the NIS, as delineated by the site boundary in green as shown on Figure 1-1. The study area boundary represents the primary area of study and not necessarily areas where proposed works will occur as part of the Proposed Development.

1.2 Site Description

The Proposed Development Site is an upland site located in southeast County Clare, approximately 3 km south of Broadford, 3.5 km southeast from Kilkishen, and 4 km northeast from Sixmilebridge, Co. Clare. The Grid Reference co-ordinates for the approximate centre of the site are E554266 N669733. Lands surrounding the study area also comprise areas of forestry as well as agricultural lands and peatlands. The location of the Proposed Development is shown in Figure 1-1.

1.3 Brief Description of the Proposed Development

The Proposed Development will consist of 9 no. turbines with a limited tip height range of 179.5 metres to 185 metres and all associated foundations and hardstanding areas, access roads and entrance(s) including upgrade of existing site roads and provision of new roads, 110kV electrical substation and wind farm control building(s), underground cabling, borrow pit(s), electrical cabling for 110kV grid connection, amenity works, biodiversity enhancement areas, temporary construction compounds, a permanent meteorological mast, temporary transition compound and upgrades to roads along the turbine delivery route.

The minimum and maximum turbine envelope has been assessed in this NIS.

A layout of the Proposed Development is provided in Figure 1-2.







2. **METHODS**

2.1 Desk Study

The desk study undertaken for this assessment included a thorough review of the available ecological data associated with European Sites within the Likely Zone of Influence of the Proposed Development. Sources of data included the following:

- Review of NPWS Conservation Objectives supporting documents, site synopsis, standard data forms and supporting documents for European Designated Sites,
- Review of online web-mappers: National Parks and Wildlife Service (NPWS)², Environmental Protection Agency (EPA)³,
- > Review of the publicly available National Biodiversity Data Centre (NBDC) web-mapper⁴,
- > Review of NPWS Article 17 metadata and GIS database.

All European Sites that could potentially be affected were identified using a source-pathway-receptor model as per OPR guidance (2021)⁵. To provide context for the assessment, European Sites surrounding the Proposed Development Site are shown on Figure 5-1 in Section 5 below. Information on these sites according to the site-specific conservation objectives is provided in Table 5-1. The catchment mapping was used to establish or discount potential hydrological connectivity between the site of the Proposed Development and any European Sites. The hydrological catchments are also shown in Figure 5-1.

The Scottish Natural Heritage (SNH) Guidance, 'Assessing Connectivity with Special Protection Areas (SPA)' (2016) was consulted. This document provides guidance in relation to the identification of connectivity between Proposed Development and Special Protection Areas. The guidance takes into consideration the distances species may travel beyond the boundary of their SPAs and provides information on dispersal and foraging ranges of bird species which are frequently encountered when considering plans and projects. Ornithological surveys undertaken at the Proposed Development site between 2018 and 2023 also informed the assessment.

Table 5-1, provides details of all relevant European Sites as identified in the preceding steps and assesses the potential for likely significant effects on each.

2.2 Field Surveys

2.2.1 **Ecological Multidisciplinary Surveys**

Multidisciplinary walkover surveys were undertaken by MKO between 2021 and 2024. The multidisciplinary walkover surveys comprehensively covered the entire study area for features and locations of ecological significance. Habitats were mapped and classified in accordance with Fossitt (2000). Based on the multi-disciplinary walkover survey findings, further detailed targeted surveys were carried out during follow-up species-specific survey visits which are described in the subsections below.

² <u>https://www.npws.ie/maps-and-data/designated-site-data</u>, Last accessed 2024.08.20.

³ <u>https://gis.epa.ie/EPAMaps/Water</u>. Last accessed 2024.08.20.

⁴ https://maps.biodiversityireland.ie/Map. Last accessed 2024.08.20.

⁵ Office of the Planning Regulator (2021) – Appropriate Assessment Screening for Development Management. OPR Practice Note PN01.



2.2.2 Otter Surveys

Following a screening exercise, it was determined that Lower River Shannon SAC is within the Likely Zone of Influence of the Proposed Development, of which Otter is a Qualifying Interest. Areas within the Proposed Development site which were identified as providing potential habitat for otter were subject to specialist targeted surveys. Otter surveys of watercourses were undertaken along watercourses in the vicinity of the Proposed Development infrastructure footprint during survey dates listed in previous sections. Otter surveys were also undertaken during a fisheries assessment of the watercourses both within and downstream of the study area between the 25th and 28th of July 2022.

The otter surveys were conducted as per NRA (2009) guidelines (Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes). This involved a search for all otter signs e.g. spraints, scat, prints, slides, trails, couches and holts. In addition to the width of the rivers/watercourses, a 10m riparian buffer (both banks) was considered to comprise part of the otter habitat (NPWS 2009). The dedicated otter surveys also followed the guidance as set out in NRA (2008) 'Guidelines for the Treatment of Otters Prior to the Construction of National Roads Schemes' and following CIEEM best practice competencies for species surveys (CIEEM, 2013)⁶.

2.2.3 Aquatic surveys

The small streams that flow off the site of the Proposed Development, and downstream watercourses, were subject to biological evaluation and assessment through kick sampling and fish stock assessment (electro-fishing) between the 25th and 28th of July 2022. These watercourses provide connectivity with downstream European Sites as identified in the screening exercise in Section 5 of this report.

The locations of the 26 no. survey sites used are shown in Plate 2-1. Surveys at each of the 26 no. survey sites included a fisheries assessment (electro-fishing and or fisheries habitat appraisal). The surveys site coordinates are shown in Table 2-1 below.

2.2.3.1 Electrofishing

A single anode Smith-Root LR24 backpack (12V DC input; 300V, 100W DC output) was used to electro-fish sites on watercourses in the survey area in July 2022 following notification to Inland Fisheries Ireland, under the conditions of a Department of the Environment, Climate and Communications (DECC) licence. The survey was undertaken in accordance with best practice (CFB, 2008; CEN, 2003) and Section 14 licencing requirements. The baseline assessment also considered the quality of spawning, nursery and holding habitat for salmonids and lamprey, which are among the Qualifying Interest species of downstream European Sites, within at the survey sites.

Site no.	Watercourse	EPA code	Location	X (ITM)	Y (ITM)
A1	Clashduff Stream	27C44	Snaty	553836	670219
A2	Clashduff Stream	27C44	Druminakella Bridge	552881	671880
A3	Gortadroma Stream	27G12	Crag	552195	669943
A4	Gortadroma Stream	27G12	Crag Bridge	551863	670582

Table 2-1 Location of n=26 aquatic survey sites at Knockshanvo wind farm, Co. Clare (* denotes eDNA sampling)

⁶ https://cieem.net/resource/competencies-for-species-survey-css/



A5	Belvoir Stream	27 B 45	Belvoir Bridge	550819	669926
A6	Ballyvorgal North Stream	27 B 47	Glenwood Bridge	550133	669294
A7*	Owenogarney River	27O01	Annagore Bridge	547643	667656
B1	Snaty River	25S34	Ballykelly	555008	670164
B 2	Snaty River	25S34	Cloontra	554575	669398
B 3	Oatfield Stream	25007	R471 crossing, Oatfield	554155	667344
B4	Unnamed stream	n/a	Cloontra West	555089	669210
B5	Snaty River	25\$34	Aughnagourney Bridge	555064	667195
B6	West Cloontra Stream	25W36	Callaghan's Bridge	556667	666673
B7	O'Neill's Stream	25002	Cloontra Fast	.556288	668282
B8	Knockshanyo Stream	25K82	Mountrice	556637	668529
B9	O'Neill's Stream	25O02	Knockshanvo Stream confluence	557852	666079
B10	Mountrice River	25M03	Sallybank	557156	670025
B11	East Cloontra Stream	25E29	Sallybank	558419	668388
B12	Mountrice River	25M03	Cloghera Bridge	558168	666159
B13*	River (Clare) Blackwater	25B06	Killally's Bridge	558950	665665
B14	Kyleglass Stream	25K83	R465 road crossing	559692	669016
C1	Rocks Stream	27R07	Crean Stream confluence	558219	671385
N1	Snaty Stream	27 S 13	Snaty	554067	671130
N2	Glenomra Wood Stream	25G12	Kilmore	560350	668820
N3	Springmount Stream	27503	Springmount	560962	668876
N4*	Glenomra Wood Stream	25G12	R471 road crossing	559988	665891





Plate 2-1 Overview of the 26 no. aquatic survey site locations for the proposed Knockshanvo wind farm, Co. Clare, July 2022. Source: Aquatic Baseline Report, Triturus Environmental Ltd.

2.2.4 Lesser Horseshoe Bat Surveys

Bat surveys undertaken in 2022, in accordance with NatureScot Guidance (NatureScot, 2021), form the core dataset for the assessment of effects on bats at the Proposed Development site. The 2022 surveys are supplemented by additional data derived from surveys undertaken on the site in 2021 in accordance with SNH (2019) Guidelines. The Proposed Development site overlaps with the core foraging range of the QI Lesser Horseshoe Bat roosts designated under Danes Hole, Poulnalecka SAC and the Proposed Development site is also located adjacent to the core foraging range of the QI Lesser Horseshoe Bat roost designated under Ratty River Cave SAC. A summary of the bat survey methods specific to Lesser Horseshoe Bat is provided below.

2.2.4.1 Lesser Horseshoe Bat Habitat Suitability Appraisal

Bat walkover surveys were carried out throughout 2021 and 2022. During these surveys, habitats within the site were assessed for their suitability to support roosting, foraging and commuting Lesser Horseshoe bats. Connectivity with the wider landscape was also considered. Suitability was assessed according to Collins (2016) which provided a grading protocol for roosting habitats and for commuting and foraging areas. New Collins guidelines were published in September 2023 (Collins, 2023), after the bat habitat appraisals was undertaken. The new protocol includes the *None* category, where no uncertainty exists on the lack of PRFs on a tree or structure. Trees where further assessment is required are marked as FAR, and trees with obvious PRF are marked PRF, which can be assessed as either PRF-I, which corresponds to the previous *Negligible* and *Low* categories, or PRF-M, which marks a sizeable feature suitable to host a maternity roost. The assessment and scope of surveys carried out with reference to the previous edition are considered in line with the updated guidelines and appropriate for the site.



Habitat suitability appraisals were conducted in 2023 and 2024 by MKO to cover new areas proposed for Hen Harrier enhancement and compensation as part of the EIAR which are located within the core foraging ranges of the Lesser Horseshoe Bat roosts of Danes Hole Poulnalecka SAC.

2.2.4.2 Manual Transect Surveys

Manual activity surveys comprised driven transects at dusk and an emergence survey at a potential roosting location. The surveys were undertaken in Spring, Summer and Autumn 2022. A series of representative routes were selected throughout the proposed development site. The aim of these surveys was to observe bat species using the site and gather any information on bat behaviour and important features used by bats to supplement the results of the ground level static surveys. No statistical data comparison was carried out for the transects due to the variety of length routes. The routes were prepared with reference to the proposed layout, desktop and walkover survey results as well as any health and safety considerations and any access limitations. As such, they generally followed existing roads and tracks. Due to the nature of the site, manual surveys were driven to connect areas with different accesses. The driven transects followed the methodology described by Roche *et al.* (2012). Transects were driven by two surveyors, recording bats in real time. Standalone transect surveys were completed for approximately three hours after sunset. Surveyors were equipped with active full spectrum bat detectors, the Batlogger M bat detector (Elekon AG, Lucerne, Switzerland), and all bat activity was recorded for subsequent analysis to confirm species identifications.

2.2.4.3 Ground-level Static Surveys

Four ground-level static bat detectors were located within the mapped core foraging range of the Lesser Horseshoe Bat roosts associated with Danes Hole, Poulnalecka SAC (detectors D01, D02, D03 and D10 as shown on Figure 4-2). These detectors were located at the proposed locations of turbines T01, T02, and T03 with an additional detector (D10) placed to the west in case of layout design changes.

The automated bat detectors were deployed for at least 10 nights in 2022 in spring (April-May), and at least 20 nights in summer (June-mid August) and autumn (mid-August-October) (NatureScot, 2021). Full spectrum bat detectors, Song Meter SM4BAT (Wildlife Acoustics, Maynard, MA, USA), were employed using settings recommended for bats, with minor adjustments in gain settings and band pass filters to reduce background noise when recording. Detectors were set to record from 30 minutes before sunset until 30 minutes after sunrise. The Song Meter automatically adjusts sunset and sunrise times using the Solar Calculation Method when provided with GPS coordinates.

Onsite weather monitoring was undertaken concurrently with static detector deployments. One Vantage Pro 2 (Davis Instruments, CA, UCS) was deployed each season and night-time hourly data was tracked remotely to ensure a sufficient number of nights (i.e., minimum 10 no.) with appropriate weather conditions were captured (i.e., dusk temperatures above 8°C, wind speeds less than 5m/s and no or only very light rainfall).

2.2.4.3.1 Bat Call Analysis

All recordings were later analysed using bat call analysis software Kaleidoscope Pro v.5.4.8 (Wildlife Acoustics, MA, USA). The aim of this was to identify, to a species or genus level, what bats were present at the proposed development site. Bat species were identified using established call parameters, to create site-specific custom classifiers and all data were manually verified. Echolocation signal characteristics (including signal shape, peak frequency of maximum energy, signal slope, pulse duration, start frequency, end frequency, pulse bandwidth, inter-pulse interval and power spectra) were compared to published signal characteristics for Lesser Horseshoe Bat (Russ, 1999).

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



maximum 15s duration. All bat passes recorded in the course of this study follow these criteria, allowing comparison. Where multiple species were recorded within the same recording, rarer or less recorded species were prioritised over common species. Consideration was given to the fact that Lesser horseshoe bats are known to have quiet and very directional echolocation calls, which are difficult to record and are likely to cause an underrepresentation of these species in the data collected, in comparison to "louder" species (i.e. Leisler's bats). Standardised equipment methods, including the use of omni-directional microphones, ensure data collection is uniform across the site and data are comparable despite this limitation.

2.2.4.3.2 Assessment of Bat Activity Levels

The online database tool Ecobat (mammal.org.uk) is recommended by NatureScot 2021 to assess bat activity levels within a proposed development site. This web-based interface, launched in August 2016, allows users to upload activity data and to contrast results with a comparable reference range, allowing objective interpretation. Uploaded data then contributes to the overall dataset to provide increasingly robust outputs. Ecobat generates a percentile rank for each night of activity and provides a numerical way of interpreting levels of bat activity in order to provide objective and consistent assessments. Ecobat was unavailable for a cross-site analysis of 2022 data as the platform has been undergoing maintenance since late 2022 with no proposed timeline of a relaunch. Therefore, data were assessed on a site-specific basis.

Following preliminary analysis and manual verification using Kaleidoscope Pro, statistical analysis and visualisation was performed using RStudio (version 2023.12.1+402.) and R¹ (version 4.3.3). RStudio, an integrated development environment for the R programming language, was employed for data cleaning, exploration, and data visualisation. The 'ggplot2' R package was particularly instrumental in creating the data visualisations shown in the results section. Data was standardised into bat pass rates, calculated as bat passes per hour (total bat passes / night length) to account for seasonal changes in night length (Matthews et al. 2016). Activity is often variable between survey nights. Therefore, the median Nightly Pass Rate was used as the most appropriate measure of bat activity (Lintott & Mathews, 2018). During all calculations, data was rounded to at least three decimal places. When visualising the bat pass rates per season, survey effort was defined as detector hours (sum of recorded hours across all detectors). This was defined to circumvent any issues arising from differences in survey effort between detectors in a season.

The methodology used to assess activity levels across the site was adapted from Mathews *et al.* (2016). For Lesser Horseshoe Bat, nightly pass rate (bpph) recorded across the site divided into quartiles was used. Median and maximum nightly activity (bpph) at each detector location were then categorized as Low, Medium, or High for each recorded season. Any figure below 25% of the maximum/average maximum nightly pass rate was considered Low activity, while figures above 75% were classified as High. Values falling between these two quartiles were defined as Medium. To prevent skewing the activity threshold towards high levels, any evident outliers recorded across the detectors were excluded. Thresholds for other bat species besides lesser horseshoe bat are provided in the table below for context.

Assessment	Activity Threshold as Bat Passes per Hour (bpph) for Bat Species						
Level	Pipistrellus spp.	Nyctalus spp.	<i>Myotis</i> spp.	Other groups			
Low	< 12.5	< 10.9	< 7	< 2.8			
Medium	12.5 - 37.4	10.9 - 32.8	7 - 21	2.8 - 11.23			
High	37.4 <	32.8 <	21 <	11.23 <			

Table 2-2 Site-specific Activity Level Categories based on Maximum Bat Passes per Hour (bpph)



Based on experience gained surveying a large number of development sites, the calculated activity thresholds were considerably high for all species surveyed. Thresholds were therefore adapted to more representative levels for conifer plantation/woodland habitats (see Table 2-3 below). Note that the higher thresholds outlined in Table 2-2 above would result in lower activity assessment levels which are not representative of the activity recorded at the site. Therefore, lower thresholds usually encountered in this type of habitat i.e. conifer forestry, have been applied.

Assessment	Activity Threshold as Bat Passes per Hour (bpph) for Bat Species			
Level	<i>Pipistrellus</i> spp.	Nyctalus spp.	<i>Myotis</i> spp.	Other groups
Low	< 5.5	< 4	< 1	< 0.5
Medium	5.5 – 16	4 - 12	1 – 3	0.5 – 2.5
High	16 <	12 <	3 <	2.5 <

Table 2-3 Adapted Activity Level Categories

2.2.5 **Bird Surveys**

In order to inform the scope of the bird surveys required for the NIS, a review was undertaken of the location of nearby Special Protection Areas and associated SCI species so that the survey design could be focussed towards target SCI species in addition to all species captured for the purpose of the EIAR. SPAs in the vicinity of the Proposed Development include the following and are discussed further in Table 5-1:

- > River Shannon and River Fergus Estuaries SPA [004077]
- Lough Derg (Shannon) SPA [004058]

A comprehensive suite of bird surveys has been undertaken at the Wind Farm Site between April 2018 and September 2023. Results are derived from a continuous 5.5 years of surveying undertaken broadly in line with NatureScot (SNH, 2017) Guidance. The surveys undertaken provide the information necessary to allow a complete, comprehensive and robust assessment of the potential impacts of the Proposed Development on avian receptors.

The various ornithological survey types undertaken, as relevant to the SCI species of the above listed SPAs, are described below.

2.2.5.1 Vantage Point Surveys

Vantage point (VP) surveys were undertaken broadly in accordance with NatureScot guidance (SNH, 2017) from April 2018 to September 2023. Surveys were conducted monthly throughout this survey period from five fixed point vantage points to allow as comprehensive as possible coverage of the 500m survey radius surrounding the proposed turbines. The vantage point locations were selected by undertaking a viewshed analysis, as described below, and confirmed by a recce visit in March 2018.

2.2.5.2 Viewshed Analysis

Viewshed analysis was carried out to inform coverage of the Wind Farm Site from fixed vantage point locations. Viewsheds were calculated using Resoft Wind Farm ZTV (Zone of Theoretical Visibility)



software in combination with QGIS (Version 3.22) using a notional layer suspended at 21m, which is representative of the minimum height considered for the Potential Collision Risk Area based on the selected turbine model. While the relevance of being able to view as much of the site to ground level is acknowledged, NatureScot guidance (2017) emphasizes the importance of visibility of the 'collision risk volume' when the data is to be used to estimate the risk of collision for birds with turbines.

The viewshed analysis involved testing each VP location for its visibility coverage by creating a viewshed point 1.75m in height (to represent the height of the observer) on a map using 10m contours terrain data. The relative height of forestry and its effects on visibility is also accounted for in the analysis. Using the ZTV software, a viewshed of 360 degrees was produced at 21m above ground level, to a 2km radius. The resulting viewshed image was then cropped to 180 degrees to give the viewshed from each VP location in line with NatureScot (2017). The viewshed analysis aims to establish whether the selected vantage points offer adequate coverage of the turbine layout plus a 500m radius of the outermost turbines, as per NatureScot (SNH 2017) recommendations.

2.2.5.3 Data Recording and Digitisation

Data on bird observations and flight activity was collected from a scanning arc of 180° and a 2km radius by an observer at each fixed vantage point location for six hours per month. Surveys were scheduled to provide a spread over the full daylight period including dawn and dusk watches to coincide with the highest periods of bird activity.

Table 2-4 VP Survey Effort			
Survey Season	Months	Minimum Effort per VP	
2018 Breeding Season (5 VPs)	Apr - Sep	36 hours/VP	
2018/19 Non-Breeding Season (5 VPs)	Oct - Mar	36 hours/VP	
2019 Breeding Season (5 VPs)	Apr - Sep	36 hours/VP	
2019/20 Non-Breeding Season (5 VPs)	Oct - Mar	30 hours/VP ⁷	
2020 Breeding Season (5 VPs)	Apr - Sep	36 hours/VP	
2020/21 Non-Breeding Season (5 VPs)	Oct - Mar	36 hours/VP	
2021 Breeding Season (5 VPs)	Apr - Sep	36 hours/VP	
2021/22 Non-Breeding Season (5 VPs)	Oct - Mar	36 hours/VP	
2022 Breeding Season (5 VPs)	Apr - Sep	36 hours/VP	
2022/23 Non-Breeding Season (5 VPs)	Oct - Mar	36 hours/VP	
2023 Breeding Season (5 VPs)	Apr - Sep	36 hours/VP	

The table below, shows a summary of the VP survey work undertaken.

Observed flight activity was recorded as per defined flight bands which were chosen in relation to the dimensions of potential turbine models for the Site. Flight bands were split into 0-10m, 10-25m, 25-175m and >175m from April 2018 to September 2021 and into 0-15m, 15-25m, 25-200m and >200m from October 2021 to September 2023. Height bands were updated in 2021, in line with the industries shift towards larger turbine models. All flight activity within the height bands 10-25m, 25-175 and >175m or 15-25m and 25-200m are considered to be within the potential collision height (PCH). Each flight observation was assigned a unique identifier when mapped in the field and subsequently digitised using GIS software.

⁷ Please see Section 7.2.6.2 for further details: 6 hours per vantage point were missed during the 2019/20 non-breeding season due to Covid-19 restrictions.



2.2.5.4 Breeding Walkover Surveys (Adapted Brown and Shepard Survey)

Breeding walkover surveys were undertaken to determine the presence of bird species of high conservation concern and identify areas of possible, probable, or confirmed breeding for bird species observed within the Wind Farm Site. The survey methodology followed the Brown and Shepherd (1993) and Calladine *et al.* (2009). The survey area for these surveys was the Wind Farm Site and a 500m survey radius of the Wind Farm Site, where access allowed.

Transect routes were devised to ensure the required coverage of different habitat was achieved within the survey area. Transects were selected to ensure all areas of suitable breeding/ foraging habitat were approached to within 100m, where access allowed.

Walkover surveys were carried out during daylight hours during the core breeding season months of April, May, June and July (2018, 2019, 2020, 2021 and 2022), with the Wind Farm Site being visited three days per month on each occasion. The timing of visits followed the recommendations of Calladine *et al.* (2009). Following all survey visits, the field maps were analysed to determine the number and location of breeding territories. All non-breeding individuals and species encountered were also recorded.

2.2.5.5 Winter Walkover Surveys

Winter walkover surveys were undertaken during the 2018/19, 2019/20, 2020/21 and 2021/22 winter seasons to record the presence of bird species of high conservation concern within areas of potentially suitable habitat for these species. The survey area extended 500m outside the Wind Farm Site.

Transect routes were devised to ensure coverage of different habitat complexes between vantage point locations within the study area, during the winter months. The methodology was broadly based on methods described in Bibby *et al.* (2000) and adapted Brown and Shepherd surveys' (SNH, 2017).



2.3 Screening Report

The approach used when carrying out the Appropriate Assessment screening exercise is summarised as follows:

- > Identify Natura 2000 sites within the potential Zone of Influence of the Proposed Development.
- > Identify the qualifying interests of the Natura 2000 sites and review their conservation objectives.
- Review whether there is potential for the qualifying interests to be significantly affected, in the absence of mitigation, by the Proposed Development based on information such as the vulnerabilities of the Natura 2000 site, proximity to the Site and the nature and scale of the works associated with the Proposed Development.
- > Consider the likelihood of the identified potential effects occurring based on the information collated and professional judgement.
- Consider the likelihood of cumulative effects arising from the project in-combination with other plans and projects.
- > Identify the likelihood of significant effects on Natura 2000 sites occurring, in the absence of mitigation, because of the Proposed Development.

2.4 **Natura Impact Statement**

The approach to preparing the Natura Impact Statement (NIS) is summarised as follows:

- > Describe the elements of the Proposed Development that are likely to give rise to significant effects on the Natura 2000 Sites.
- > Set out the conservation objectives of the Natura 2000 sites.
- > Describe how the Proposed Development will affect the key species and key habitats of the Natura 2000 sites.
- > Describe how the integrity of Natura 2000 sites is likely to be affected by the Proposed Development.
- > Describe what measures are to be introduced to avoid, reduce or remedy the adverse effects on the integrity of the Natura 2000 site.
- Consider findings and determine if potential for adverse effects on Natura 2000 sites remains after such measures have been implemented.

The headings within the appropriate assessment report template provided in the European Commission guidance document 'Assessment of plans and projects significantly affecting Natura 2000 sites'⁸ have been used to guide the structure of this report. The approach taken in preparing both the AA screening report and NIS is based on standard methods and best practice guidance, as listed in the references section of this report.

2.5 **Project Team**

Table 2-5 Project Team

Name	Role	Experience
Rachel Walsh (BSc. Env)	Multidisciplinary walkover surveys,	Rachel is a Senior Ecologist with MKO with over 4 years' experience in habitat and fauna

⁸ http://ec.europa.eu/environment/nature/natura2000/management/docs/art6/natura_2000_assess_en.pdf [last accessed 20204.08.20]



	otter surveys, author	surveying and has undertaken ecological impact assessment for a wide range of projects including renewable energy developments.	
Pat Roberts (BSc., MCIEEM)	Reviewer	Pat is Principal Ecologist with MKO and has over 18 years' experience in ecological management and assessment.	
Ross Macklin (Ph.D. (candidate), B.Sc. (Hons) MCIEEM, MIFM, HDip GIS, PDip IPM	Aquatic surveys	Aquatic, fisheries and mammalian ecologist with over 18 years' professional experience in Ireland. Director of Triturus Environmental Ltd. Ross has a B.Sc. in Applied Ecology and diplomas in integrated Pest Management and GIS and currently completing his PhD in fisheries ecology.	
Bill Brazier Bill Brazier (Ph.D. (candidate), B.Sc. (Hons.), MIFM)	Aquatic surveys	Aquatic, fisheries and mammalian ecologist with over 11 years' professional experience in Ireland. He is Associate Director and senior ecologist at Triturus Environmental Ltd.	
Sara Fissolo (BSc.)	Bat Surveys, Bat data collation	Project Ecologist with MKO. B.Sc. (Hons) Ecology and Environmental Biology, University College Cork, Ireland.	
		Advanced Bat Survey Techniques (BCI), Bat Impacts and Mitigation (CIEEM), Bats in Heritage Structures (BCI), Bat Care (BCT), Bats and Lighting (BCI), Kaleidoscope Pro Analysis (Wildlife Acoustics).	
Ryan Connors (BSc., MSc.)	Bat Surveys	B.Sc. (Hons) Zoology, University College Galway, Ireland, M.Sc. (Hons) Conservation Behaviour, Atlantic Technological University, Galway, Ireland.	
		Surveying Trees for Bats (BRTS), Structure & Tree Inspection, Manual Transect Survey, Bat Habitat Appraisal, Emergence and Re-Entry Surveys, Kaleidoscope Pro Analysis, Winter Tree Identification (Internal).	
Laura McEntegart (B.Sc.)	Bat surveys and data analysis	B.Sc. (Hons) Botany and Plant Science, National university of Ireland, Galway	
		Bat Handling Training Course (BCI), Bats: Assessing the Impact of Development on Bats, Mitigation & Enhancement - (CIEEM), Kaleidoscope Pro Analysis (Wildlife Acoustics). Endoscope Training (Internal), Emergence and Re-Entry Surveys (Internal) Structure & Tree Inspection (Internal), Manual Transect Survey (Internal), Bat Habitat Appraisal (Internal).	
Keith Costello (B.Sc.)	Bat surveys	BSc Environmental Science, National University of Ireland, Galway	
		Kaleidoscope Pro Analysis (Wildlife Acoustics), Endoscope Training (Internal), Emergence and Re-Entry Surveys (Internal), Structure & Tree Inspection (Internal), Manual Transect Survey (Internal), Bat Habitat Appraisal (Internal)	
Shane Connolly (B.Sc.)	Bat surveys and analysis	B.Sc. (Hons) in Botany from National University of Ireland, Galway. Kaleidoscope Pro Analysis (Wildlife Acoustics), Endoscope Training (Internal), Emergence and Re-Entry Surveys (Internal) Structure & Tree Inspection (Internal), Manual Transect Survey (Internal), Bat Habitat Appraisal (Internal).	



Allen Mee, Athena Michaelides, Cian Cahalin, Colin Delahunt, Conor Geoghegan, Ciaran McKenna, Chris Peppiatt, Fionn O'Donoghue, Gerry Murphy, Ian Hynes, John Carey, Jonah Gaine, Joe Kelly, Jennifer Snook, Katie Grice, Louis De Vries, Marcus Hogan, Margeaux Pierrel, Mike Sylvia, Nessa Lee, Peter Capsey, Patrick Manley, Sherene Acun, Susan Doyle, Sean O'Brien, Tony Kennealy, Tom Ryan, Zuzana Erosova and Zak O'Connor of	Ornithological surveys	Ornithological surveys were undertaken from April 2018 to September 2023 and were devised by Principal Ornithologist Padraig Cregg of MKO, who has over 9 years' experience in surveying and ecological assessment. All surveyors are competent experts in the field of ornithological surveying.
Erosova and Zak O'Connor of MKO.		

2.6 Limitations

Aquatic surveys were undertaken during base summer flows, dry and bright conditions and at the appropriate time of year for aquatic and fisheries surveys (i.e. open season for fisheries assessments, white-clawed crayfish & macrophyte surveys). All selected surveys sites were accessible which facilitated catchment-wide data collection.

With regard to the bat surveys undertaken, all surveys were undertaken in full accordance with the relevant guidelines and during the appropriate season and weather conditions.

No significant limitations in the scope, scale or context of the surveys for this NIS have been identified.



3. DESCRIPTION OF PROPOSED DEVELOPMENT

3.1 **Characteristics of the Proposed Development**

The planning application for the Proposed Development under Section 37E of the Planning and Development Act 2000, as amended, comprises the turbines and associated foundations and hardstanding areas, meteorological mast, site entrance, junction accommodation works, access roads, temporary construction compounds, temporary transition compound, 110kV electrical substation, underground cabling, borrow pits, site drainage, tree felling, amenity works, biodiversity enhancement measures and all ancillary works. The Proposed Development is fully described below and in the EIAR that supports the planning application. Detailed planning drawings of all elements of the Proposed Development are provided with the planning documentation.

A layout of the Proposed Development is shown in Figure 1-2.

The Development Description as per the An Bord Pleanála Planning Notice Project Description is as follows:

3.1.1 Wind Farm Site

- *i.* Construction of 9 no. wind turbines with a blade tip height range from 179.5m to 185m inclusive, a hub height range from 102.5m to 110.5m inclusive and a rotor diameter range from 149m to 163m inclusive with associated foundations, hard-standing and assembly areas.
- ii. Construction of 1 no. permanent 110 kV electrical substation including 2 no. control buildings lightening protection, welfare facilities, car parking, and all associated electrical plant and apparatus, security fencing, external lighting, underground cabling, wastewater holding tank and all associated infrastructure, apparatus and landscaping;
- *Underground electrical cabling (33kV) and communications cabling connecting the wind turbines to the proposed on-site 110kV electrical substation and associated ancillary works;*
- *iv.* Erection of 1 no. Meteorological Mast of 105 metres above existing ground level for the measuring of meteorological conditions, including a lightning rod which will extend above the mast;
- v. Construction of new permanent access roads and upgrade of existing roads to provide access within the site and to connect the wind turbines and associated infrastructure;
- vi. Construction of 1 no. new permanent access to the site off the R465 regional road to serve as the sole entrance to the wind farm during its operational phase and to facilitate the delivery of the construction materials and turbine components to site during the construction, operational and decommissioning phases;
- vii. Construction of 2 no. new permanent access points off the L-3042 and L-30144-0 local roads to facilitate traffic movement across the site during construction, operation and decommissioning phases. Both accesses will be gated and opened when required during the operational phase;
- viii. Development of 5 no. borrow pits;
- *ix.* Construction of 3 no. temporary construction compounds and associated ancillary infrastructure including temporary site offices, staff facilities and car-parking areas, all to be removed at end of construction phase;
- x. Temporary works at 3 no. locations along the R465 regional road associated with the facilitation of turbine component and abnormal load delivery to site. These works will primarily include the trimming of vegetation and strengthening of road verges;



- xi. Installation of a temporary transition compound to facilitate turbine blade delivery during the construction phase, within the townland of Court, Co. Limerick. The works will include installation of a temporary stone hard standing area and associated entrance and egress to and from the N69 national road and will be removed at the end of the construction phase.
- xii. Permanent amenity works comprising the construction of 1 no. new marked trail, the development of 2 no. new viewing areas and upgrade to 1 no. existing viewing area, including the installation of associated signage and seating;
- *xiii.* Permanent and temporary Site Drainage;
- xiv. Operational Stage Site Signage;
- *xv.* Ancillary forestry felling to facilitate construction and operation of the proposed development;
- xvi. Biodiversity enhancement measures including the permanent clear-felling of land, and;
- *xvii.* All related site works and ancillary development including landscaping considered necessary to facilitate the proposed development.

This application is seeking a ten-year permission and 35 year operational life from the date of commissioning of the wind energy development.

3.1.2 Grid Connection

- *i.* The provision of underground electrical cabling (110kV) from the proposed Knockshanvo Wind Farm development to the existing Ardnacrusha 110kV electrical substation to facilitate the connection to the national grid;
- *ii.* Provision of 14 joint bays, communication chambers and earth sheath links along the proposed underground electrical cabling route;
- *iii.* Permanent and temporary Site Drainage;
- *iv.* Ancillary forestry felling to facilitate construction and operation of the proposed development;
- v. Reinstatement of land, road and track surface above the proposed cabling trench;
- *vi.* All related site works and ancillary development considered necessary to facilitate the proposed development.

All elements of the overall project, comprising works on the Wind Farm Site, and the Grid Connection route to Ardnacrusha 110kV electrical substation have been assessed as part of this NIS.



3.2 Development Components of the Proposed Wind Farm Site

3.2.1 Wind Turbines

3.2.1.1 **Turbine Locations**

The proposed wind turbine layout has been optimised using industry standard wind farm design software to maximise the energy yield from the site, while maintaining sufficient distances between the proposed turbines to ensure turbulence and wake effects do not compromise turbine performance. The Grid Reference coordinates of the proposed turbine locations are listed in the table below.

Turbine No.	Irish Transverse Mercator Co-ordinates		Top of Foundation
	Easting (m)	Northing (m)	Elevation (m OD)
1	553306	669420	248
2	553422	670076	232.5
3	553812	669851	266.5
4	556212	669444	221.5
5	556663	670001	191.5
6	556896	669601	180.5
7	556727	669042	176
8	558463	669913	186
9	558864	669557	196.5

Table 3-1 Proposed Wind Turbine Locations and Elevations

3.2.1.2 Turbine Type

Wind turbines use the energy from the wind to generate electricity. A wind turbine consists of four main components:

- Foundation unit
- > Tower
- > Nacelle (turbine housing)
- > Rotor

The proposed wind turbines to be installed on the Wind Farm Site will have a ground-to-blade tip height, hub height and blade length within the following, limited, ranges:

- > Turbine Tip Height Maximum height 185 metres, Minimum height 179.5 metres
- > Hub Height Maximum height 110.5 metres, Minimum height 102.5 metres
- > Blade Length: Maximum length 81.5 metres, Minimum length 74.5 metres.



Modern wind turbines from the main turbine manufacturers have evolved to share a common appearance and other major characteristics, with only minor cosmetic differences differentiating one from another. The wind turbines that will be installed on the Wind Farm Site will be conventional three-blade turbines, which will be geared to ensure the rotors of all turbines rotate in the same direction at all times.

For the purposes of this NIS, various types and sizes of wind turbines, within the proposed ranges outlined above, have been assessed within this NIS. This allows for a robust assessment of the proposed range of dimensions.

3.2.1.3 **Turbine Foundations**

Each wind turbine is secured to a reinforced concrete foundation that is installed below the finished ground level. The turbine foundation transmits any load on the wind turbine into the ground. foundation footprint, at each proposed turbine location, is assessed in this NIS.

After the foundation level of each turbine has been formed using piling methods or on competent strata, the bottom section of the turbine tower "Anchor Cage" is levelled and reinforcing steel is then built up around and through the anchor cage. The outside of the foundation is shuttered with demountable formwork to allow the pouring of concrete and is backfilled accordingly with appropriate granular fill to finished surface level.

3.2.1.4 Hard Standing Areas

Hard standing areas consisting of levelled and compacted hardcore will be installed around each turbine base. These will facilitate access, turbine assembly and turbine erection. The hard-standing areas are used to accommodate cranes used in the assembly and erection of the turbine. The hardstands also allow for the offloading and storage of turbine components, and generally provide a safe, level working area around each turbine position. The hard-standing areas are extended to cover the turbine foundations, once completed, by placing crushed stone over the foundation. The turbine hardstand assessed in this NIS measure 35m x 112m.

A two-metre wide working area will be required around each hard standing area, with the sides of the excavated areas sloped sufficiently to ensure that slippage does not occur. Material excavated to create the working area will be stored locally at turbine hardstands for later reuse in backfilling the working area around the turbine foundation or transported immediately on excavation to one of the 5 no. borrow pits. The excavated material stored locally will be sealed using the back of the excavator bucket and surrounded by silt fences to ensure sediment-laden run-off does not occur. All peat placement areas will be upslope of founded roads/hardstands and will be inspected by the Project Geotechnical Engineer before material is temporarily stored in the area.

3.2.1.5 Assembly Area

Levelled assembly areas comprising of bare soil surface will be located on either side of the hardstanding area. These assembly areas are required for offloading turbine blades, tower sections and hub from trucks until such time as they are ready to be lifted into position by cranes and to assist the main crane during turbine assembly. Refer to Appendix 4-1 of the EIAR for the planning application drawings assessed in this NIS.

3.2.1.6 **Construction Methodology - Turbine Foundations**

Each of the turbines to be erected on the Wind Farm Site will have a reinforced concrete base that is installed below the finished ground level. The turbine foundation will either be formed using piling methods or on competent strata (i.e., bedrock or subsoil of sufficient load bearing capacity). Where the ground conditions do not have a competent stratum of sufficient load bearing capacity, piling methods



will be utilised. Overburden will be stripped off the foundation area to a suitable formation using a 360° excavator and will be stored locally for later reuse in backfilling around the turbine foundation or in borrow pit restoration. A two-metre-wide working area will be required around each turbine base, with the sides of the excavated areas sloped sufficiently to ensure that slippage does not occur. Material excavated to create the working area will be stored locally for later reuse in backfilling the working area around the turbine foundation. The excavated material will be sealed using the back of the excavator bucket and surrounded by silt fences to ensure sediment-laden run-off does not occur.

The formation material will be approved by an engineer as meeting the turbine manufacturer's requirements. If the formation level is reached at a depth greater than the depth of the foundation, the ground level will have to be raised with clause 804 or similar hardcore material, compacted in 250 millimetres (mm) layers, with sufficient compacted effort (i.e., compacted with seven passes using 12 tonne roller). Drainage measures will be installed to protect the formation by forming an interceptor drain around the perimeter of the base which will outfall out at the lowest point level spreader or settlement pond.

An embankment approximately 600 mm high will be constructed around the perimeter of each turbine base and a fence will be erected to prevent construction traffic from driving into the excavated hole and to demarcate the working area. All necessary health and safety signage will be erected to warn of deep excavations etc. Access to and from excavated bases will be formed by excavating a pedestrian walkway to 1:12 grade.

There will be a minimum of 100 mm of blinding concrete laid on the formation material positioned using concrete skip and 360° excavator to protect ground formation and to give a safe working platform.

The anchor cage is delivered to the Proposed Development site in two or more parts depending on the turbine type. A 360° excavator or crane with suitable approved lifting equipment will be used to unload sections of the anchor cage and reinforcing steel. The anchor cage is positioned in the middle of the turbine base and is assembled accordingly. When the anchor cage is in final position it is checked and levelled by using an appropriate instrument. The anchor cage is positioned 250mm – 300mm from formation level by use of adjustable legs. Reinforcement bars are then placed around the anchor cage, first radial bars, then concentric bars, shear bars and finally the superior group of bars. Earthing material is attached during the steel foundation build up. The level of the anchor cage will be checked again prior to the concrete pour and during the concrete pour.

Formwork to concrete bases will be propped/supported sufficiently so as to prevent failure. Concrete for bases will be poured using a concrete pump. Each base will be poured in three stages. Stage 1 will see the concrete being poured and vibrated in the centre of the anchor cage to bring the concrete up to the required level inside the cage. Stage 2 will see the centre of the steel foundation being poured and vibrated to the required level. Stage 3 will see the remaining concrete being poured around the steel foundation to bring it up to the required finished level. After a period of time when the concrete has set sufficiently the top surface of the concrete surface is to be finished with a power float.

Once the base has sufficient curing time the hard-standing areas will be extended to cover the turbine foundations, by placing crushed stone over the foundation.

3.2.2 Onsite 110kV Electrical Substation and Control Buildings

It is proposed to construct one 110 kV electrical substation within the Wind Farm Site. The proposed onsite 110kV electrical substation will have 2 no. control buildings, associated electrical plant and equipment, a wastewater holding tank and will be constructed in accordance with EirGrid substation specifications and requirements. The construction and electrical components of the electricity



substation will be to EirGrid specifications⁹. Further details regarding the connection between the site substation itself and then on to the national electricity grid are provided in Section 3.3 below and Drawings No. '05783-DR-150' to '05783-DR-160' in Appendix 4-5 of the EIAR.

The footprint of the proposed onsite electrical substation compound measures approximately 13,450 square metres, and will include 2 no. wind farm control buildings and the electrical substation components necessary to consolidate the electrical energy generated by each wind turbine, and export that electricity from the wind farm substation to the national grid. The onsite substation will be a permanent development under the ownership of the ESB/EirGrid.

The substation compound will be surrounded by an approximately 2.4-metre-high steel palisade fence, and internal fences will also segregate different areas within the main substation.

3.2.2.1 Wind Farm Control Buildings

Two no. wind farm control buildings will be located within the substation compound. The EirGrid Control Building will be located towards the centre of the substation compound and will measure 25 metres by 18 metres and 8.51 metres in height. The Independent Power Provider (IPP) Control Building located at the eastern edge of the substation compound will measure 20.15 metres by 10.74 metres and 6.74 metres in height.

The wind farm control buildings will include welfare facilities for the staff that will work on the Proposed Development during the operational phase of the project. Toilet facilities will be installed with a low-flush cistern and low-flow wash basin. Due to the specific nature of the Proposed Development there will be a very small water requirement for occasional toilet flushing and hand washing and therefore the water requirement of the Proposed Development does not necessitate a potable source. It is proposed to harvest rainwater from the roofs of the buildings, and if necessary, bottled water will be supplied for drinking.

It is proposed to manage wastewater from the staff welfare facilities in the control buildings by means of a sealed storage tank, with all wastewater being tankered off site by permitted waste collector to wastewater treatment plants. It is not proposed to treat wastewater on-site, and therefore the EPA's 2009 'Code of Practice: Wastewater Treatment and Disposal Systems Serving Single Houses (p.e. 10)' does not apply. Similarly, the EPA's 1999 manual on 'Treatment Systems for Small Communities, Business, Leisure Centres and Hotels' also does not apply, as it too deals with scenarios where it is proposed to treat wastewater on-site.

Such a proposal for managing the wastewater arising on site has become almost standard practice on wind farm sites, which are often proposed in areas where finding the necessary percolation requirements for on-site treatment would be challenging, and has been accepted by numerous Planning Authorities and An Bord Pleanála as an acceptable proposal.

The proposed wastewater storage tank will be fitted with an automated alarm system that will provide sufficient notice that the tank requires emptying. The wastewater storage tank alarm will be part of a continuous stream of data from the site's turbines, wind measurement devices and electrical substation that will be monitored remotely 24 hours a day, 7 days per week. Only waste collectors holding valid waste collection permits under the Waste Management (Collection Permit) Regulations, 2007(as amended), will be employed to transport wastewater away from the site.

⁹ EirGrid Document XDS-GFS-00-001-R4 110/220/400kV Substation General Requirements (2019). Available at: https://cms.eirgrid.ie/sites/default/files/publications/6-110-220-400-kV-Substation-General-Requirements.pdf



3.2.2.2 Construction Methodology – Onsite 110kV Electrical Substation and Control Buildings

The proposed onsite electrical substation will be constructed by the following methodology:

- > The area of the onsite substation will be marked out using ranging rods or wooden posts and the soil and overburden stripped and will be either temporarily stockpiled locally at the substation location, or transported immediately on excavation to one of the 5 no. borrow pits.
- > The dimensions of the onsite substation area have been designed to meet the requirements of EirGrid and the necessary equipment to safely and efficiently operate the permitted wind farms;
- > A generator will be temporarily located in the area of the onsite substation to provide a local electricity supply during construction;
- > 2 no. control buildings will also be built within the onsite substation compound;
- > The foundations will be excavated down to the level indicated by the designer and appropriately shuttered reinforced concrete will be laid over it. An anti-bleeding admixture will be included in the concrete mix;
- > The block work walls will be built up from the footings to damp proof course level and the floor slab constructed, having first located any ducts or trenches required by the follow on mechanical and electrical contractors;
- > The block work will then be raised to wall plate level and the gables & internal partition walls formed. Scaffold will be erected around the outside of the building for this operation;
- > The concrete roof slabs will be lifted into position using an adequately sized mobile crane;
- > The timber roof trusses will then be lifted into position using a telescopic load all or mobile crane depending on site conditions. The roof trusses will then be felted, battened, tiled and sealed against the weather.
- > The electrical equipment will be installed and commissioned.
- > Perimeter fencing will be erected.
- > The construction and components of the substation have been designed to EirGrid specifications.

3.2.3 Internal Site Cabling

Each turbine will be connected to the on-site electrical substation via an underground 33 kV (kilovolt) electrical cable. Fibre-optic cables will also connect each wind turbine to the wind farm control buildings in the onsite 110kV electrical substation compound. The electrical and fibre-optic cables running from the turbines to the onsite substation compound will be run in cable ducts approximately 1.3 metres below the ground surface, in the roadways. The route of the cable ducts will follow the access track from each turbine location to the proposed onsite 110kV electrical substation.

3.2.3.1 Construction Methodology – Internal Site Cabling

The transformer in each turbine is connected to the substation through a network of buried electrical cables. The ground is trenched using a mechanical excavator. The top layer of soil is removed and saved so that it is replaced on completion. The cables are bedded with suitable material unless the ground conditions are such that no bedding is required. The cables will be laid at a depth that meets all national and international requirements, and will be approximately 1.3m below ground level; a suitable marking tape is installed between the cables and the surface. On completion, the ground will be reinstated as previously described above.



Clay plugs will be installed at regular intervals of not greater than 50 metres along the length of the trenches to prevent the trenches becoming conduits for runoff water. While the majority of the cable trenches will be backfilled with native material, clay subsoils of low permeability will be used to prevent conduit flow in the backfilled trenches. This material will be imported onto the Wind Farm Site should sufficient volumes not be encountered during the excavation phase of roadway and turbine foundation construction. Potential quarries that will be considered for the delivery of materials to the Site include; Jim Bolton Sand & Gravel Ltd, Faheymore, Bridgetown, Co Clare: Dereen Sand & Gravel Ltd, O'Brien's Bridge, Montpelier, Limerick and Bobby O'Connell & Sons Ltd, Ballycar, Ardnacrusha, Co Clare.

3.2.4 Meteorological Mast

One permanent meteorological mast is proposed as part of the Proposed Development. The meteorological mast will be equipped with wind monitoring equipment at various heights. The mast will be located at E556203 N669109. The mast will be a self-supporting slender structure 105 metres in height with a lightning mast on top. The mast will be constructed on a hard standing area measuring 21m by 14m and accommodate the crane that will be used to erect the mast. Approximately 75 m of new track roads will be required to access the meteorological mast hard standing area.

3.2.4.1 Construction Methodology – Meteorological Mast

The meteorological mast foundation will comprise a gravity type foundation. Given the ground conditions present at the proposed meteorological mast, the foundation will be founded on glacial till, or weathered bedrock. The founding depth for the met mast foundation is envisaged to be 0.5 to 1.0m below ground level. At the underside of the met mast foundation, a layer of structural up-fill (class 6N) will be required. The meteorological mast will be supported by guyed lattices.

3.2.5 Access Roads

3.2.5.1 Road Construction Types

To provide access within the Wind Farm Site and to connect the wind turbines and associated infrastructure existing tracks will need to be upgraded and new access roads will need to be constructed. The road construction design has taken into account the following key factors as stated in the Fehily Timoney & Company's (FTC) *Peat and Spoil Management Plan* in Appendix 4-2 of the EIAR:

- 1. Buildability considerations.
- 2. Serviceability requirements for construction and wind turbine delivery and maintenance vehicles.
- 3. Minimise excavation arisings.
- 4. Requirement to minimise disruption to peat hydrology.

The access roads on site will be constructed as excavate and replace (founded) type construction, which, given the ground conditions and type of terrain present, this is deemed the most appropriate construction approach. Floating road construction will not be undertaken on the Proposed Development.

The total length of new proposed access road to be constructed on site is 9.3km. The proposed makeup of the founded access roads is a minimum stone thickness of 750mm. The requirement for a layer of geotextile and geogrid and the necessary stone thickness will be confirmed at pre-construction stage.



3.2.5.1.1 Upgrade to Existing Roads or Tracks

The construction methodology for upgrading of existing sections of excavated roads or tracks, as presented in FTC's *Peat & Spoil Management Plan* in Appendix 4-2 of the EIAR, is summarised below. This methodology includes procedures that are to be included in the construction to avoid any adverse impact on peat stability.

- 1. Access road construction will be to the line and level requirements as per design/planning conditions.
- 2. For upgrading of existing access roads (Type A) the following guidelines apply:
 - a. Excavation of the access road will take place to a competent stratum beneath the peat, removing all peat and any soft clay and backfilling with suitable granular fill.
 - b. Benching of the excavation will be required between the existing section of access road and the widened section of access road where the depth of excavation exceeds 500mm.
 - c. The surface of the existing access track will be overlaid with up to 500mm of selected granular fill.
 - d. Access roads will be finished with a layer of capping across the full 6m width of the track.
 - e. A layer of geogrid/geotextile may be required at the surface of the existing access road and at the base of the widened section of access road, where shallow groundwater or surface water is encountered, and where there is a cohesive subgrade to prevent missing of materials(to be confirmed by the designer).
 - f. For excavations in peat, side slopes will not greater than 1 (v): 3 (h). This slope inclination will be reviewed during construction, as appropriate. Where areas of weaker peat are encountered then slacker slopes will be required to ensure stability.
- *3.* The finished road width will have a running width of 5m, with wider section on bends and corners.
- 4. On side long sloping ground any road widening works required will be done on the upslope side of the existing access road, where possible. Where not possible, a specific Risk Assessment Method Statement (RAMS) from the contractor will be produced, detailing how the downslope works will be undertaken, including that all plant would operate from the already constructed section of track, with no loading of the peat on the downslope slope, limiting the length of ground to be stripped/excavated at any one time.

3.2.5.1.2 Construction of New Excavated Roads

Excavate and replace type access roads are the conventional method for construction of access roads on peatland sites and the preferred construction technique in shallow peat provided sufficient placement/reinstatement capacity is available on site for the excavated peat, as is the case for the Proposed Development Site.

The construction methodology for the construction of excavated roads, as presented in FTC's *Peat & Spoil Management Plan* in Appendix 4-2 of the EIAR, is summarised below. This methodology includes procedures which will be implemented during the construction phase to avoid impact on peat stability.

- 1. Prior to commencing the construction of the excavated roads, movement monitoring posts will be installed in areas where the peat depth is greater than 2.0m.
- 2. Interceptor drains will be installed upslope of the access road alignment to divert any surface water away from the construction area



- 3. Excavation of roads will be to the line and level given in the design requirements. Excavation will take place to a competent stratum beneath the peat.
- 4. Road construction will be carried out in sections of approximately 50m lengths i.e. no more than 50m of access road will be excavated without re-placement with stone fill.
- 5. Once excavated, peat will be temporarily stored in localised areas adjacent to excavations for roads and hardstands before being placed into the permanent peat storage areas within the borrow pits. All peat placement areas will be upslope of founded roads/hardstands and will be inspected by the Project Geotechnical Engineer before material is temporarily stored in the area.
- 6. Excavation of materials with respect to control of peat stability.
 - a. Acrotelm (top about 0.3 to 0.4m of peat) will be required for landscaping and will be stripped and temporarily stockpiled either alongside the roads, or in clearfell areas around turbines/hardstands for re-use as required. Acrotelm stripping will be undertaken prior to main excavations.
 - b. The acrotelm will be placed with the vegetation part of the sod facing the right way up to encourage growth of plants and vegetation.
 - *c.* All catotelm peat (peat below about 0.3 to 0.4m depth) will be transported immediately on excavation to the designated placement areas.
- 7. Excavation side slopes in peat will not greater than 1 (v): 3 (h). This slope inclination will be reviewed during construction. Should areas of weaker peat be encountered then slacker slopes will be required. Battering of the side slopes of the excavations will be carried out as the excavation progresses.
- 8. End-tipping of stone onto the road during the construction/upgrading of the access road will be carefully monitored to ensure the excessive impact loading, which may adversely affect the adjacent peat, is limited.
- 9. The excavated access road will be constructed with a minimum of 750mm of selected granular fill. Granular fill will be placed and compacted in layers in accordance with the TII Specification for Road Works¹⁰.
- 10. Access roads will be finished with a layer of capping across the full width of the road.
- 11. A layer of geogrid/geotextile will be required at the surface of the competent stratum, where this stratum is cohesive in nature.
- 12. Where slopes of greater than 5 degrees are encountered along with relatively deep peat (i.e., greater than 1.5m) and where it is proposed to construct the access road perpendicular to the slope contours, it is best practice to start construction at the bottom of the slope and work towards the top, where possible. This method avoids any unnecessary loading to the adjacent peat and greatly reduces any risk of peat instability.
- 13. Where the above is not possible, a specific Risk Assessment Method Statement (RAMS) from the contractor will be produced, detailing how the downslope works will be undertaken, including that all plant would operate from the already constructed section of track, with no loading of the peat on the downslope slope and limiting the length of ground to be stripped/excavated at any one time. Movement monitoring posts (as described in the Peat & Spoil Management Plan, Appendix 4-2) will also be installed downslope of the works area to allow for ongoing monitoring during the construction works.
- *14.* A final surface layer will be placed over the excavated road and graded to accommodate wind turbine construction and delivery traffic.
- 15. The construction and upgrading of access roads in areas of deep peat (greater than 2m) will be inspected on a routine basis (by the Site Manager/Ecological Clerk of Works/Project Geotechnical Engineer) during the works, particularly before/following tracking by heavy vehicular loads.

¹⁰ TII Specification for Road Works Series 600 – Earthworks (including Erratum No. 1), June 2013, CC-SPW-00600. Available at: https://www.tiipublications.ie/library/CC-SPW-00600-03.pdf



3.2.5.2 Construction Methodology - Access Roads

Site roads will be constructed to each turbine base and at each base a crane hard standing will be constructed to the turbine manufacturer's specifications.

The road excavations will follow a logical route working away from the borrow pit locations. Excavated material will be transported back to the borrow pits in haul trucks.

When the road formation layer has been reached, stone from the on-site borrow pit shall be placed to form the road foundation. In the event of large clay deposits being encountered in sections of road, a geotextile layer will be required at sub base level. The sub grade will be compacted with the use of a roller. The final surface course on the road will not be provided until all turbine bases have been poured. This prevents damage to the surface course due to stone and concrete trucks movements. The road will be upgraded prior to the arrival of the first turbine. All roads will be maintained for the duration of the operation of the Proposed Development.

3.2.6 Wind Farm Site Entrance

It is proposed to access the Wind Farm Site via a newly proposed access track off the R465 Regional Road to the east of the site. The proposed entrance takes the form of a priority type junction with the R465 forming the priority route. This entrance will be created to facilitate the delivery of the construction materials and turbine components. Appropriate sightlines will be established to the north and south of the proposed site entrance for the safe egress of traffic. The proposed works will result in a permanent site access from the regional road, which will also form the sole entrance to the Proposed Development during the operational phase.

The construction methodology for the site access follows the same methodology as the site roads, as discussed above.

3.2.7 Borrow Pits

3.2.7.1 **Description**

It is proposed to develop 5 No. on-site borrow pits as part of the Proposed Development. It is proposed to obtain approximately 60% of all rock and hardcore material that will be required during the construction of the Proposed Development from the on-site borrow pits. Usable rock may also be won from other infrastructure construction including the substation and the turbine base excavations. Some aggregate material due to a requirement for specific grade, quality or quantity may be sourced from suitable licenced quarries around the site. An example of quarries located within 3km of the Proposed Development include:

- Jim Bolton Sand & Gravel Ltd., Faheymore, Bridgetown, Co. Clare, V94 4A37
- > Bobby O'Connell & Sons Ltd., Ballycar, Ardnacrusha, Clare
- > Dereen Sand & Gravel Ltd, O'Brien's Bridge, Montpelier, Limerick
- > Roadstone Ltd, Ballylin, Foynes, Co. Limerick, V94 NY54

Borrow pit No. 1 located approximately 110 metres to the west of Turbine No. 1, measures approximately $6,400m^2$ in area and is intended to supply hardcore materials for the construction of the turbines in the west of the site, access roads thereto and a temporary construction compound.

Borrow pit No. 2 located approximately 750 metres to the northwest of Turbine No. 4, measures approximately $9,900m^2$ in area and is intended to supply hardcore materials for the construction of turbines in the northwest of the site and access roads thereto.



Borrow pit No. 3 located approximately 260 metres to the southeast of Turbine No. 4, measures approximately $5,500m^2$ in area and is intended to supply hardcore materials for the construction of the turbines in the centre of the site, access roads thereto, and the permanent meteorological mast.

Borrow pit No. 4 located approximately 160 metres to the west of Turbine No. 6, measures approximately 5,500m² in area and is intended to supply hardcore materials for the construction of the turbines in the centre of the site, access roads thereto, electrical substation and a temporary construction compound.

Borrow pit No. 5 located approximately 240 metres to the east of Turbine No. 9, measures approximately $6,700m^2$ in area and is intended to supply hardcore materials for the construction of the turbines in the east of the site, access roads thereto, electrical substation and a temporary construction compound.

The borrow pits will, on removal of all necessary and useful rock, will be reinstated with excavated peat and subsoils. Post-construction, the borrow pits areas will be permanently secured and a stock-proof fence will be erected around the borrow pit areas to prevent access to these areas. Appropriate health and safety signage will also be erected on this fencing and at locations around the fenced area.

At certain turbine foundation and hardstand locations, depending on local ground conditions, the extraction of rock may be required in order to obtain a level construction area. Any rock obtained from a turbine location will be used to supply the hardcore materials requirement for that turbine's hardstand and access road.

Hardcore materials will be extracted from the borrow pits (and some turbine locations, if necessary), principally by means of rock breaking. Depending on the hardcore volume requirements, blasting may also be used as a more effective rock extraction method, capable of producing significant volumes of rock in a matter of milliseconds. Blasting will only be carried out after notifying any potentially sensitive local residents. However, data available from the ground investigations undertaken to date indicated that the rock can be removed by breaking.

The two proposed extraction methods are detailed below.

3.2.7.2 Rock Extraction Methods

Where present, overburden will be stripped back and stockpiled in dedicated safe locations (please see Appendix 4-2 of the EIAR, Peat and Spoil Management Plan) using standard tracked excavators. Two extraction methods will be used and have been assessed for breaking out the useful rock below; rock breaking and blasting.

3.2.7.2.1 Rock Breaking

Weathered or brittle rock can be extracted by means of a hydraulic excavator and a ripper attachment. This is a common extraction methodology where fragmented rock is encountered as it can be carefully excavated in layers by a competent operator. In areas where rock of a much higher strength is encountered and cannot be removed by means of excavating then a rock breaking methodology may be used. Where rock breaking is required, a large hydraulic 360-degree excavator with a rock breaker attachment is used. Given the power required to break out tight and compact stone at depth, the machines are generally large and in the 40-60 tonne size range. Even where rock might appear weathered or brittle at the surface, the extent of weathering can quickly diminish with depth resulting in strong rock requiring significant force to extract it at depths of only a few metres.

A large rock breaking excavator progressively breaks out the solid rock from the ground in the borrow pit area. The large rock breaker is typically supported by a smaller rock breaker which can often be in the 30-40 tonne size range, and works to break the rocks down to a size that they can be fed into a crusher.


The extracted broken rock is loaded into a mobile crusher using a wheeled loading shovel and crushed down to the necessary size of graded stone required for the on-site civil works. The same wheeled loader takes the stone from the crusher conveyor stockpile and stockpiles it elsewhere away from the immediate area of the crusher until it is required elsewhere on the Wind Farm Site.

3.2.7.2.2 Rock Blasting

Where blasting is used as an extraction method, a mobile drilling rig is used to drill vertical boreholes into the area of rock that is to be blasted. The drilling rigs used are normally purpose built, selfpropelled machines, designed specifically for drilling blast boreholes. A drilling rig working for 3-4 days would typically drill the necessary number of boreholes required for a single blast. The locations, depth and number of boreholes are determined by the blast engineer, a specialist role fulfilled by the blasting contractor that will be employed to undertake the duties.

The blast engineer will then arrange for the necessary quantity of explosive to be brought to site to undertake a single blast. The management of explosives on site and the actual blasting operation will be agreed in advance with and supervised by An Garda Siochána. The blast engineer sets the explosives in place in the boreholes, sets the charges, and fires the blast. The blast takes only a matter of milliseconds, but may be perceived to take longer as blast noise echoes around the area.

A properly designed blast will generate rock of a size that can be loaded directly into a mobile crusher, using the same wheeled loader description outlined above. From that point on, the same method is used for processing the rock generated from a blast, as would be used to process rock generated by rock breaking. It would be likely that a drilling rig would recommence drilling blast holes for the next blast as soon one blast finished. Rock blasting will be undertaken in line with the Safety and Health Commission for the Mining and other Extractive Industries report on *Guidance on the Safe Use of Explosives in Quarries 2001*¹¹to ensure the safe use of explosives on-site. Only authorised people will handle explosives for rock blasting at the site. Given the small quantities of explosives to be used on site, it is considered that there is negligible risk of a major accident occurring from the use of explosives on site.

3.2.7.3 **Construction Methodology – Borrow Pits**

The borrow pit locations were selected based on the shallow depth of peat and overburden and accessibility from the existing forestry tracks.

The borrow pits will be constructed as follows:

- 1. Peat and overburden will be removed and temporarily stored in localised areas adjacent to the borrow pit locations before being placed into the permanent peat storage areas within the borrow pits. The rock within the proposed borrow pit footprints will be removed by either breaking or blasting depending on its excavatability, which will be determined from confirmatory ground investigation carried out at the proposed borrow pits. The ground investigation will comprise rotary core drilling with associated engineering logging including rock quality designation and strength and durability testing. Data available from the ground investigation undertaken to date indicates that the rock can be removed by breaking.
- 2. It is proposed to construct the borrow pits so that the base of the borrow pits are below the level of the adjacent section of access road. As excavation progresses into the back

¹¹

https://www.hsa.ie/eng/publications_and_forms/publications/mines_and_quarries/guidance%20on%20the%20safe%20use%20of%20explosives%20in%20quarries.pdf



edge of the borrow pits, localised deepening of the borrow pit floors may be required depending on extraction operations.

- 3. Slopes within the excavated rock formed around the perimeter of the borrow pits will be formed at stable inclinations to suit local in-situ rock conditions. Exposed sections of the rock slopes will be left with irregular faces and declivities to promote re-vegetation and provide a naturalistic appearance.
- 4. The stability of the rock faces within the borrow pits will be inspected by the Project Geotechnical Engineer upon excavation to ensure stability during construction works and in the long term. This inspection will allow unfavourable rock conditions to be identified and suitable mitigation measures to be applied such as removal of loose rock, in line with best practice guidelines.
- 5. It will be necessary to construct rock buttresses founded on in-situ rock within the borrow pits to create individual cells (2 or 4 no.). The cells will be opened in sequence and filled as needed. The rock buttresses will be constructed of rock fill from the borrow pit excavation, placed and compacted in layers. The founding stratum for each rock buttress will be inspected and approved by the Project Geotechnical Engineer.
- 6. The rock buttresses will be constructed in stages to allow infilling of peat and spoil within cells. The buttress will be constructed of selected rock fill and placed and compacted in suitable layers to form a buttress of sufficient stability to retain the placed peat and spoil.
- 7. Infilling of the peat and spoil will commence at the back edge of the borrow pit and progress towards the borrow pit entrance/rock buttress, allowing the borrow pit to be developed and infilled in cells. The contractor excavating the rock will be required to develop the borrow pits in a way which will allow the excavated peat and spoil to be reinstated safely.
- 8. A number of rock buttresses to form cells with the borrow pits will be required to ensure access for trucks and excavators can be achieved. See Drawings P22-153-0600-0018 to 0022 for the location of the rock buttresses. The locations of the rock buttresses shown on Drawings P22-153-0600-0018 to 0022 (Peat and Spoil Management Plan in Appendix 4-2 of the EIAR) for the borrow pits are indicative only and may change subject to local conditions encountered on site during construction and as a result of the confirmatory ground investigation.
- 9. The rock buttresses will be wide enough (up to 4m) to allow construction traffic access for tipping and grading during the placement of the excavated peat and spoil. The permanent side slopes of the rock buttress will be constructed at between 40 to 60 degrees.
- 10. A rock buttress (perimeter berm) will be required on the downslope side of the borrow pits to safely retain the infilled peat and spoil. The height of the berm constructed will be greater than the height of the reinstated peat and spoil to prevent any surface peat and spoil run-off. A berm up to 7m in height will be required at each borrow pit. The highest berm is required at borrow pit 4.
- 11. The perimeter berm will be founded on weathered bedrock i.e. competent strata. The founding stratum for the perimeter berm will be inspected and approved by the Project Geotechnical Engineer.
- 12. A level surface in the underlying granular mineral soil or weathered bedrock will be prepared before placing and compacting the rock fill used to construct the berms. Both



of these materials will be encountered at the borrow pit locations and both are suitable founding strata for the berms.

- 13. In order to prevent water retention occurring behind the buttresses, the buttresses will be constructed of coarse boulder fill with a high permeability. The buttress will be constructed of well graded granular rock fill of 100mm up to 500mm in size. In addition, drains will be placed through the buttresses to allow surface water to drain from the surface of the placed peat. These drains will be inspected periodically, both during construction and during operation of the Proposed Development, to ensure they do not become blocked.
- 14. A layer of geotextile will be placed on the inside face of the perimeter berm to act as a separator layer between the berm and the placed peat/spoil, to prevent the placed peat/spoil infilling any voids on the inside face of the berm, maintaining the permeability of the berm.
- *15.* The use of temporary access ramps and long reach excavators during the placement of the excavated peat and spoil will be required.
- *16.* The surface of the placed peat and spoil will be shaped using excavators to allow efficient run-off of surface water from the placed arisings.
- 17. As the berms are slightly higher than the retained peat, drains will be provided at regular intervals through the berms, at the same level as the top of the peat surface, to prevent ponding of water around the edges of the repositories. These drains will be 150mm diameter flexible plastic drainage pipes or equivalent.
- 18. A layer of geogrid to strengthen the surface of the placed peat within the borrow pits will be required.
- 19. An interceptor drain will be installed upslope of the borrow pit. This drain will divert any surface water away from the borrow pit and hence prevent water from ponding and lodging during construction and also when reinstated.
- 20. Temporary control of groundwater within the borrow pits will be required and exact measures will be determined as part of the confirmatory ground investigation programme. A temporary pump and suitable outfall locations will be required during construction.
- 21. Perimeter drains will be installed around the individual cells within the borrow pits and will discharge to a settlement pond at the lower side/outfall location of the borrow pits.
- 22. The acrotelm will be placed with the vegetation part of the sod facing the right way up to encourage growth of plants and vegetation at the surface of the peat and spoil within the borrow pits.
- 23. Supervision by the Project Geotechnical Engineer is required for the development of the borrow pits.
- 24. All the above-mentioned general guidelines and requirements will be implemented by the Contractor during construction.

A temporary access track will be placed around the perimeter of the borrow pit area to allow for the tipping of peat over the edge of the borrow pit area. This track will be constructed using granular fill (excavated from the borrow pits) and will be placed and compacted as per the main site access roads.



3.2.8 Peat and Spoil Management Plan

The purpose of Peat and Spoil Management Plan (Appendix 4-2 of the EIAR) is to provide a management plan, with particular reference to peat stability for the construction phase of the Proposed Development. The report describes how peat and spoil, which will be excavated from infrastructure locations such as turbine bases, hardstands, borrow pits and roads, will be handled and placed/reinstated onsite. The report also provides construction details for the types of roads which will be put in place at the site and proposed peat and spoil placement/reinstatement areas which will be developed at the site.

3.2.8.1 Peat and Spoil Usage in Restoration of Borrow Pits

Once the required volume of rock has been extracted from the borrow pit areas it is proposed to reinstate these areas with peat and overburden excavated from the works areas of the Proposed Development. The borrow pits will be extracted and reinstated in sequence, beginning with the borrow pit nearest the Wind Farm Site entrance (Borrow pit No. 5).

Where possible, the acrotelm peat that has been excavated from across the site and not retained for reinstatement and landscaping works in those locations, will be stored with the vegetated side facing up so as to promote the growth of vegetation and placed across the surface of the stored peat within the borrow pit areas.

3.2.9 **Temporary Construction Compounds**

3 no. temporary construction compounds are proposed for the Wind Farm Site to avoid excessive movements around the site. Construction compound 1 and 2 each measure approximately 68 metres by 45 metres and 3,060 m² in area, located in the western and central sections of the site, adjacent to the existing access road, approximately 125 metres north of Turbine No. 3, and approximately 155 metres west of Turbine No. 6, respectively.

Construction compound 3 measures approximately 104 metres by 60 metres and $6,240 \text{ m}^2$ in area is proposed for the east of the site, adjacent to the proposed new access road approximately 65 metres to the west of Turbine No. 9, and approximately 700 metres east of the electricity substation.

The construction compounds will consist of temporary site offices, staff facilities and car-parking areas for staff and visitors. Construction materials and turbine components will be brought directly to the proposed turbine locations following their delivery to the site. Temporary port-a-loo toilets located within a staff portacabin will be used during the construction phase. Wastewater from staff toilets will be directed to a sealed storage tank, with all wastewater being tankered off site by permitted waste collector to wastewater treatment plants. The nearest licenced primary wastewater treatment plant is located in O'Briensbridge, approximately 7km east of the Proposed Development.

3.2.9.1 Construction Methodology - Temporary Construction Compounds

The 3 no. temporary construction compounds will be constructed as follows:

- > The area to be used for each compound will be marked out at the corners using ranging rods or timber posts. Drainage runs and associated settlement ponds will be installed around the perimeter;
- > The compound platform will be established using a similar technique as the construction of the substation platform as discussed in Section 4.2.2 above;



- > A layer of geo-grid will be installed where deemed necessary by the designer and compacted layers of well graded granular material will be spread and lightly compacted to provide a hard area for Site offices and storage containers;
- A limited amount of fuel will have to be stored on the Proposed Development site and for the Grid connection in appropriately bunded containers and a bunded area for oil storage will be constructed within the compound.
- > Areas within the compound will be constructed as site roads and used as vehicle hardstanding during deliveries and for parking;
- > A bunded containment area will be provided within the compound for the storage of lubricants, oils and site generators etc;
- > A waste storage area will be provided within the compounds;
- > The compounds will be fenced and secured with locked gates if necessary; and,
- > Upon completion of the Proposed Development the temporary construction compounds will be decommissioned and allowed to vegetate naturally.

3.2.10 Amenity Works

The Proposed Development will provide approximately 1.4km of a dedicated amenity trail in the form of a new track within and connecting to the 12 O'Clock Hills Trailhead. This amenity trail in the townlands of Snaty (Wilson) and Snaty (Massy) will allow walkers to relocate from the existing trail on the public road, into the forest environment, thus increasing the appeal and safety of the existing trail. Two new viewing areas and one upgrade to an existing viewing area will be provided by the Proposed Development. The new viewing area will be placed along the northern end of the existing 12 O'Clock Hills' Fairy Trail, while upgrades will be made to the existing viewing area at the Lower Summit of Knockanuarha. Seating, signage and fixed binoculars are proposed for these two viewing areas, where there will be long-ranging views available. Development works for this amenity trail will require felling of one row trees and the inclusion of a hardcore track. Due to the proposal to incorporate a turbine hardstand area into this amenity trail, it will not be possible to open this trail until the operational stage of the Proposed Development.

3.2.11 **Temporary Works Associated with Turbine Component and Abnormal Load Delivery**

It is proposed that large wind turbine components will be delivered to the Wind Farm Site from Shannon Foynes Port, via the N69 National Secondary Road. A summary of the turbine delivery route is as follows:

- From the access road serving Shannon Foynes Port the route turns south onto the N69 National Secondary Road at the existing priority junction.
- From this point the route heads east on N69 for approximately 32 km.
- The route then turns at the N69 / R510 roundabout to head south for approximately 1.1km, passing through Ard Aulin roundabout to reach the roundabout of the R510 and Father Russell Road.
- From here the route turns heading northeast on Father Russell Road for approximately 1.3km passing through the Oakfield Roundabout to reach the roundabout that connects with the R526.
- The route continues northeast on the R526 for approximately 1.5km passing through the roundabout with Dooradoyle Road to the traffic signals at Ballinacurra Road.
- From this point the route travels northeast through Limerick City Centre for approximately 2.9km via O'Connell Avenue, O'Connell Street, Bridge Street and Athlunkard Street to the roundabout of R463 Corbally Road / Pa Healy Road.
- > The route then heads north on the R463 for approximately 4.3km crossing the River Shannon, which forms the County Limerick and County Clare border, onto the river crossing at Ardnacrusha.



From here the route merges and continues on the R465 for approximately 7.2km, to the location of the proposed Wind Farm Site access junction on the R465.

The total length of the Turbine Delivery Route from Foynes Port to the access junction off the R465 is approximately 50 kms. All deliveries of abnormally sized loads will be made using An Garda Siochána escorts and local transient traffic management measures put in place by the haulage company.

The delivery route for general construction traffic including site staff and heavy goods vehicles (HGVs) delivering general construction materials to the site may vary depending on the location of the suppliers used for concrete and other materials required to construct the Proposed Development.

Concrete / Rock / Stone

At this stage it is not confirmed where the concrete required for the turbine foundations or the finer crushed stone required during the construction phase will be transported from. There are quarries located to the south of the Proposed Development (R465 Limerick and south), from the north and northwest (R465 from Broadford) and from the southeast (via R466 and R465 from Broadford) that may be used to provide concrete, rock and stone. While it is proposed that quarries situated closest to the site will be used in order to minimise the traffic effects of the Proposed Development, in order to test a robust traffic scenario it is assumed that all concrete, rock and stone may be delivered from any one of these directions.

General construction materials, felled timber, other miscellaneous items and waste

Similarly, it is not confirmed at this stage where general construction materials, felled timber, miscellaneous items and waste will be transported from or to. Again, in order to test a robust traffic scenario, it was assumed that all general construction traffic may be delivered from the same directions as described above.

Other wind turbine component deliveries (components delivered using standard HGVs)

> All other wind turbine components delivered by standard HGVs will arrive at Shannon Foynes Port and will be delivered by via the same haul route as for the abnormally sized loads as set out above.

3.2.11.2 Accommodation Works

Works such as road widening are sometimes required along proposed turbine transport routes to accommodate the large vehicles used to transport turbine components to wind farm sites. The proposed transport route for the Proposed Development has been the subject of a route assessment to determine if any widening works are required along its length and are as follows:

Location 1 – Left turn onto N69

Vehicles will be accommodated with some minor temporary removal of street furniture, poles/posts, signs, cabinets, overhead cables, removal/trimming of trees. Oversail of the blade outside the carriageway edge is required, with a potential oversail impact on third-party lands.

Location 2 – S-Bend on N69

There will be requirement for some minor temporary removal of street furniture, poles/posts, signs, cabinets, overhead cables, at this location. Oversail of the blade outside the carriageway edge is required.



Location 3 – Bends on N69

There will be no impacts at this location.

Location 4 – Left bend on N69

There will be no impacts at this location.

Location 5 – Left bend on N69

There will be requirement for some minor temporary removal of street furniture, poles/posts, signs, cabinets, overhead cables, at this location. Oversail of the blade outside the carriageway edge is required.

Location 6 - Right bend on N69

Vehicles will be accommodated with some minor temporary removal of street furniture, poles/posts, signs, cabinets, overhead cables. Oversail of the blade outside the carriageway edge is required, with a potential oversail impact on third-party lands.

Location 7 - Right bend on N69 - Kildimo

Vehicles will be accommodated with some minor temporary removal of street furniture, poles/posts, signs, cabinets, overhead cables, including parking restrictions. Oversail of the blade outside the carriageway edge is required, with a potential oversail impact on third-party lands.

Location 8 – N69 Ferrybridge

There will be no impacts at this location as the load on the tower transporter will be fully raised to avoid contact with the road.

Location 9 - Roundabout on N69 - Clarina

Tower transporter vehicles will be accommodated with some minor temporary removal of street furniture, poles/posts, signs, cabinets, overhead cables. A minor temporary over-run through the roundabout centre island will be required in order to accommodate the tower transporter vehicle.

Location 10 - N69/N18 east/R510 roundabout

There will be requirement for some minor temporary removal of street furniture, poles/posts, signs, cabinets, overhead cables, at this location to accommodate the tower transporter vehicle. Oversail of the tower transporter over the grass verge is required, with a potential for a minor temporary over-run through splitter islands required. The blade lifter vehicle will not impact this location.

Location 11 - R510 roundabout

There will be requirement for some minor temporary removal of street furniture, poles/posts, signs, cabinets, overhead cables, including pruning of trees at this location to accommodate both the tower transporter and blade lifter vehicles. Oversail over the roundabout centre island is required for the tower transporter vehicle, with a slight over-run of the centra island required from the blade lifter vehicle.



Location 12 & 13 – R510/Father Russell Road roundabout

There will be requirement for some minor temporary removal of street furniture, poles/posts, signs, cabinets, overhead cables, at this location to accommodate both the tower transporter and blade lifter vehicles. There will be oversail required outside the carriageway edge, with a temporary over-run through the roundabout island and splitter island required.

Location 14 – Father Russell Road/R526 roundabout

There will be requirement for some minor temporary removal of street furniture, poles/posts, signs, cabinets, overhead cables, including the removal of an EIR box, electric cables and cycle lane separation bollards at this location to accommodate both the tower transporter and blade lifter vehicles. There will be slight oversail required outside the carriageway edge.

Location 15 - R526/R926 roundabout

The tower transporter vehicle will require for some minor temporary removal of street furniture, poles/posts, signs, cabinets, overhead cables at this location. There will be slight oversail required outside the carriageway edge. The blade lifter vehicle will not impact this location.

Location 16 & 17 – Right bend and crest on R463

There will be no impacts at this location as the tower transporter and blade lifter loads will be fully raised to avoid contact with the road.

Location 18 & 19 - Crest on bridge and R463 roundabout

There will be requirement for some minor temporary removal of street furniture, poles/posts, signs, cabinets, overhead cables, with the removal of overhead cables also included due to the blade lifter vehicle at this location to accommodate both the tower transporter and blade lifter vehicles. There will be slight oversail required outside the carriageway edge, and the tower transporter load will be fully raised to avoid contact with the road.

Location 20 - Crest on bridge on R463

There will be no impacts at this location as the tower transporter load will be fully raised to avoid contact with the road.

Location 21 – Dip in road on R463

There will be no impacts at this location as the tower transporter load will be fully raised to avoid contact with the road.

Location 22 – Crest on R463

There will be no impacts at this location as the tower transporter load will be fully raised to avoid contact with the road.

Location 23

There will be requirement for some minor temporary removal of street furniture, poles/posts, signs, cabinets, overhead cables, including trees and vegetation to be trimmed and poles to be removed at this location to accommodate both the tower transporter and blade lifter vehicles. There will be minor



oversail of the blade only outside the carriageway edge, with the requirement for road verges to be strengthened for both the tower transporter and blade lifter vehicles.

Location 24 & 25

There will be requirement for some minor temporary removal of street furniture, poles/posts, signs, cabinets, overhead cables, including trees and vegetation to be trimmed and poles to be removed at this location to accommodate both the tower transporter and blade lifter vehicles. There will be minor oversail outside the carriageway edge, with the requirement for road verges to be strengthened for both the tower transporter and blade lifter vehicles, which will impact on third-party lands.

Location 26

There will be requirement for some minor temporary removal of street furniture, poles/posts, signs, cabinets, overhead cables, including trees and vegetation to be trimmed at this location to accommodate both the tower transporter and blade lifter vehicles. There will be minor oversail outside the carriageway edge, with the requirement for road verges to be strengthened for both the tower transporter and blade lifter vehicles, which will impact on third-party lands.

Location 27

There will be requirement for some minor temporary removal of street furniture, poles/posts, signs, cabinets, overhead cables, including trees and vegetation to be trimmed at this location to accommodate both the tower transporter and blade lifter vehicles. There will be minor oversail outside the carriageway edge, with the requirement for road verges to be strengthened for both the tower transporter and blade lifter vehicles, which will impact on third-party lands.

Location 28 – Proposed access junction A on R465

The proposed junction on the R465 will provide access to the Proposed Development for all traffic during the construction phase, including abnormally sized loads, standard HGV deliveries and construction staff. When the Proposed Development is operational the junction will provide for all maintenance trips.

The junctions design includes 13m junction radii and 1:10 tapers in accordance with TII Junction Design Guidelines (TII DN-GEO-03060) for junctions with HGV turning movements. The junction design also includes a temporary run-over area required to accommodate the abnormally sized loads.

Location 29 – Proposed access junction B on L-3042, Drumshillagh or Sallybank (Parker)

As construction, operational and decommissioning traffic travels through the internal layout all traffic requiring to access Turbines No 1 to 7 will require to cross the L-3042 at the proposed junction set out in Figure 15-8 in Chapter 15 of the EIAR. The junction takes the form of a crossroads with traffic management measures required during the construction and decommissioning stages of the Proposed Development to ensure a safe environment for existing and development generated traffic. The junction designs and the visibility splays proposed in the horizontal and vertical planes are in accordance with guidelines and will therefore operate without traffic management measures during the operational phase, when background traffic volumes on the L-3042, and the traffic generated by the Proposed Development are low. It is proposed that the site accesses are gated to restrict access to the site to authorised personnel only.

Once operational, access to the site at this location will be required for occasional maintenance trips only. During this period the gates will remain closed and will be opened by the maintenance staff for the duration of their visit. At present there is an existing agricultural/forest access that links into the L-3042 from the west. It is proposed to retain this access, improved to provide 13m junction radii appropriate for existing vehicle types. The western arm then continues west, which will accommodate all development generated traffic. Outside construction periods, this arm will be gated just to the west of the existing agricultural/forestry access. During the operational stage the gate will be opened by maintenance staff to gain access.

A new access is proposed on the east side of the L-3042. This access is for the purpose of all development generated traffic to cross the L-3042, with no turning movements permitted between the new access and the existing L-3042. For this reason, nominal junction radii of 3m are proposed. Similarly, once construction of the Proposed Development is complete this access will be gated and opened when required by staff for access during maintenance visits.

Locations 30 & 31 – Proposed access junctions C and D, Snaty (Massy)

All construction, operational and decommissioning traffic requiring access to Turbines No 1 to 3 will require to cross the existing un-named local road at Access Junction C and Junction D, with the proposed junction layout.

At present there is an existing agricultural/forest access that links into the un-named local road from the east. It is proposed to retain this access, with 6m junction radii proposed in accordance with the existing access.

A new access is proposed on the west side of the un-named local road. This access is for the purpose of development generated traffic only, with no turning movements permitted. Nominal junction radii of 3m is proposed at this location. It is proposed that the access on the western side is gated and opened during construction periods and for maintenance visits only.

The junction layout proposed at Access Junction D takes the form of 2 no. staggered priority junctions that will be in place permanently during the operational phase, with temporary routes through the junction to be used during the construction phase only.

3.2.11.3 **Temporary Transition Compound**

A temporary transition compound is proposed adjacent to the N69, in the townland of Court, Co. Limerick, to facilitate turbine blade delivery. The compound measures approximately 200m along the N69 and 60m in width. Turbine components are generally transported at night when traffic is lightest and this is done in consultation with the roads authorities and An Garda Síochána, and special permits are generally required.

3.2.11.4 Construction Methodology – Temporary Works Associated with Turbine Component and Abnormal Load Delivery

It is proposed that large wind turbine components will be delivered to the Wind Farm Site from Shannon Foynes Port, via the N69 National Secondary Road. As discussed above, widening works are required along sections of the proposed turbine delivery route. The works include the trimming of vegetation and strengthening of road verges using the methodologies outlined above.

The construction methodology of the compound will be similar to that of the turbine hardstands, and will be in place solely for the duration of turbine blade delivery to the Wind Farm Site.

Once the turbines have been delivered to the Wind Farm Site, the temporary transition compound will be decommissioned, and the site will be reinstated to its original form. Therefore, it is proposed to replant the trees being lost in their original locations.



Advanced nursery stock will be planted in order to reduce the amount of time required to reach the age class of the trees being removed. The species to be planted will comprise poplar, willow, or hawthorn preferably, or another native species that is found locally and which is suited to local soil conditions and to be being planted as advanced stock.

3.2.12 Ancillary Forest Felling

3.2.12.1 Tree Felling

Some of the proposed Wind Farm Site is occupied by commercial forestry. As part of the Proposed Development, tree felling will be required within and around the development footprint to allow the construction of turbine bases, bat buffers, access roads, and the other ancillary infrastructure.

It should be noted that forestry on the proposed Wind Farm Site was originally planted as a commercial crop and will be felled in the future should the Proposed Development proceed or not.

A total of 107.56 hectares of forestry will be felled for the Proposed Development. This includes a total of 48.89 hectares permanently felled within the footprint of the Wind Farm Site (including the 50m buffer to all habitat features used by bats, as discussed in Section 6.3 in Chapter 6 Biodiversity of the EIAR), approximately 5.69 hectares temporarily felled within the footprint of the Wind Farm Site and 52.98 hectares as part of the Hen Harrier Compensation and Enhancement Plan.

3.2.12.2 Replanting

The clearfelling of trees in the State requires a felling licence, as discussed above. The associated afforestation of alternative lands equivalent in area to those lands being permanently clearfelled is also subject to licensing ('afforestation licensing'). The Forest Service of the Department of Agriculture, Food & the Marine is Ireland's national forest authority and is responsible for all forest licensing. In light of the foregoing and for the purposes of this project, the developer commits that the location of any replanting (alternative afforestation) associated with the project will be greater than 10km from the Wind Farm Site and also outside any potential hydrological pathways of connectivity i.e., outside the catchment within which the Proposed Development is located. Areas of forestry proposed to be permanently clearfelled for this Wind Farm are located in upland, marginal land locations. The developer commits to not commencing the project until both felling and afforestation licences are in place and this ensures the afforested lands are identified, assessed and licensed appropriately by the relevant consenting authority.



3.2.13 Biodiversity Management Plan (BMP)

As outlined in Chapter 7 of the EIAR, there is the potential for impact on foraging hen harrier during the operational phase of the Wind Farm Site. As outlined, there is the potential for the loss of 58.57 hectares of foraging habitat for hen harrier through displacement within the Wind Farm Site post-construction. It is proposed to reduce the impact on foraging hen harrier through compensation and enhancement of the surrounding lands. A detailed description of the compensation and enhancement measures for hen harrier are outlined in the Biodiversity Management Plan (BMP) in Appendix 6-5 of the EIAR. A total of 54.2ha of compensation lands is being proposed for the benefit of hen harrier. A further 46.5ha of upland grassland and peatland is now also proposed for enhancement and safeguarding for foraging hen harrier. It is proposed to enhance habitats such as heath/bog, scrub and grassland through the retention and reinstatement of beneficial landscape features (e.g. scrub and hedgerows), through rush management, and through the management of grazing timing and intensity. It is proposed that these compensation and enhancement measures will be in place before the construction phase begins, to ensure that there is ample foraging habitat for the local hen harrier pair before disturbance or displacement occurs.

Measures described in the BMP will also serve to offset the loss of 0.9ha of wet heath, 0.45ha of oakash-hazel woodland and 920m of hedgerow/treeline associated with the Proposed Development. The Plan provides for sufficient habitat restoration to ensure no net permanent loss of these habitats occur. A total of 1,170m of linear hedgerow and treeline habitat is proposed.

3.3 Development Components of the Proposed Grid Connection

3.3.1 Grid Connection Cabling

A connection between the Wind Farm Site and the national electricity grid will be necessary to export electricity from the proposed wind farm.

It is proposed to construct a 110kV substation at the eastern end of the Wind Farm Site and to connect from here to the existing Ardnacrusha 110kV substation via underground 110kV electrical cabling, measuring approximately 9.2 km in total, utilising public local road networks, existing Coillte forest access tracks, existing private forestry access tracks and private agricultural lands.

3.3.1.1 Construction Methodology - Grid Connection Cable Trench from substation to the National Grid

The underground cabling works will consist of the installation of ducts in an excavated trench to accommodate power cables, and a fibre communications cables to allow communications between the proposed 110kV onsite substation and the existing 110kV Ardnacrusha substation. The proposed Grid Connection will involve 2 No. bridge crossings including 2 No. horizontal directional drilling (HDD) crossings. The underground cable will encounter 5 no. water culverts along the Grid Connection route.

The underground cable for the Grid Connection will be a single circuit connection consisting of 3 no. 160mm diameter high-density polyethylene (HDPE) power cable ducts, 2 no. 125mm diameter HDPE communications ducts and 1 no. 63mm diameter earth continuity duct to be installed in an excavated trench, to a width of between 600mm and 825mm, and a maximum depth of 1,315mm. Minimum trench depths will depend on the crossings and space restrictions, where ducting arrangements can run flat, where crossings are very shallow.



The Grid Connection route utilises public local road networks (8,077m), existing access tracks (460m), private forestry access tracks and private lands (650m). The following methodology will be followed during the trenching works:

- The Contractor, and their appointed Site Manager, will prepare a targeted Method Statement concisely outlining the construction methodology and incorporating all mitigation and control measures included within the planning application and accompanying reports and as required by planning conditions where relevant;
- > All existing underground services shall be identified on site prior to the commencement of construction works;
- > At watercourse crossings, the contractor will be required to adhere to the environmental control measures detailed in the CEMP (see Appendix 4-3of the EIAR);
- Where the cable route intersects with culverts, the culvert will remain in place (where possible) and the ducting will be installed either above or below the culvert to provide minimum separation distances in accordance with ESB and Uisce Éireann specifications¹²;
- In the event that existing culverts require movement/reinstatement for ducting installation, the trench will be installed to the desired width and be supported by rapid hardening wet concrete grade C25/30 between the culvert and the pipe ducting. Existing culverts will be supported until the rapid hardening concrete sets, the desired backfill will be reinstated with the desired backfill as per guidelines for the opening (Guidelines for Managing Openings in Public Roads, 2017¹³). Once the ducts are installed the culvert will be reinstated to match existing levels and dimensions;
- > Traffic management measures will be implemented as described in the Traffic Management chapter, and detailed Traffic Management Plan (Appendix 15-2 of EIAR)
- Excavated material will be temporarily stockpiled onsite for re-use during reinstatement. Stockpiles will be restricted to less than 2m in height. Stockpiles will be located a minimum of 50m from surface water features and all stockpiling locations will be subject to approval by the Site Manager and ECoW.
- > Excavated material will be employed to backfill the trench and any surplus material will be transported off site and disposed at a fully authorised soil recovery site,
- > Any earthen (sod) banks to be excavated will be carefully opened with the surface sods being stored separately and maintained for use during reinstatement;
- > The excavated trench will be dewatered if required, from a sump installed within the low section of the opened trench. Where dewatering is required, dirty water will be fully and appropriately attenuated, through silt bags, before being discharged to vegetation or surface water drainage feature;
- Reinstatement of Private Land Where required, grass will be reinstated by either seeding or by replacing with grass turves;
- No more than a 100m section of trench will be opened at any one time. The second 100m will only be excavated once the majority of reinstatement has been completed on the first;

¹² ESB Document PE424-F7001-R00-001-001 HV Cables – General Construction Methodology (2012). Available at: http://eirgridlaoiskilkenny.ie/media/pdf/21%20The%20Final%20Planning%20Application%20(Jan%202013)/Vol%203B%20Environmental%20Documents/%20Underground%20Cables%20Construction al%20Supplemantal%20Documents/Supplementary%20Environmental%20Documents/4%20Underground%20Cables%20Construction

^{%20}Methodology.pdf

Uisce Éireann Document IW-CDS-5050-03 Code of Practice for Water Infrastructure (2020). Available at: https://www.water.ie/docs/connections/fags/Water-Code-of-Practice.pdf

EirGrid Documents CDS-GFS-00-001-R1 110kV, 220kV and 400kV Underground Cable Functional Specification (2021). Available at: https://www.eirgrid.ie/site-files/library/EirGrid/110kV-Underground-Cable-Functional-Specification-General-Requirements.pdf

¹³ Department of Transport, Tourism and Sport Guidelines for Managing Openings in Public Roads (2017). Available at: https://www.gov.ie/pdf?file=https://assets.gov.ie/44340/93268cf8e49943cb836fda4f6ea6dfd0.pdf#page=null



- > The excavation, installation and reinstatement process will take on average of 1 no. day to complete a 100m section;
- > Where the cable is being installed in a roadway, temporary reinstatement may be provided to allow larger sections of road to be permanently reinstated together;
- Following the installation of ducting, pulling the cable will take approximately 1 no. day between each joint bay, with the jointing of cables taking approximately 1 week per joint bay location.

For the trenching and ducting works, the following step by step methodology will apply:

- Grade, smooth and trim trench floor when the required 1315mm depth and 825mm width have been obtained.
- > Place bedding layer of Cement Bound Granular Mixture B (CBGM B) material in accordance with the specification and compact it so that the compacted thickness is as per the drawings.
- Lay the bottom row of ducts in trefoil formation as detailed on the design drawings. Use spacers as appropriate to establish horizontal duct spacing. Fit a secure cap / bung to the end of each duct run to prevent the ingress of dirt or water.
- Carefully surround and cover ducts with CBGM B in accordance with the design drawings and specifications and thoroughly compact without damaging ducts.
- > Place cable protection strips on compacted CBGM B directly over the ducts.
- > Lay the top row of ducts onto the freshly compacted CBGM B including the cable protection strips above the bottom row of ducts. Place a secure cap at the end of each duct to prevent the ingress of dirt or water.
- Carefully surround and cover ducts with CBGM B material in accordance with the drawings and thoroughly compact without damaging ducts.
- > Place red cable protection strip on top of compacted CBGM B over each set of ducts as shown on the drawings.
- Place and thoroughly compact CBGM B material or Clause 804 backfill or soil backfill as specified and place warning tape at the depth shown on the drawings.
- For concrete and asphalt/bitmac road sections, carry out immediate permanent reinstatement in accordance with the specification and to the approval of the local authority and/or private landowners, unless otherwise agreed with local authorities.
- Clean and test the ducts in accordance with the specification by pulling through a brush and mandrel. Install 12 mm polypropylene draw rope in each duct and seal all ducts using robust duct end seals fitted with rope attachment eyes in preparation for cable installation at a later date. All the works should be witnessed by ESBN Clerk of Works (ECoW) as required.

The proposed on-site 110kV electrical substation will be connected to the existing 110kV Ardnacrusha electrical substation via underground 110kV electrical cabling which will be constructed to EirGrid specifications¹⁴, guided by the methodology outlined above.

3.3.1.1.1 Existing Underground Services

Any underground services encountered along the grid cable routes will be surveyed for level and the ducting will pass over the service provided adequate cover is available. A minimum clearance of 300 mm will be required between the bottom of the ducts and the service in question. If the clearance cannot be achieved the ducting will pass under the service and again 300 mm clearance between the top of the communications duct and bottom of the service will be achieved. In deeper excavations an additional layer of marker tape will be installed between the communications duct and top level yellow marker tape. If the required separation distances cannot be achieved then a number of alternative options are available such as using steel plates laid across the width of the trench and using 35N

¹⁴ https://www.eirgrid.ie/site-files/library/EirGrid/110kV-Underground-Cable-Functional-Specification-General-Requirements.pdf



concrete surrounding the ESB ducts where adjacent services are within 600mm, with marker tape on the side of the trench. Back fill around any utility services will be with dead sand/pea shingle.

3.3.1.1.2 **Joint Bays**

Joint bays are 6m x 2.5m x 2.05m pre-cast concrete chambers where lengths of cable will be joined to form one continuous cable. They will be located at various points along the grid ducting route approximately every 700 metres – 850 metres along the route. Please refer to Appendix 4-5 for further details on joint bay construction and cable installation.

Where possible, joint bays will be located in areas where there is a natural widening/wide grass margin on the road in order to accommodate easier construction, cable installation and create less traffic congestion. During construction the joint bay locations will be completely fenced off, and once they have been constructed, they will be backfilled until cables are being installed.

In association with Joint Bays, Communication Chambers are required at every joint bay location to facilitate communication links between the proposed onsite 110kV electrical substation and the existing 110kV electrical substation at Ardnacrusha. Earth Sheath Link Chambers are also required at every joint bay along the cable route. Earth Sheath Links are used for earthing and bonding cable sheaths of underground power cables, so that the circulating currents and induced voltages are eliminated or reduced.

Earth Sheath Link Chambers and Communication Chambers are located in close proximity to Joint Bays. Earth Sheath Link Chambers and Communication Chambers will typically be pre-cast concrete structures with an access cover at finished surface level.

Marker posts will be used on non-roadway routes to delineate the duct route and joint bay positions.

3.3.1.1.3 Grid Connection Watercourse/Culvert Crossings

The cable route will involve 2 No. bridge crossings, both of which will be horizontal directional drilling (HDD) crossings and will not interact with the existing bridge structure. As there is insufficient cover and depth in the bridge to cross with the bridge deck, HDD will be required. Where the cable route intersects with existing watercourses, a detailed construction method statement will be prepared by the Contractor prior to the commencement of construction and is to be approved by the Local Authority and relevant environmental agencies.

The underground cable will encounter 5 no. water culverts along the route. Existing culverts will be crossed using open trenching with an undercrossing, due to the depth of the culvert. A confirmatory site survey of all culverts has been completed as part of this phase of the project prior to planning to confirm the crossing methods.

Inland Fisheries Ireland have published guidelines relating to construction works along water bodies entitled "*Requirements for the Protection of Fisheries Habitats during Construction and Development Works at River Sites (Eastern Regional Fisheries Board, 2004)*", and these guidelines will be adhered to during the construction of the Proposed Development.

3.4 **Construction Phasing and Timing**

It is estimated that the construction phase of the Proposed Development will take 18 to 24 months from starting on site to the commissioning of the electrical system. Construction will not commence (excluding any activity associated with the Biodiversity Management Plan), until the forestry which hosted the 2023 hen harrier nest is no longer suitable for hen harrier. This forestry was planted in 2018. It is considered that pre-thicket forestry is suitable for breeding hen harrier within the first ten years of



planting. It is therefore considered that during the normal course of events, this forestry block will become unsuitable for hen harrier in c. 2028.

3.4.1 Construction Sequencing

The construction phase can be broken down into three main, overlapping phases: 1) civil engineering works - 10 months, 2) electrical works including grid connection works - 6 months, and 3) turbine erection and commissioning - 8 months. The main task items under each of the three phases are outlined below.

Civil Engineering Works

- > Create new entrance.
- Felling of forestry (as outlined in Section 4.2.12)
- > Construct new site roads (permanent), drainage ditches and culverts.
- > Clear and hardcore area for construction compound incorporating temporary site offices. Install same.
- > Construct remaining new site roads and hard-standings and crane pads.
- Construct the substation, control buildings and groundworks for the substation compound.
- Excavate/pile for turbine bases where required. Excavate borrow pits. Store soil/peat locally for backfilling and re-use. Place blinding concrete to turbine bases. Fix reinforcing steel and anchorage system for tower section. Construct shuttering. Fix any ducts etc. to be cast in. Pour concrete bases. Cure concrete. Remove shutters after 1-2 days.

Electrical Works

- > Construct bases/plinths for transformer in the sub-station.
- > Excavate trenches for site cables, lay cables and backfill. Provide ducts at road crossings.
- > Install external electrical equipment at substations
- > Install transformer at compound.
- > Erect stock proof and palisade fencing around substation area.
- > Install internal collector network and communication cabling.
- Construct grid connection.

Turbine Erection and Commissioning

- > Backfill tower foundations and cover with suitable material.
- > Erect towers, nacelles and blades.
- > Complete electrical installation.
- > Install anemometry masts and decommission and remove existing mast.
- Commission and test turbines.
- Complete site works reinstate site.
- Remove temporary site offices. Provide any gates, landscaping, signs etc. which may be required.



3.5 **Operation**

The Proposed Development is expected to have a lifespan of 35 years. Planning permission is being sought for a 35-year operation period commencing from the date of full operational commissioning of the wind farm. During the operational period, on a day-to-day basis the wind turbines will operate automatically, responding by means of anemometry equipment and control systems to changes in wind speed and direction.

The wind turbines will be connected together and data relayed from the wind turbines to an off-site control centre. Each turbine will also be monitored off-site by the wind turbine supplier. The monitoring of turbine output, performance, wind speeds, and responses to any key alarms will be monitored at an off-site control centre 24-hours per day.

Each turbine will be subject to a routine maintenance programme involving a number of checks and changing of consumables, including oil changes. In addition, there will be a requirement for unscheduled maintenance, which could vary between resetting alarms to major component changes requiring a crane. Maintenance traffic will consist of four-wheel drive vehicles or vans. In the event that a single replacement turbine blade is required to be delivered to the Wind Farm Site, a blade lifter vehicle will be used to transport the turbine blade from the port of delivery to the Wind Farm Site and hence the temporary measures for turbine delivery proposed during construction, including a set down area, are not anticipated during operation. The electricity substation and site tracks will also require periodic maintenance.

3.6 **Decommissioning**

The wind turbines proposed as part of the Wind Farm Site are expected to have a lifespan of 35 years. Following the end of their useful life, the wind turbines may be replaced with a new set of turbines, subject to planning permission being obtained, or the Proposed Development will be decommissioned fully. The onsite 110kV electrical substation and 110kV electrical cabling will remain in place as it will be under the ownership of the ESB and will form a permanent part of the national electricity grid.

Upon decommissioning of the Proposed Development, the wind turbines will be disassembled in reverse order to how they were erected. All above ground turbine components will be separated and removed off-site for recycling.

Turbine hardstands and foundations will remain in place underground and will be left to revegetate naturally. Leaving the turbine hardstands and foundations in-situ is considered a more environmentally prudent option, as to remove that volume of reinforced concrete from the ground could result in significant environment nuisances such as noise, dust and/or vibration.

Site roadways will be left in situ, as appropriate to facilitate on-going forestry operations. Underground cables, including grid connection, will be removed and the ducting left in place.

A decommissioning plan will be agreed with the local authorities three months prior to decommissioning the Proposed Development.

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4. FIELD SURVEY RESULTS

4.1 **General Description of Habitats**

Most of the Proposed Development site comprises different stages of coniferous plantation forestry including recent clear-fell (WS5)¹⁵, second rotation, immature, semi-mature and mature conifer forestry (WD4).

There are areas adjacent to the study area which comprise upland blanket bog (PB2), including Gortacullin Bog NHA which is adjacent to the northern boundary. Smaller areas of upland blanket bog, cutover bog (PB4), wet heath (HH3) and dry heath (HH1) are present within the study area.

Due to the upland nature of the study area, the majority of watercourses within the site are eroding in nature, typical of headwaters and as such are categorised as eroding/upland rivers (FW1). Several small streams are found throughout the site. The Clashduff and Gortadroma streams drain the western portion of the site to the Owenogarney River. The Snaty, O'Neill's Stream, Knockshanvo stream and Mountrice stream drain the central areas of the site southwards towards the Blackwater River. The Glenomra Wood Stream is found to the east of the site which also drains to the Blackwater River. As is typical of FW1 type rivers, these watercourses were typically narrow and shallow with trickling to fast flows, and the substrate typically comprised bedrock, boulders, cobbles and gravels. Drainage ditches (FW4) associated with forestry plantations are found throughout the site.

The study area is dominated by conifer forestry and as such does not comprise a large amount of linear habitat such as treelines (WL2) or hedgerows (WL1). However, the area to the southeast of the study area associated with the proposed access road into the site consists of agricultural fields bordered by treelines (WL2). Large treelines are also present within the proposed transitional compound area along the proposed turbine delivery route. The proposed transitional compound area also consists of improved agricultural grassland (GA1) and wet grassland (GS4).

Proposed enhancement areas for Hen Harrier comprise mature conifer forestry (WD4), agricultural grassland (GA1) with associated hedgerows (WL1) and treelines (WL2) and wet heath (HH3).

4.2 **Otter**

A mustelid print, likely otter, was recorded close to the existing water crossing over the Mountrice River in the east of the Proposed Development site. No other otter signs were recorded within the site or in close proximity to any of the main windfarm infrastructure i.e. turbines, hardstands, new wind farm roads etc. The main watercourses were assessed as providing suitable commuting and foraging habitat for the species and otter may occur within the Proposed Development site, at least on occasion. Following aquatic surveys and fisheries assessments, it was assessed that the fisheries potential of the upper reaches of watercourses, downstream of the Proposed Development site. Otter spraint was recorded at 3 locations on larger watercourses downstream of the study area during aquatic surveys. A map showing otter records within and downstream of the Proposed Development site is shown in Figure 4-1. These records were found approx. 10km upstream of Lower River Shannon SAC and therefore, on a precautionary basis, may be from individuals associated with the SAC otter population.

¹⁵ Fossitt, J. A. (2000). A Guide to Habitats in Ireland. Dublin: The Heritage Council.



4.3 Lesser Horseshoe Bat

4.3.1 Manual Activity Surveys

Manual activity surveys were undertaken in the form of driven transects in Spring, Summer and Autumn 2022. No Lesser horseshoe bats were recorded during the manual activity surveys.

4.3.2 Ground Level Static Surveys

Lesser horseshoe bat passes were detected across the Site during static detector surveys, for a total amount of 1,098 bat passes in 2022. The species occurred at almost all static detector locations across the site, but higher activity was recorded within the central and western areas of the site. Figure 4-2 shows the numbers of Lesser Horseshoe Bat passes recorded at each detector across the three surveys seasons in 2022. However, only detectors D01, D02, D03 and D10 in the west of the site are located within the 2.5km core foraging range of the QI Lesser Horseshoe Bat roosts associated with Danes Hole, Poulnalecka SAC. These detectors were at the locations of proposed turbines T01, T02 and T03.

A total of 320 Lesser Horseshoe Bat passes were recorded within the core foraging range of the SAC during the 2022 survey season. Lesser horseshoe bats were more often recorded during the Autumn survey season.

Spring and Autumn are transitional periods for bats, as individuals leave their hibernation sites and occupy transitional roost in preparation for the maternity season in Spring, and leave the maternity roosts, disperse and prepare for hibernation in Autumn. It is likely that this species utilises the conifer plantation as foraging and commuting grounds to and from these roosts and, likely, other unreported locations.

4.4

Aquatic QI Species of Lower River Shannon SAC

The small streams that flow off the site of the Proposed Development, and downstream watercourses, were subject to biological evaluation and assessment through kick sampling and fish stock assessment (electro-fishing) between the 25th and 28th of July 2022. Full details of the results of these surveys are provided in Chapter 6 of the EIAR. See Plate 2-1 above for the location of survey sites.

The Aquatic Baseline Report (EIAR, Appendix 6-4) summarises the results as follows:

Broadly speaking, the most important watercourses for aquatic ecology within vicinity of the Proposed Development were the larger Owenogarney River, River Blackwater and Glenomra Wood Stream. These supported higher conservation value species such as Atlantic salmon, lamprey (Lampetra sp.), ...(and) otter ...Localised areas of higher value aquatic habitats (e.g. salmonid spawning/nursery) were also present on smaller watercourses including the Clashduff Stream and Mountrice River. No rare or protected macro-invertebrates (with the exception of crayfish), macrophytes, aquatic bryophytes or Annex I habitats were recorded in any of the survey watercourses.

4.4.1 Atlantic Salmon

With the exception of site B3 on the Oatfield Stream (three-spined stickleback only), salmonids were recorded at all 13 no. sites supporting fish during the survey. Atlantic salmon were present at 5 no. sites, on the Clashduff Stream (A2), Owenogarney River (A7), Mountrice River (B12), River Blackwater (B13) and Glenomra Wood Stream (N4).



4.4.2 **Lamprey**

Lamprey ammocoetes (Lampetra sp.) were recorded from 2 no. sites on the River Blackwater (B13) and its tributary the O'Neill's Stream (B9).

4.5 **Bird Surveys of SCI Species of Nearby European Sites**

In order to inform the scope of the bird surveys required for the NIS, a review was undertaken of the location of nearby Special Protection Areas and associated SCI species so that the survey design could be focussed towards target SCI species in addition to other target species. SPAs in the vicinity of the Proposed Development include the following and are discussed further in Table 5-1:

- > River Shannon and River Fergus Estuaries SPA [004077]
- Lough Derg (Shannon) SPA [004058]

Only records of the target SCI species which were recorded during the surveys are presented below.

4.5.1 Golden Plover

Vantage Point Surveys

Golden plover were observed on only one occasion during the vantage point surveys between April 2018 and September 2023. In October 2021, an individual bird was observed commuting, approximately 1.2km south of the Wind Farm Site.

There were no further observations of this species during any of the other comprehensive surveys.

4.5.2 Black-headed Gull

Vantage Point Surveys

Black-headed gull were observed on three occasions during vantage point surveys between April 2018 and September 2023. Observations ranged from an individual to four birds and were of birds commuting. There was one observation within 500m of the proposed turbine layout and two observations within the potential collision height. All observations were in the breeding season (May to July).

Breeding Walkover Surveys

Black-headed gull were only observed on one occasion during the breeding walkover surveys. An individual was observed circling over a silage field before landing to feed. This observation was adjacent to the Wind Farm Site.

There were no additional observations of this species during any of the other comprehensive surveys.



4.5.3 **Cormorant**

Vantage Point Surveys

Cormorant were observed on four occasions during vantage point surveys between April 2018 and September 2023. All observations were of individuals commuting and were within the potential collision height. All observations were at, or within 500m of, the Wind Farm Site. There were three observations during the breeding season and one during the non-breeding season.

There were no additional observations of this species during any of the other comprehensive surveys.

4.5.4 **Curlew**

Incidental Observations

Curlew was recorded on only one occasion as an incidental observation. An individual was observed calling during a breeding raptor survey. There were no additional observations of this species during any of the other comprehensive surveys.







5. STAGE 1 – APPROPRIATE ASSESSMENT SCREENING

5.1

European Sites within the Zone of Influence of the Proposed Development

The first step in identification of Natura 2000 sites is to determine the potential zone of influence of the project. When the potential zone of influence of the project has been determined Natura 2000 sites within this area can be identified and the information on each collated. The methodology by which this was carried out is outlined in Section 2.1.1 above. The information on each European Site was obtained from the resources available on protected sites section of the NPWS website¹⁶.

Table 5-1 below provides details of all relevant European Sites identified and assesses the potential for likely significant effects on each. European Sites surrounding the Proposed Development are shown in Figure 5-1.

¹⁶ https://www.npws.ie/protected-sites (last accessed 20th August 2024)





Tuble of Tuchuncuuon of L	anopean sites wann are lakery zone of innaen		
European Sites and distance from Proposed Development	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie)	Conservation Objectives	Identification of Source-Pathway-Receptor chain
Special Areas of Conse	rvation (SAC)		
Glenomra Wood SAC [001013] Distance: 374m between the study area boundary and proposed Grid Connection route.	> 91A0 Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles	Detailed conservation objectives for this site, (Version 1, June 2018 ¹⁷), were reviewed as part of the assessment and are available at <u>www.npws.ie</u> In summary, the conservation objective for the SAC is to maintain the favourable conservation condition of the habitat for which the SAC has been selected.	There will be no direct effects as the project footprint is located entirely outside the designated site. The SAC is located approx. 374m from the proposed turbine delivery route. No pathway for indirect effects on the terrestrial QI habitat for which the SAC has been designated exists. No pathway for likely significant effect on this European Site was identified, when considered in the absence of any mitigation, individually or cumulatively with other plans or projects and the site is not within the Likely zone of influence and is not considered further in this assessment.
Danes Hole, Poulnalecka SAC [000030] Distance: 383m	 > 1303 Lesser Horseshoe Bat <i>Rhinolophus hipposideros</i> > 8310 Caves not open to the public > 91A0 Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles 	Detailed conservation objectives for this site, (Version 1, July 2018 ¹⁸), were reviewed as part of the assessment and are available at <u>www.npws.ie</u> In summary, the conservation objective for the SAC is to maintain or restore the favourable conservation	There is no potential for direct effects as the Proposed Development is located entirely outside of this designated site. Danes Hole, Poulnalecka SAC has been designated for the presence of a winter roost (id. 59) and summer roost (id. 720) for lesser horseshoe bat (<i>Rhinolophus hipposideros</i>). According to map 3 of the site-specific conservation objectives, the Proposed Development is located within the core foraging range of lesser horseshoe bat (2.5km, NPWS 2018). A potential pathway for effect on this OI was identified

Table 5-1 Identification of European Sites within the Likely zone of influence

 $^{^{17} \} https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO001013.pdf$

¹⁸ https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000030.pdf



European Sites and distance from Proposed Development	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie)	Conservation Objectives	Identification of Source-Pathway-Receptor chain
		condition of the habitats and species for which the SAC has been selected.	in the form of loss of foraging and commuting habitat for Lesser Horseshoe Bat, collision risk with turbines and disturbance/displacement. A complete source pathway receptor chain was identified and in the absence of mitigation, there is potential for the Proposed Development to result in likely significant effects on this European Site. Therefore, the European Site is located within the Likely zone of influence and is considered further in this assessment.
Lower River Shannon SAC [002165] Overland distance: approx. 5km from the Proposed Wind Farm Site. 616m from proposed transitional compound area Hydrological distances: At its closest point,	 [1029] Freshwater Pearl Mussel Margaritifera margaritifera [1095] Sea Lamprey Petromyzon marinus [1096] Brook Lamprey Lampetra planeri [1099] River Lamprey Lampetra fluviatilis [1106] Atlantic Salmon Salmo salar (only in fresh water) [1110] Sandbanks which are slightly covered by sea water all the time [1130] Estuaries 	Detailed conservation objectives for this site, (Version 1, August 2012 ¹⁹), were reviewed as part of the assessment and are available at <u>www.npws.ie</u> In summary, the conservation objective for the SAC is to maintain or restore the favourable conservation condition of the habitats and species for which the SAC has been selected.	There will be no direct effects as the project footprint is located entirely outside the designated site. A source-pathway-receptor chain for effect on this SAC was identified due to downstream hydrological connectivity with the Proposed Development site. A potential for significant effect exists as a result of deterioration in water quality and disturbance to QI fauna as a result of the Proposed Development. A complete source pathway receptor chain was identified and in the absence of mitigation, there is potential for the Proposed Development to result in likely significant effects on this European Site. Therefore the European Site is located within the Likely zone of influence and is considered further in this assessment.
At its closest point, the Proposed			

 $^{^{19} {\}it https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf}$



European Sites and distance from	Qualify Interests	Interests/Special Conservation for which the European site	Conservation Objectives	Identification of Source-Pathway-Receptor chain
Development		n designated (Sourced from		
Development	Objectiv	ves www.nnws.ie)		
Development is	>	[1140] Mudflats and		
approx. 1.8km		sandflats not covered by		
downstream of		seawater at low tide		
proposed transitional	>	[1150] *Coastal lagoons		
compound area	>	[1160] Large shallow inlets		
1		and bays		
	>	[1170] Reefs		
	>	[1220] Perennial vegetation		
		of stony banks		
	>	[1230] Vegetated sea cliffs of		
		the Atlantic and Baltic		
		coasts		
	>	[1310] <i>Salicornia</i> and other		
		annuals colonizing mud and		
		sand		
	>	[1330] Atlantic salt		
		meadows (<i>Glauco</i> -		
		Puccinellietalia maritimae)		
	>	[1349] Bottlenose Dolphin		
		Tursiops truncatus		
	>	[1355] Otter <i>Lutra lutra</i>		
	>	[1410] Mediterranean salt		
		meadows (<i>Juncetalia</i>		
		56ubric56e)		
	>	[3260] Water courses of		
		plain to montane levels with		
		the Ranunculion fluitantis		
		and Callitricho-Batrachion		
		vegetation		
	>	[6410] Molinia meadows on		
		calcareous, peaty or clayey-		



European Sites and distance from Proposed Development	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie)	Conservation Objectives	Identification of Source-Pathway-Receptor chain
	silt-laden soils (<i>Molinion</i> caeruleae) > [91E0] *Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno- Padion, Alnion incanae, Salicion albae)		
Ratty River Cave SAC [002316] Distance: 2.5km	 [1303] Lesser Horseshoe Bat <i>Rhinolophus hipposideros</i> [8310] Caves not open to the public 	Detailed conservation objectives for this site, (Version 1, July 2018 ²⁰), were reviewed as part of the assessment and are available at <u>www.npws.ie</u> In summary, the conservation objective for the SAC is to restore the favourable conservation condition of the habitats and species for which the SAC has been selected.	 There will be no direct effects as the project footprint is located entirely outside the designated site. Ratty River Cave SAC has been designated for the presence of a winter roost (id. 51) and summer roost (id. 05) for lesser horseshoe bat (<i>Rhinolophus hipposideros</i>). The Proposed Development is adjacent to the core foraging range of the QI lesser-horseshoe bat population (2.5km, NPWS 2018). Therefore, taking a precautionary approach, a potential for significant effect on the SAC was identified as a result of commuting/foraging habitat loss, disturbance and collision risk. A complete source pathway receptor chain was identified and in the absence of mitigation, there is potential for the Proposed Development to result in likely significant effects on this European Site. Therefore the European Site is located within the Likely zone of influence and is considered further in this assessment.

 $^{^{20}\} https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002316.pdf$



European Sites and distance from Proposed Development	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie)	Conservation Objectives	Identification of Source-Pathway-Receptor chain
Askeaton Fen Complex SAC [002279] Distance: 3.5km west of proposed transitional compound area	 7210 Calcareous fens with <i>Cladium mariscus</i> and species of the Caricion davallianae 7230 Alkaline fens 	Detailed conservation objectives for this site, (Version 1, May 2018 ²¹), were reviewed as part of the assessment and are available at <u>www.npws.ie</u> In summary, the conservation objective for the SAC is to maintain the favourable conservation condition of the habitats for which the SAC has been selected.	There will be no direct effects as the project footprint is located entirely outside the designated site. This SAC is located to the west of the proposed transitional compound area. There is no downstream surface water connectivity from the proposed development site to the SAC. The proposed wind farm site is located within a separate hydrological catchment to the SAC, Due to the small scale of groundworks required at the compound site and the intervening distance between the SAC and the proposed development, there is no potential for significant effect via hydrological or hydrogeological pathways. No pathway for likely significant effect on this European Site was identified, when considered in the absence of any mitigation, individually or cumulatively with other plans or projects and the site is not within the Likely zone of influence and is not considered further in this assessment.
Kilkishen House SAC [002319] Distance: 3.7km	> 1303 Lesser Horseshoe Bat <i>Rhinolophus hipposideros</i>	Detailed conservation objectives for this site, (Version 1, July 2018 ²²), were reviewed as part of the assessment and are available at <u>www.npws.ie</u> In summary, the conservation objective for the SAC is to restore the	There will be no direct effects as the project footprint is located entirely outside the designated site. Kilkishen House SAC has been designated for the presence of a winter/summer roost (id. 27) for lesser horseshoe bat (<i>Rhinolophus</i> <i>hipposideros</i>). According to map 2 of the site-specific conservation objectives, the development site is located outside of the core foraging

https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002279.pdf
 https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002319.pdf



European Sites and distance from Proposed Development	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie)	Conservation Objectives	Identification of Source-Pathway-Receptor chain	
		favourable conservation condition of the species for which the SAC has been selected.	range of lesser horseshoe bat for both selected roosts (2.5km, NPWS 2018). Therefore, there is no potential for significant impacts on the SAC.	
			No pathway for likely significant effect on this European Site was identified, when considered in the absence of any mitigation, individually or cumulatively with other plans or projects and the site is not within the Likely zone of influence and is not considered further in this assessment.	
Special Protection Area (SPA)				
River Shannon and River Fergus Estuaries SPA [004077] Overland distance: approx. 9km from the Proposed Wind Farm Site. 620m from proposed	 A017 Cormorant <i>Phalacrocorax</i> <i>carbo</i> breeding + wintering A038 Whooper Swan <i>Cygnus</i> <i>cygnus</i> wintering A046 Light-bellied Brent Goose <i>Branta bernicla hrota</i> wintering A048 Shelduck <i>Tadorna</i> <i>tadorna</i> wintering A050 Wigeon <i>Anas penelope</i> wintering A052 Teal <i>Anas crecca</i> 	Detailed conservation objectives for this site, (Version 1, September 2012 ²³), were reviewed as part of the assessment and are available at <u>www.npws.ie</u> In summary, the conservation objective for the SPA is to maintain the favourable conservation condition of the habitats and species for which the SPA has been selected.	There will be no direct effects as the project footprint is located entirely outside the designated site. A source-pathway-receptor chain for effect on this SPA was identified due to downstream hydrological connectivity with the Proposed Development site. A potential for deterioration in water quality as a result of the Proposed Development was identified. In addition, a potential for impact on SCI species as a result of ex-situ habitat loss, disturbance and collision risk was identified.	
transitional compound area	 wintering A054 Pintail Anas acuta wintering 		A complete source pathway receptor chain was identified and in the absence of mitigation, there is potential for the Proposed Development to result in likely significant effects on this European	

 $^{^{23} \} https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf$



European Sites and distance from Proposed Development	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie)	Conservation Objectives	Identification of Source-Pathway-Receptor chain
Hydrological distances: At its closest point, approx. 1.8km downstream of proposed transitional compound area	 A056 Shoveler Anas clypeata wintering A062 Scaup Aythya marila wintering A137 Ringed Plover Charadrius hiaticula wintering A137 Ringed Plover Charadrius hiaticula wintering A140 Golden Plover Pluvialis apricaria wintering A141 Grey Plover Pluvialis squatarola wintering A142 Lapwing Vanellus vanellus wintering A142 Lapwing Vanellus vanellus wintering A143 Knot Calidris canutus wintering A149 Dunlin Calidris alpina wintering A149 Dunlin Calidris alpina wintering A156 Black-tailed Godwit Limosa limosa wintering A157 Bar-tailed Godwit Limosa lapponica wintering A160 Curlew Numenius arquata wintering A162 Redshank Tringa totanus wintering A164 Greenshank Tringa nebularia wintering A179 Black-headed Gull Chroicocephalus ridibundus wintering A999 Wetlands 		Site. Therefore the European Site is located within the Likely zone of influence and is considered further in this assessment.



European Sites and distance from Proposed Development	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie)	Conservation Objectives	Identification of Source-Pathway-Receptor chain
Lough Derg (Shannon) SPA [004058] Distance: 10.8km	 A017 Cormorant <i>Phalacrocorax</i> carbo A061 Tufted Duck <i>Aythya</i> fuligula A067 Goldeneye <i>Bucephala</i> clangula A193 Common Tern <i>Sterna</i> hirundo Wetland and Waterbirds [A999] 	First Order Site-specific Conservation Objectives are available for this site which are <i>To maintain or restore the favourable</i> <i>conservation condition of the bird</i> <i>species listed as Special Conservation</i> <i>Interests for this SPA</i> And <i>To maintain or restore the favourable</i> <i>conservation condition of the wetland</i> <i>habitat at Lough Derg (Shannon) SPA</i> <i>as a resource for the regularly-</i> <i>occurring migratory waterbirds that</i> <i>utilise it.</i> NPWS (2022) Conservation objectives for Lough Derg (Shannon) SPA [004058]. First Order Site-specific Conservation Objectives Version 1.0. Department of Housing, Local Government and Heritage.	There will be no direct effects as the project footprint is located entirely outside the designated site. The SPA is located upgradient of the Proposed Development site. There is no downstream hydrological connectivity from the Proposed Development site to the SPA. Therefore, there is no source-pathway- receptor chain for impact via hydrological pathways. During ornithological surveys undertaken at the Proposed Development site over five and a half years, no records of Tufted Duck, Golden eye or Common Tern were observed. Cormorant were observed on only four occasions during vantage point surveys between April 2018 and September 2023. All observations were of individuals commuting. Given that cormorant were only observed commuting through the site on four occasions, despite undertaking a comprehensive suite of surveys over five and a half years, it is concluded that the Proposed Development site is of no ecological importance to this species given how infrequently the species was observed. Therefore, there is no potential for significant effect to any of the SCI species listed. No pathway for likely significant effect on this European Site was identified, when considered in the absence of any mitigation, individually or cumulatively with other plans or projects and the site is not within the Likely Zone of Impact and is not considered further in this assessment.



European Sites and distance from Proposed Development	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie)	Conservation Objectives	Identification of Source-Pathway-Receptor chain
Slieve Aughty Mountains SPA [004168] Distance: 11km	 A082 Hen Harrier <i>Circus</i> <i>cyaneus</i> A098 Merlin <i>Falco columbarius</i> 	Detailed conservation objectives for this site, (Version 1, December 2022 ²⁴) were reviewed as part of the assessment and are available at <u>www.npws.ie</u> In summary, the conservation objective for the SPA is to restore or maintain the favourable conservation condition of the species for which the SPA has been selected.	There will be no direct effects as the project footprint is located entirely outside the designated site. The Proposed Development site is outside of the core foraging range and maximum foraging range for breeding Hen Harrier (2km, 10km respectively; SNH 2016). Therefore, there is no potential for significant effect via habitat loss, disturbance, displacement or collision risk on the breeding populations associated with this SPA. While Hen Harrier were recorded within the Proposed Development site during breeding and wintering seasons, these birds are associated with a confirmed nest present within the Proposed Development site. This population is remote and separate from the population associated with the SPA. The Proposed Development site is located outside of the core foraging range for Merlin (5km, SNH 2016). Merlin were only observed on one occasion during five and a half years of ornithological surveys, therefore it has been concluded that the Proposed Development site is not of ecological importance to this species. Therefore, there is no potential for significant effect on the SCI populations associated with the SPA. No pathway for likely significant effect on this European Site was identified, when considered in the absence of any mitigation, individually or cumulatively with other plans or projects and the site is

 $^{^{24} \} https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004168.pdf$



European Sites and distance from Proposed Development	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie)	Conservation Objectives	Identification of Source-Pathway-Receptor chain
			not within the Likely zone of influence and is not considered further in this assessment.
Slievefelim to Silvermines Mountains SPA [004165] Distance: 14.3km	A082 Hen Harrier <i>Circus cyaneus</i>	Detailed conservation objectives for this site, (Version 1, September 2022 ²⁵) were reviewed as part of the assessment and are available at <u>www.npws.ie</u> In summary, the conservation objective for the SPA is to restore the favourable conservation condition of the species for which the SPA has been selected.	There will be no direct effects as the project footprint is located entirely outside the designated site. The Proposed Development site is outside of the core foraging range and maximum foraging range for breeding Hen Harrier (2km, 10km respectively; SNH 2016). Therefore, there is no potential for effect via habitat loss, disturbance, displacement or collision risk on the breeding populations associated with this SPA. While Hen Harrier were recorded within the Proposed Development site during breeding and wintering seasons, these birds are associated with a confirmed nest present within the Proposed Development site. Therefore, there is no potential for significant effect on the SCI populations associated with the SPA. No pathway for likely significant effect on this European Site was identified, when considered in the absence of any mitigation, individually or cumulatively with other plans or projects and the site is not within the Likely Zone of Impact and is not considered further in this assessment.

 $^{^{25} {\}it https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004165.pdf}$



5.2 **Cumulative Effects**

In the absence of mitigation, the potential for cumulative significant effect on the following European Sites has been identified and requires further assessment within the NIS. Projects considered during the cumulative assessment at the screening stage include those listed in the Appendix:

- > Danes Hole, Poulnalecka SAC [000030]
- > Ratty River Cave SAC [002316]
- Lower River Shannon SAC [002165]
- > River Shannon and River Fergus Estuaries SPA [004077]

No potential for cumulative significant effect on any other European Site in-combination with other plans and projects has been identified.

5.3 Stage 1 Appropriate Assessment Screening Conclusion

It cannot be excluded beyond reasonable scientific doubt, in view of best scientific knowledge, on the basis of objective information and in light of the conservation objectives of the relevant European sites, that the Proposed Development, individually or in combination with other plans and projects, would be likely to have a significant effect on the following European Sites:

- Danes Hole, Poulnalecka SAC [000030]
- > Ratty River Cave SAC [002316]
- Lower River Shannon SAC [002165]
- > River Shannon and River Fergus Estuaries SPA [004077]

As a result, an Appropriate Assessment is required and a Natura Impact Statement has been prepared in respect of the Proposed Development.


6.

STAGE 2- NATURA IMPACT STATEMENT (NIS)

The potential for likely significant effects on the above listed European Sites in the absence of any mitigation, individually or cumulatively with other plans or projects, was identified in the preceding section.

The following sections consider each European Site individually and:

- 1. Determine which individual qualifying features have the potential to be adversely affected by the Proposed Development.
- 2. Provide information with regard to the Conservation Objectives and site-specific pressures and threats for those qualifying features that have the potential to be adversely affected.

The Competent Authority will be required to carry out an appropriate assessment to determine whether the proposed development would adversely affect the integrity of the Danes Hole, Poulnalecka SAC, Ratty River Cave SAC, Lower River Shannon SAC, or River Shannon and River Fergus Estuaries SPA, should the Proposed Development proceed. The '*integrity of the site*' can be defined as '*the coherence of the site*'s *ecological structure and function, across its whole area, or the habitats, complex of habitats and/or populations of species for which the site is or will be classified*²⁶.

²⁶ http://ec.europa.eu/environment/nature/natura2000/management/docs/art6/provision_of_art6_en.pdf



6.1 Identification of relevant Qualifying Features and Desk Study

6.1.1 Danes Hole, Poulnalecka SAC [000030]

The potential for impacts on this SAC were identified in Table 5-1 above. The Proposed Development site is located within the core foraging range of the roosts designated for this SAC as mapped in Map 3 of the site-specific conservation objectives (SSCOs).

The identified pathways for effect include the following:

Danes Hole, Poulnalecka SAC has been designated for the presence of a winter roost (id. 59) and summer roost (id. 720) for lesser horseshoe bat (*Rhinolophus hipposideros*). According to map 3 of the site-specific conservation objectives, the development site is located within the core foraging range of lesser horseshoe bat (2.5km, NPWS 2018). The proposed Turbines T01, T02 and T03 and associated infrastructure, as well as an area proposed for habitat enhancement for hen harrier, overlap with the core foraging area. A potential pathway for effect on this QI was identified in the form of loss of foraging and commuting habitat, collision risk and disturbance/displacement as a result of construction and operation of the Proposed Development.

Table 6-1 below lists the qualifying features of this European Site and determines, in the light of their Conservation Objectives, and associated Targets and Attributes, whether there is any complete source-pathway-receptor chain, by which adverse effects may occur.

611.1 Identification of Individual Qualifying Features with the Potential to be Affected

Qualifying feature	Conservation Objective (NPWS, Version 1, July 2018 ²⁷),	Rationale	Potential for Adverse Effects Y/N
1303 Lesser Horseshoe Bat <i>Rhinolophus hipposideros</i>	To restore the favourable conservation condition of Lesser	The SAC has been designated for the presence of a winter roost (id. 59) and summer roost (id. 720) for lesser horseshoe bat (<i>Rhinolophus hipposideros</i>). According to map 3 of the site-specific conservation objectives, the development site is located within the core foraging range	Yes

Table 6-1 Assessment of Qualifying features potentially affected

²⁷ https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000030.pdf



Qualifying feature	Conservation Objective (NPWS, Version 1, July 2018 ²⁷),	Rationale	Potential for Adverse Effects Y/N
	Horseshoe Bat in Danes Hole, Poulnalecka SAC	of lesser horseshoe bat (2.5km, NPWS 2018). A potential pathway for adverse effect on this QI was identified in the form of loss of foraging and commuting habitat, collision risk and disturbance/displacement as a result of construction and operation of the Proposed Development.	
8310 Caves not open to the public	Caves not open to the public (8310) is integrally linked to lesser horseshoe bat (<i>Rhinolophus hipposideros</i>) (1303) as part of the habitat for the species; therefore, a separate conservation objective has not been set for the habitat in Danes Hole, Poulnalecka SAC.	The Proposed Development site is located completely outside of the SAC, therefore, there is no potential for direct or indirect adverse effect on the cave habitat of lesser horseshoe bat as a result of the Proposed Development.	No
91A0 Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles	To maintain the favourable conservation condition of Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles in Danes Hole, Poulnalecka SAC	Due to the terrestrial nature of this QI habitat, and the lack of hydrological or any other type of connectivity between the habitat and the Proposed Development site, there is no potential for adverse effect on this QI habitat.	No





6.1.1.2 Site Specific Pressures and Threats

As per the Natura 2000 Data Form, the site-specific threats, pressures and activities with potential to impact on the European Site were reviewed and considered in relation to the Proposed Development. These are provided in the table below.

Negative Impacts			
Rank	Threats and	1 Pressures	Inside/Outside
High	A10.01	Removal of hedges and copses or shrub	Inside
High	D05	Improved access to site	Inside
High	M02.03	Decline or extinction of species	Inside
High	B06	Grazing in forests/woodland	Inside

Table 6-2 Site-specific threats, pressures and activities

Potential pathways for effect with regard to site-specific threats, pressures and activities have been identified in relation to 'Removal of hedges and copses or shrub' and 'Decline or extinction of species.'



6.1.2 **Ratty River Cave SAC [002316]**

The potential for impacts on this SAC were identified in Table 5-1 above. As indicated by Map 2 of the site-specific conservation objectives, the mapped core foraging range of the designated roosts is adjacent to the western boundary of the Proposed Development site.

The identified pathways for effect include the following:

Ratty River Cave SAC has been designated for the presence of a winter roost (id. 51) and summer roost (id. 05) for lesser horseshoe bat (*Rhinolophus hipposideros*). The Proposed Development site is outside of, but adjacent to, the core foraging range of the QI lesser-horseshoe bat population (2.5km, NPWS 2018). However, taking a precautionary approach, a potential for adverse effect on the SAC was identified in the form of loss of foraging and commuting habitat, collision risk and disturbance/displacement as a result of construction and operation of the Proposed Development.

The table below lists the qualifying features of this European Site and determines, in the light of their Conservation Objectives, and associated Targets and Attributes, whether there is any complete source-pathway-receptor chain, by which adverse effects may occur.

6.1.2.1 Identification of Individual Qualifying Features with the Potential to be Affected

Table 6-3 Assessment of Qualifying features potentially affected

Qualifying feature	Conservation Objective (NPWS, Version 1, July 2018 ²⁸),	Rationale	Potential for Adverse Effects Y/N
1303 Lesser Horseshoe Bat <i>Rhinolophus hipposideros</i>	To restore the favourable conservation condition of Lesser Horseshoe Bat in Danes Hole, Poulnalecka SAC	The SAC has been designated for the presence of a winter roost (id. 51) and summer roost (id. 05) for lesser horseshoe bat (<i>Rhinolophus hipposideros</i>). The Proposed Development site is outside of but adjacent to the core foraging range of the QI lesser-horseshoe bat population (2.5km, NPWS 2018). Therefore, taking a precautionary approach, a potential for adverse effects on the SAC was identified.	Yes

²⁸ https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002316.pdf



Qualifying feature	Conservation Objective (NPWS, Version 1, July 2018 ²⁸),	Rationale	Potential for Adverse Effects Y/N
8310 Caves not open to the public	Caves not open to the public (8310) is integrally linked to lesser horseshoe bat (<i>Rhinolophus hipposideros</i>) (1303) as part of the habitat for the species; therefore, a separate conservation objective has not been set for the habitat in Danes Hole, Poulnalecka SAC.	The Proposed Development site is located completely outside of the SAC, therefore, there is no potential for direct or indirect adverse effect on the cave habitat of lesser horseshoe bat as a result of the Proposed Development.	No



6.1.2.2 Site Specific Pressures and Threats

As per the Natura 2000 Data Form, the site-specific threats, pressures and activities with potential to impact on the European Site were reviewed and considered in relation to the Proposed Development. These are provided in the table below.

Negative Impacts				
Rank	Threats and	1 Pressures	Inside/Outside	
High	A10.01	Removal of hedges and copses or shrub	Outside	
High	D05	Demolishment of buildings and human structures	Inside	
Low	A10.01	Removal of hedges and copses or shrub	Inside	

Table 6-4 Site-specific threats, pressures and activities

Potential pathways for effect with regard to site-specific threats, pressures and activities have been identified in relation to 'Removal of hedges and copses or shrub'.



6.1.3 Lower River Shannon SAC [002165]

The potential for impacts on this SAC were identified in Table 5-1 above. The SAC is located 616m over land distance from the Proposed Development site at its closest point (being 616m from the proposed transitional compound area and approx. 5km over-land distance from the Proposed Wind Farm Site).

The SAC is located 1.8km downstream of the Proposed Development site at its closest point (1.8km downstream of the proposed transitional compound area and approx. 15km downstream of the Proposed Wind Farm Site).

The identified pathways for effect include the following:

> Deterioration in water quality within the SAC associated with the construction and operation of the Proposed Development.

Construction phase activities will include soil stripping, ground levelling and deeper excavations for foundations, removal of vegetation cover and excavation of soil, subsoil and fill where present. These activities can result in the release of suspended solids to surface watercourses and could result in an increase in the suspended sediment load, resulting in increased turbidity which in turn could affect the water quality and fish stocks in the local rivers and downstream River Shannon. Run-off of untreated pumped groundwater presents a risk. Accidental spillage during refuelling of construction plant with petroleum hydrocarbons is a pollution risk to groundwater and surface water. Concrete and other cement-based products are highly alkaline and corrosive and can have negative impacts on water quality. They generate very fine, highly alkaline silt (pH 11.5) that can physically damage fish by burning their skin and blocking their gills. Conifer felling will be required for the Proposed Development as part of construction works for proposed infrastructure as well as for enhancement measures for Hen Harrier as part of the Biodiversity Management Plan.

Potential water quality effects during tree felling could arise from:

- > Exposure of soil and subsoils due to vehicle tracking, and skidding or forwarding extraction methods resulting in a source of suspended sediment which can become entrained in surface water runoff and enter surface water courses;
- > Entrainment of suspended sediment in watercourses due to vehicle tracking through watercourses;
- > Damage to roads resulting in a source of suspended sediment which can become entrained in surface water runoff and enter surface water courses;
- > Release of sediment attached to timber in stacking areas; and,
- > Nutrient release.

The following pathway for effect was also identified:

> Disturbance to QI fauna associated with construction and operation of the Proposed Development.



Table 6-5 lists the qualifying features of this European Site and determines, in the light of their Conservation Objectives, and associated Targets and Attributes, whether there is any complete source-pathway-receptor chain, by which adverse effects may occur.

6.1.3.1 Identification of Individual Qualifying Features with the Potential to be Affected

Qualifying feature	Conservation Objective (NPWS, Version 1, August 2012 ²⁹)	Rationale	Potential for Adverse Effects Y/N
[1029] Freshwater Pearl Mussel <i>Margaritifera</i> <i>margaritifera</i>	To restore the favourable conservation condition of Freshwater Pearl Mussel in the Lower River Shannon SAC	According to map 15 of the site specific conservation objectives document, the conservation objective is applied only to the population of Freshwater Pearl Mussel present in the Cloon River, Co. Clare. The Proposed Development site has no hydrological connectivity with the Cloon River population, and therefore, no pathway for adverse effect on the QI species was identified.	No
[1095] Sea Lamprey Petromyzon marinus	To restore the favourable conservation condition of Sea Lamprey in the Lower River Shannon SAC	The SAC is located downstream of the Proposed Development. There are no instream works proposed, therefore there is no potential for direct adverse effect on the species. However, a complete source-pathway-receptor chain for indirect adverse effects on this species was identified as a result of deterioration in water quality as a result of the Proposed Development, therefore, further assessment is required.	Yes
[1096] Brook Lamprey <i>Lampetra planeri</i>	To maintain the favourable conservation condition of Brook Lamprey in the Lower River Shannon SAC	The SAC is located downstream of the Proposed Development. There are no instream works proposed, therefore there is no potential for direct adverse effect on the species. However, a complete source-pathway-receptor chain for indirect adverse effects on this species was identified as a result of deterioration in water quality as a result of the Proposed Development, therefore, further assessment is required.	Yes

Table 6-5 Assessment of Qualifying features potentially affected

²⁹ NPWS (2012) Conservation Objectives Lower River Shannon SAC 002165. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.



[1099] River Lamprey <i>Lampetra fluviatilis</i>	To maintain the favourable conservation condition of River Lamprey in the Lower River Shannon SAC	The SAC is located downstream of the Proposed Development. There are no instream works proposed, therefore there is no potential for direct adverse effect on the species. However, a complete source-pathway-receptor chain for indirect adverse effects on this species was identified as a result of deterioration in water quality as a result of the Proposed Development, therefore, further assessment is required.	Yes
[1106] Atlantic Salmon <i>Salmo</i> <i>salar</i> (only in fresh water)	To restore the favourable conservation condition of Salmon in the Lower River Shannon SAC	The SAC is located downstream of the Proposed Development. There are no instream works proposed, therefore there is no potential for direct adverse effect on the species. However, a complete source-pathway-receptor chain for indirect adverse effects on this species was identified as a result of deterioration in water quality as a result of the Proposed Development, therefore, further assessment is required.	Yes
[1110] Sandbanks which are slightly covered by sea water all the time	To maintain the favourable conservation condition of Sandbanks which are slightly covered by sea water all the time in the Lower River Shannon SAC	According to the Site-Specific Conservation Objectives (SSCOs), the mapped QI habitat is located over 70km downstream of the Proposed Development in marine waters. Given the large intervening distance between the Proposed Development site and the SAC, the assimilative capacity of intervening waterbodies, and the marine nature of the QI habitat being insensitive to localise, upstream sedimentation events, the potential for source-pathway-receptor chain for indirect adverse effects on the habitat can be ruled out and further assessment is not required.	No
[1130] Estuaries	To maintain the favourable conservation condition of Estuaries in the Lower River Shannon SAC	According to the Site-Specific Conservation Objectives (SSCOs), the mapped QI habitat is located approx. 1.8km downstream of the Proposed Development (the proposed transitional compound area). A complete source-pathway-receptor chain for indirect adverse effects on the habitat was identified as a result of deterioration in water quality as a result of the Proposed Development, therefore, further assessment is required.	Yes
[1140] Mudflats and sandflats not covered by seawater at low tide	To maintain the favourable conservation condition of Mudflats and sandflats not covered by seawater at low tide in the Lower River Shannon SAC	According to the Site-Specific Conservation Objectives (SSCOs), the mapped QI habitat is located approx. 3km downstream of the Proposed Development (proposed transitional compound area). A complete source-pathway-receptor chain for indirect adverse effects on the habitat was identified as a result of deterioration in water quality as a result of the Proposed Development, therefore, further assessment is required.	Yes
[1150] *Coastal lagoons	To restore the favourable conservation condition of Coastal	The QI habitat is located downstream of the Proposed Development. A complete source- pathway-receptor chain for indirect adverse effects on the habitat was identified as a result of	Yes



	lagoons in the Lower River Shannon SAC	deterioration in water quality as a result of the Proposed Development, therefore, further assessment is required.	
[1160] Large shallow inlets and bays	To maintain the favourable conservation condition of Large shallow inlets and bays in the Lower River Shannon SAC	According to the Site-Specific Conservation Objectives (SSCOs), the mapped QI habitat is located over 50km downstream of the Proposed Development in marine waters. Given the large intervening distance between the Proposed Development site and the SAC, the assimilative capacity of intervening waterbodies, and the marine nature of the QI habitat being insensitive to localise, upstream sedimentation events, the potential for source-pathway-receptor chain for indirect adverse effects on the habitat can be ruled out and further assessment is not required.	No
[1170] Reefs	To maintain the favourable conservation condition of Reefs in the Lower River Shannon SAC	According to Map 8 of the site-specific conservation objectives, the QI habitat is located approx. 8.5km downstream of the Proposed Development (proposed transitional compound area). A complete source-pathway-receptor chain for indirect adverse effects on the habitat was identified as a result of deterioration in water quality as a result of the Proposed Development, therefore, further assessment is required.	Yes
[1220] Perennial vegetation of stony banks	To maintain the favourable conservation condition of Perennial vegetation of stony banks in the Lower River Shannon SAC	The Proposed Development is located completely outside of the SAC boundary. Due to the terrestrial nature of this habitat, and the lack of hydrological or any other type of connectivity between the habitat and the Proposed Development site, no pathway for adverse effect on the QI habitat was identified.	No
[1230] Vegetated sea cliffs of the Atlantic and Baltic coasts	To maintain the favourable conservation condition of Vegetated sea cliffs in the Lower River Shannon SAC	The Proposed Development is located completely outside of the SAC boundary. Due to the terrestrial nature of this habitat, and the lack of hydrological or any other type of connectivity between the habitat and the Proposed Development site, no pathway for adverse effect on the QI habitat was identified.	No
[1310] <i>Salicornia</i> and other annuals colonizing mud and sand	To maintain the favourable conservation condition of <i>Salicornia</i> and other annuals colonizing mud and sand in the Lower River Shannon SAC	The QI habitat is often associated with the salt meadow habitats which are located downstream of the Proposed Development according to Map 12 of the Site-Specific Conservation Objectives. A complete source-pathway-receptor chain for indirect adverse effects on the habitat was identified as a result of deterioration in water quality as a result of the Proposed Development, therefore, further assessment is required.	Yes
[1330] Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>)	To restore the favourable conservation condition of Atlantic salt meadows (<i>Glauco-Puccinellietalia</i>	This QI habitat is located approx. 5km downstream of the Proposed Development (proposed transitional compound area) according to Map 12 of the Site-Specific Conservation Objectives. A complete source-pathway-receptor chain for indirect adverse effects on the habitat was	Yes



	<i>maritimae</i>) in the Lower River	identified as a result of deterioration in water quality as a result of the Proposed Development,	
	Shannon SAC	therefore, further assessment is required.	
[1349] Bottlenose Dolphin <i>Tursiops truncatus</i>	To maintain the favourable conservation condition of Bottlenose Dolphin in the Lower River Shannon SAC	Suitable habitat for this species exists downstream of the Proposed Development (approx. 10km downstream of the proposed transitional compound area according to Map 16 of the Site-specific conservation objectives). A complete source-pathway-receptor chain for indirect adverse effects on the species was identified as a result of deterioration in water quality as a result of the Proposed Development, therefore, further assessment is required.	Yes
[1355] Otter <i>Lutra lutra</i>	To restore the favourable conservation condition of Otter in the Lower River Shannon SAC	The SAC is located downstream of the Proposed Development. A complete source-pathway- receptor chain for indirect adverse effects on the species was identified as a result of deterioration in water quality as a result of the Proposed Development, therefore, further assessment is required. Evidence of otter activity was found within the Proposed Development site in the form of otter prints as well as downstream of the Proposed Development site. Taking a precautionary approach, the potential for disturbance of individuals of the SAC population as a result of the Proposed Development requires further assessment.	Yes
[3260] Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation	To maintain the favourable conservation condition of Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation in the Lower River Shannon SAC	Taking a precautionary approach, there is potential for this QI habitat to be present downstream of the Proposed Development. A complete source-pathway-receptor chain for indirect adverse effects on the habitat was identified as a result of deterioration in water quality as a result of the Proposed Development, therefore, further assessment is required.	Yes
[1410] Mediterranean salt meadows (<i>Juncetalia maritimi</i>)	To restore the favourable conservation condition of Mediterranean salt meadows (<i>Juncetalia maritimi</i>) in the Lower River Shannon SAC	This QI habitat is located downstream of the Proposed Development according to Map 12 of the Site-Specific Conservation Objectives. A complete source-pathway-receptor chain for indirect adverse effects on the habitat was identified as a result of deterioration in water quality as a result of the Proposed Development, therefore, further assessment is required.	Yes
[6410] <i>Molinia</i> meadows on calcareous, peaty or clayey- silt-laden soils (<i>Molinion</i> <i>caeruleae</i>)	To maintain the favourable conservation condition of <i>Molinia</i> meadows on calcareous, peaty or clayey-silt laden soils (<i>Molinion</i>	The Proposed Development is located completely outside of the SAC boundary. Due to the terrestrial nature of this habitat, and the lack of hydrological or any other type of connectivity between the habitat and the Proposed Development site, no pathway for adverse effect on the QI habitat was identified.	No



	<i>caeruleae</i>) in the Lower River Shannon SAC		
[91E0] *Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)	To restore the favourable conservation condition of Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior (Alno-Padion,</i> <i>Alnion incanae, Salicion albae</i>) in the Lower River Shannon SAC	Taking a precautionary approach, there is potential for this QI habitat to be present downstream of the Proposed Development. A complete source-pathway-receptor chain for indirect adverse effects on the habitat was identified as a result of deterioration in water quality as a result of the Proposed Development, therefore, further assessment is required.	Yes



6.1.3.2 Site Specific Pressures and Threats

As per the Natura 2000 Data Form, the site-specific threats, pressures and activities with potential to impact on the European Site were reviewed and considered in relation to the Proposed Development. These are provided in the table below.

Table 6-6 Site-specific threats, pressures and activities

Negative Impacts			
Rank	Threats and	1 Pressures	Inside/Outside
Medium	E01	Urbanised areas, human habitation	Outside
Medium	K02.03	Eutrophication (natural)	Outside
Medium	J02.01.02	Reclamation of land from sea, estuary or marsh	Outside
Low	C01.01.02	Removal of beach material	Inside
Low	F01	Marine and freshwater aquaculture	Inside
Medium	E03	Discharges	Outside
Medium	E03	Discharges	Inside
Low	J02.10	Management of aquatic and bank vegetation for drainage purposes	Inside
Medium	A08	Fertilisation	Outside
Medium	H04	Air pollution, air-borne pollutants	Outside
Medium	A08	Fertilisation	Inside
Low	F03.01	Hunting	Inside
Medium	A04	Grazing	Inside
Low	В	Sylviculture, forestry	Inside
Low	J02.12.01	Sea defense or coast protection works, tidal barrages	Inside
Low	G01.01	Nautical sports	Inside
Medium	J02.01.01	Polderisation	Inside
Low	D01.01	Paths, tracks, cycling tracks	Inside
Low	C01.03.01	Hand cutting of peat	Inside
Low	I01	Invasive non-native species	Inside

Potential pathways for effect with regard to site-specific threats, pressures and activities have been identified in relation to 'Discharges'.



6.1.4 River Shannon and River Fergus Estuaries SPA [004077]

The potential for impacts on this SPA were identified in Table 5-1 above. The Proposed Wind Farm site is approx. 9km over-land from the SPA.

The Proposed Development is approx. 1.8km upstream of the SPA at its closest point (being 1.8km from the proposed transitional compound area and approx. 15km downstream of the Proposed Wind Farm site).

The identified pathways for effect include the following:

A source-pathway-receptor chain for effect on this SPA was identified due to downstream hydrological connectivity with the Proposed Development site. A potential for deterioration in water quality of the SPA, thus affecting SCI supporting habitat of SCI species was identified as a result of construction and operation of the Proposed Development.

In addition, a potential for impact on SCI species as a result of ex-situ habitat loss, disturbance and collision risk was identified.

The table below lists the qualifying features of this European Site and determines, in the light of their Conservation Objectives, and associated Targets and Attributes, whether there is any complete source-pathway-receptor chain, by which adverse effects may occur.

6.1.4.1 Identification of Individual Qualifying Features with the Potential to be Affected

Qualifying feature	Conservation Objective (NPWS, Version 1, September 2012 ³⁰),	Rationale	Potential for Adverse Effects Y/N
[A017] Cormorant (<i>Phalacrocorax carbo</i>)	To maintain the favourable conservation condition of Cormorant	Cormorant was only observed on four occasions, despite undertaking a comprehensive suite of surveys over five and a half years. The Wind Farm Site is of no ecological importance to this species, given how infrequently the species was observed. Therefore, there is no potential for	Yes

Table 6-7 Assessment of Qualifying features potentially affected

³⁰ NPWS (2012) Conservation Objectives: River Shannon and River Fergus Estuaries SPA 004077. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.



	in the River Shannon and River Fergus Estuaries SPA	likely adverse effect via collision risk, disturbance, displacement or habitat loss to the SCI population associated with the SPA.	
		However, a potential for adverse effect to the species was identified as a result of deterioration in water quality during construction, operation and decommissioning of the Proposed Development, thus affecting the supporting wetland habitat of the species. Therefore, further assessment is required.	
[A038] Whooper Swan (<i>Cygnus cygnus</i>)	To maintain the favourable conservation condition of Whooper Swan in the River Shannon and River Fergus Estuaries SPA During comprehensive ornithological surveys undertaken over five and a half years at the Proposed Development site, no records of this species were observed. Therefore, there is no potential for likely adverse effect via collision risk, disturbance, displacement or habitat loss to the SCI population associated with the SPA.		Yes
		However, a potential for adverse effect to the species was identified as a result of deterioration in water quality during construction, operation and decommissioning of the Proposed Development, thus affecting the supporting wetland habitat of the species. Therefore, further assessment is required.	
[A046] Light-bellied Brent Goose (<i>Branta bernicla hrota</i>)	To maintain the favourable conservation condition of Light- bellied Brent Goose in the River Shannon and River Fergus Estuaries SPA	During comprehensive ornithological surveys undertaken over five and a half years at the Proposed Development site, no records of this species were observed. Therefore, there is no potential for likely adverse effect via collision risk, disturbance, displacement or habitat loss to the SCI population associated with the SPA.	Yes
		However, a potential for adverse effect to the species was identified as a result of deterioration in water quality during construction, operation and decommissioning of the Proposed Development, thus affecting the supporting wetland habitat of the species. Therefore, further assessment is required.	
[A048] Shelduck (<i>Tadorna tadorna</i>)	To maintain the favourable conservation condition of Shelduck in the River Shannon and River Fergus Estuaries SPA	During comprehensive ornithological surveys undertaken over five and a half years at the Proposed Development site, no records of this species were observed. Therefore, there is no potential for likely adverse effect via collision risk, disturbance, displacement or habitat loss to the SCI population associated with the SPA.	Yes
		However, a potential for adverse effect to the species was identified as a result of deterioration in water quality during construction, operation and decommissioning of the Proposed	



		Development, thus affecting the supporting wetland habitat of the species. Therefore, further assessment is required.	
[A050] Wigeon (Anas penelope)To maintain the favourable conservation condition of Wigeon in the River Shannon and River Fergus Estuaries SPADuring comprehensive ornithole Proposed Development site, no potential for likely adverse effect the SCI population associated with		During comprehensive ornithological surveys undertaken over five and a half years at the Proposed Development site, no records of this species were observed. Therefore, there is no potential for likely adverse effect via collision risk, disturbance, displacement or habitat loss to the SCI population associated with the SPA.	Yes
		However, a potential for adverse effect to the species was identified as a result of deterioration in water quality during construction, operation and decommissioning of the Proposed Development, thus affecting the supporting wetland habitat of the species. Therefore, further assessment is required.	
[A052] Teal (<i>Anas crecca</i>)	To maintain the favourable conservation condition of Teal in the River Shannon and River Fergus Estuaries SPA	During comprehensive ornithological surveys undertaken over five and a half years at the Proposed Development site, no records of this species were observed. Therefore, there is no potential for likely adverse effect via collision risk, disturbance, displacement or habitat loss to the SCI population associated with the SPA.	
		However, a potential for adverse effect to the species was identified as a result of deterioration in water quality during construction, operation and decommissioning of the Proposed Development, thus affecting the supporting wetland habitat of the species. Therefore, further assessment is required.	
[A054] Pintail (<i>Anas acuta</i>) To maintain the favourable conservation condition of Pintail in the River Shannon and River Fergus Estuaries SPA		During comprehensive ornithological surveys undertaken over five and a half years at the Proposed Development site, no records of this species were observed. Therefore, there is no potential for likely adverse effect via collision risk, disturbance, displacement or habitat loss to the SCI population associated with the SPA.	Yes
		However, a potential for adverse effect to the species was identified as a result of deterioration in water quality during construction, operation and decommissioning of the Proposed Development, thus affecting the supporting wetland habitat of the species. Therefore, further assessment is required.	
[A056] Shoveler (<i>Anas</i> <i>clypeata</i>)	To maintain the favourable conservation condition of Shoveler in	During comprehensive ornithological surveys undertaken over five and a half years at the Proposed Development site, no records of this species were observed. Therefore, there is no	Yes



	the River Shannon and River Fergus Estuaries SPA	potential for likely adverse effect via collision risk, disturbance, displacement or habitat loss to the SCI population associated with the SPA.	
		However, a potential for adverse effect to the species was identified as a result of deterioration in water quality during construction, operation and decommissioning of the Proposed Development, thus affecting the supporting wetland habitat of the species. Therefore, further assessment is required.	
[A062] Scaup (<i>Aythya marila</i>)	[A062] Scaup (<i>Aythya marila</i>) To maintain the favourable conservation condition of Scaup in the River Shannon and River Fergus Estuaries SPA During comprehensive ornithological surveys undertaken over five and a half years at the proposed Development site, no records of this species were observed. Therefore, there potential for likely adverse effect via collision risk, disturbance, displacement or habitat the SCI population associated with the SPA.		Yes
		However, a potential for adverse effect to the species was identified as a result of deterioration in water quality during construction, operation and decommissioning of the Proposed Development, thus affecting the supporting wetland habitat of the species. Therefore, further assessment is required.	
[A137] Ringed Plover (<i>Charadrius hiaticula</i>)	To maintain the favourable conservation condition of Ringed Plover in the River Shannon and River Fergus Estuaries SPA	During comprehensive ornithological surveys undertaken over five and a half years at the Proposed Development site, no records of this species were observed. Therefore, there is no potential for likely adverse effect via collision risk, disturbance, displacement or habitat loss to the SCI population associated with the SPA.	
		However, a potential for adverse effect to the species was identified as a result of deterioration in water quality during construction, operation and decommissioning of the Proposed Development, thus affecting the supporting wetland habitat of the species. Therefore, further assessment is required.	
[A140] Golden Plover (<i>Pluvialis apricaria</i>)	To maintain the favourable conservation condition of Golden Plover in the River Shannon and River Fergus Estuaries SPA	This species was only observed on one occasion, despite undertaking a comprehensive suite of surveys over five and a half years. The Wind Farm Site is of no Ecological Importance to this species, given how infrequently the species was observed.	Yes
		However, a potential for adverse effect to the species was identified as a result of deterioration in water quality during construction, operation and decommissioning of the Proposed Development, thus affecting the supporting wetland habitat of the species. Therefore, further assessment is required.	



[A141] Grey Plover (<i>Pluvialis squatarola</i>)	To maintain the favourable conservation condition of Grey Plover in the River Shannon and River Fergus Estuaries SPA	During comprehensive ornithological surveys undertaken over five and a half years at the Proposed Development site, no records of this species were observed. Therefore, there is no potential for likely adverse effect via collision risk, disturbance, displacement or habitat loss to the SCI population associated with the SPA. However, a potential for adverse effect to the species was identified as a result of deterioration in water quality during construction, operation and decommissioning of the Proposed Development, thus affecting the supporting wetland habitat of the species. Therefore, further assessment is required.	Yes
[A142] Lapwing (<i>Vanellus vanellus</i>)	To maintain the favourable conservation condition of Lapwing in the River Shannon and River Fergus Estuaries SPA	During comprehensive ornithological surveys undertaken over five and a half years at the Proposed Development site, no records of this species were observed. Therefore, there is no potential for likely adverse effect via collision risk, disturbance, displacement or habitat loss to the SCI population associated with the SPA. However, a potential for adverse effect to the species was identified as a result of deterioration in water quality during construction, operation and decommissioning of the Proposed Development, thus affecting the supporting wetland habitat of the species. Therefore, further assessment is required.	Yes
[A143] Knot (<i>Calidris canutus</i>)	To maintain the favourable conservation condition of Knot in the River Shannon and River Fergus Estuaries SPA	During comprehensive ornithological surveys undertaken over five and a half years at the Proposed Development site, no records of this species were observed. Therefore, there is no potential for likely adverse effect via collision risk, disturbance, displacement or habitat loss to the SCI population associated with the SPA. However, a potential for adverse effect to the species was identified as a result of deterioration in water quality during construction, operation and decommissioning of the Proposed Development, thus affecting the supporting wetland habitat of the species. Therefore, further assessment is required.	Yes
[A149] Dunlin (<i>Calidris alpina</i>)	To maintain the favourable conservation condition of Dunlin in the River Shannon and River Fergus Estuaries SPA	During comprehensive ornithological surveys undertaken over five and a half years at the Proposed Development site, no records of this species were observed. Therefore, there is no potential for likely adverse effect via collision risk, disturbance, displacement or habitat loss to the SCI population associated with the SPA.	Yes



		However, a potential for adverse effect to the species was identified as a result of deterioration in water quality during construction, operation and decommissioning of the Proposed Development, thus affecting the supporting wetland habitat of the species. Therefore, further assessment is required.	
[A156] Black-tailed Godwit (<i>Limosa limosa</i>)	To maintain the favourable conservation condition of Black-tailed Godwit in the River Shannon and River Fergus Estuaries SPA	 During comprehensive ornithological surveys undertaken over five and a half years at the Proposed Development site, no records of this species were observed. Therefore, there is no potential for likely adverse effect via collision risk, disturbance, displacement or habitat loss to the SCI population associated with the SPA. However, a potential for adverse effect to the species was identified as a result of deterioration in water quality during construction, operation and decommissioning of the Proposed 	
		assessment is required.	
[A157] Bar-tailed Godwit (<i>Limosa lapponica</i>)	To maintain the favourable conservation condition of Bar-tailed Godwit in the River Shannon and River Fergus Estuaries SPA	During comprehensive ornithological surveys undertaken over five and a half years at the Proposed Development site, no records of this species were observed. Therefore, there is no potential for likely adverse effect via collision risk, disturbance, displacement or habitat loss to the SCI population associated with the SPA. However, a potential for adverse effect to the species was identified as a result of deterioration in water quality during construction, operation and decommissioning of the Proposed Development, thus affecting the supporting wetland habitat of the species. Therefore, further assessment is required.	Yes
[A160] Curlew (<i>Numenius arquata</i>)	To maintain the favourable conservation condition of Curlew in the River Shannon and River Fergus Estuaries SPA	Curlew was observed on only one occasion as an incidental observation, despite undertaking a comprehensive suite of surveys over five and a half years. The Wind Farm Site is of no ecological importance to this species, given how infrequently the species was observed. Therefore, there is no potential for likely adverse effect via collision risk, disturbance, displacement or habitat loss to the SCI population associated with the SPA. However, a potential for adverse effect to the species was identified as a result of deterioration in water quality during construction, operation and decommissioning of the Proposed Development, thus affecting the supporting wetland habitat of the species. Therefore, further assessment is required.	Yes



	[A162] Redshank (<i>Tringa totanus</i>)	To maintain the favourable conservation condition of Redshank in the River Shannon and River Fergus Estuaries SPA	During comprehensive ornithological surveys undertaken over five and a half years at the Proposed Development site, no records of this species were observed. Therefore, there is no potential for likely adverse effect via collision risk, disturbance, displacement or habitat loss to the SCI population associated with the SPA.	Yes
			However, a potential for adverse effect to the species was identified as a result of deterioration in water quality during construction, operation and decommissioning of the Proposed Development, thus affecting the supporting wetland habitat of the species. Therefore, further assessment is required.	
	A164] Greenshank (<i>Tringa</i> nebularia) To maintain the favourable conservation condition of Greenshank it in the River Shannon and River Fergus Estuaries SPA During comprehensive ornithological surveys undertaken over five and a half years at the Proposed Development site, no records of this species were observed. Therefore, there is no potential for likely adverse effect via collision risk, disturbance, displacement or habitat loss the SCI population associated with the SPA.		Yes	
			However, a potential for adverse effect to the species was identified as a result of deterioration in water quality during construction, operation and decommissioning of the Proposed Development, thus affecting the supporting wetland habitat of the species. Therefore, further assessment is required.	
[A179] Black-headed Gull (Chroicocephalus ridibundus)To maintain the favourable conservation condition of Black- headed Gull it in the River Shannon and River Fergus Estuaries SPABlack-headed gull was only observed on four occasions, or suite of surveys over five and a half years. Furthermore, a season, while this SPA is designated for the wintering pop- ecological importance to this species, given how infrequent Therefore, there is no potential for likely adverse effect vi displacement or habitat loss to the SCI population associal		Black-headed gull was only observed on four occasions, despite undertaking a comprehensive suite of surveys over five and a half years. Furthermore, all observations were within breeding season, while this SPA is designated for the wintering population. The Wind Farm Site is of no ecological importance to this species, given how infrequently the species was observed. Therefore, there is no potential for likely adverse effect via collision risk, disturbance, displacement or habitat loss to the SCI population associated with the SPA.	Yes	
			However, a potential for adverse effect to the species was identified as a result of deterioration in water quality during construction, operation and decommissioning of the Proposed Development, thus affecting the supporting wetland habitat of the species. Therefore, further assessment is required.	
	[A999] Wetland and Waterbirds	To maintain the favourable conservation condition of the wetland habitat in the River Shannon and	A potential for adverse effect to the SCI supporting wetland habitats of the SPA was identified as a result of deterioration in water quality during construction, operation and decommissioning of the Proposed Development. Therefore, further assessment is required.	Yes



River Fergus Estuaries SPA as a	
resource for the regularly-occurring	
migratory waterbirds that utilise it.	





6.1.4.2 Site Specific Pressures and Threats

As per the Natura 2000 Data Form, the site-specific threats, pressures and activities with potential to impact on the European Site were reviewed and considered in relation to the Proposed Development. These are provided in the table below.

Negative Impacts			
Rank	Threats and	Threats and Pressures	
Medium	G01.01	Nautical sports	Inside
Medium	D03.02	Shipping lanes	Inside
High	E03	Discharges	Inside
High	E01	Urbanised areas, human habitation	Outside
High	A08	Fertilisation	Outside
High	E02	Industrial or commercial areas	Outside
Medium	F01	Marine and freshwater aquaculture	Inside

Table 6-8 Site-specific threats, pressures and activities

Potential pathways for effect with regard to site-specific threats, pressures and activities have been identified in relation to 'Discharges'.



6.2 Assessment of the effects of the Proposed Development on the integrity of Natura 2000 Sites

This section of the report sets out the potential effects of the Proposed Development (either alone or in combination with other projects or plans) on the integrity of Danes Hole, Poulnalecka SAC, Ratty River Cave SAC, Lower River Shannon SAC, and River Shannon and River Fergus Estuaries SPA, with respect to the conservation objectives of the sites and to their structure and function.

6.2.1 **Potential for Direct Effects on the European Sites**

A potential for direct effect on the Lesser Horseshoe Bat Qualifying Interest roosts designated under the following SACs was identified:

- > Danes Hole, Poulnalecka SAC
- > Ratty River Cave SAC

The conservation objective for Lesser Horseshoe Bat within Danes Hole, Poulnalecka SAC, is '*To* restore the favourable conservation condition of Lesser Horseshoe Bat in Danes Hole, Poulnalecka SAC'.¹⁸

The conservation objective for Lesser Horseshoe Bat within Ratty River Cave SAC, is *To restore the favourable conservation condition of Lesser Horseshoe Bat in Ratty River Cave SAC.*¹⁹

6.2.1.1 Lesser Horseshoe Bat - Collision Risk

6.2.1.1.1 **Operational Phase**

The Proposed Wind Farm site is partly located within the core foraging range of the QI Lesser Horseshoe bat roosts designated for Danes Hole, Poulnalecka SAC. The western boundary of the Proposed Development site is also located adjacent to the mapped core foraging range of the lesser horseshoe bat roosts designated for Ratty River Cave SAC. Therefore, the potential for direct adverse effect as a result of collision risk to Lesser Horseshoe bats with turbine blades is assessed in this section.

Assessment of Site-Risk

The likely impact of a proposed development on bats is related to site-based risk factors, including habitat and development features. The site risk assessment, as per Table 3a of the NatureScot guidance, is provided in Table 6-9 below.

Criteria	Site-specific Evaluation	Site Assessment
Habitat Risk	The habitats within the site provide suitable foraging habitat for bats and are connected to the wider landscape by linear features, primarily conifer plantation edges. The wider environment provides suitable features such as scrub, treelines and rivers/streams. The site does not provide an extensive and diverse habitat mosaic of high quality for foraging bats or meet any of the criteria of a high- risk site as set out in Table 3a of NatureScot, 2021.	Moderate

Table 6-9 Site-risk Level Determination for the Proposed Development Site (Adapted from NatureScot 2021)



Criteria	Site-specific Evaluation	Site Assessment
Project Size	Following the criteria set out in NatureScot, 2021 the project is of Small scale as it consists of 10 no. turbines. Whilst those turbines are over 100m in height, it is not a strategic infrastructural development and is well below the number of turbines that would constitute a Large development (NatureScot, 2021). No other wind energy developments within 5km. Comprising turbines >100 m in height	Medium
Site Risk Asse	Medium Site Risk (3)	

The site of the Proposed Development is located in an area of predominantly conifer plantation forestry. As per table 3a of the NatureScot Guidance (2021), it has a *Moderate* habitat risk score. As per Table 3a, the Proposed Development is a *Medium* project size (10 turbines). The cross tabulation of a Medium project on a Moderate risk site results in an overall **Medium** risk score (NatureScot Table 3a).

As discussed in Section 4.3.2, overall activity levels were low for Lesser Horseshoe Bat within the western portion of the site which overlaps with the mapped core foraging range of the SAC population. No Lesser Horseshoe bat activity was recorded during the walked transects undertaken.

Due to these species ecology and the lack of regular high activity levels across the site, no adverse collision related effects are anticipated on lesser horseshoe bats. Nevertheless, a range of mitigations measures will be in place to prevent and monitor collision mortality during operation of the Proposed Development for all bat species and are included below as this will further negate the potential for adverse effects to Lesser Horseshoe Bat associated with the SACs.

Mitigation Measures

This section describes the best practice and site-specific mitigation measures that are in place to avoid and reduce the potential for adverse effects on Lesser horseshoe bat as a result of the operational phase of the proposed development.

Lighting

With regard to the potential for lighting to increase collision risk, it is noted that there will be some illumination of the turbines in the form of aviation lighting, and whilst this lighting is unlikely to result in any increase in collision risk, a comprehensive and site-specific mitigation and monitoring programme for a period of at least 3 years post construction is proposed (detailed below). If in the course of this monitoring, any potential for impact on bats is identified, specific measures including curtailment, will be implemented to avoid any such impacts.

Buffering

In accordance with NIEA Guidance, a minimum 50m buffer to all habitat features used by bats (e.g. hedgerows, tree lines etc.) should be applied to the siting of all wind turbines (See example provided below). This buffer is measured between the blade tip of the turbine and the nearest point of the habitat feature. For wind farms proposed to be key-holed into commercial forestry plantation, NIEA Guidance recommends a minimum buffer of 100m between the turbines and the edge of the forestry. All turbines are located within or at the edge of forestry habitats. In the case of proposed T6, where the proposed buffer would reach beyond the existing road into newly planted oak treelines, felling will remain to the western side of the road to ensure the treeline is retained.



The turbine model to be installed on the site will have an overall ground-to-blade tip height in the range of 185m maximum to 179.5m minimum; rotor diameter in the range of 163m maximum to 149m minimum and hub height of 110.5m maximum and 102m minimum. The buffer calculation is based on the lowest potential swept area of the turbine blades, and therefore the largest area of required forestry felling. Should a turbine with a higher blade swept area be built, the area of temporary felling required will be lower. The largest felling buffer for the proposed wind farm is 102.4m.

It is necessary to calculate the distance between the edge of the habitat feature and the centre of the tower (b). Using the formula:

$$b = \sqrt{(50+bl)^2 - (hh - fh)^2}$$

Where, **bl** =Blade length, **hh** = hub height, **fh** = feature height all in metres.

E.g. (below) $\mathbf{b} = 69.3 \text{m}$ (Plate 6-1)



Plate 6-1 Calculate buffer distances (Natural England, 2014).

Blade Feathering

NIEA Guidelines also recommend that, in addition to buffers applied to habitat features, all wind turbines are subject to 'feathering' of turbine blades when wind speeds are below the cut-in speed of the proposed turbine. This means that the turbine blades are pitched at 90 degrees or parallel to the wind to reduce their rotation speed to below two revolutions per minute while idling. This measure has been shown to significantly reduce bat fatalities (by up to 50%) in some studies (NIEA, 2021).

In accordance with NIEA Guidelines, blade feathering will be implemented as a standard across all proposed turbines when wind speeds are below the cut-in speed of the turbine.

Curtailment

An adaptive monitoring and mitigation strategy has been devised for the Proposed Development, in line with the case study example provided in Appendix 5 of the NatureScot (2021) Guidance and based on the site-specific data.



Curtailment involves raising the cut-in speed with associated loss of power generation in combination with reducing the blade rotation (blade feathering) below the cut-in speed. Blade feathering will be introduced as standard across the site, as above.

Curtailment will be implemented during periods with high median bat activity across all bat species (i.e. Spring at T7 and T9, Summer at T3, T5, T6, T7 and T9 and Autumn at T5 and T6), with simultaneous activity monitoring taking place. Turbines will be curtailed during the weather conditions most suitable for bat activity at the site.

Due to the high levels of general bat activity recorded across the Site, curtailment will be implemented as a standard at all turbines, during conditions most suitable for bat activity at the site.

Recent research used to inform NatureScot guidance has found that 90% of all bat activity can occur on sites when temperature exceeded 11.5°C and windspeed was below 5m/s. In addition, the bat activity is generally recorded 30 minutes after sunset and 40 minutes prior to sunrise. Therefore, a software module will be programmed into the SCADA system controlling the turbines to curtail turbines when all these criteria are met. Curtailment is achieved by opening the blade pitch into the fully-feathered position, which reduces blade rotation speed to <1rpm.

The effectiveness of curtailment will be monitored in order to determine (a) whether it is working effectively (i.e. whether bat mortality is detected, thereby confirming its effectiveness), and (b) whether the curtailment regime can be refined such that turbine down-time can be minimised whilst ensuring that it remains effective at preventing casualties.

A summary of the proposed seasonal curtailment is provided in Table 6-10 below.

Turbine	Proposed Curtailment Period		
No.	Spring (April to May)	Summer (June to mid- August)	Autumn (mid-August to October)
Turbine 3	No	Yes	No
Turbine 5	Yes	Yes	Yes
Turbine 6	Yes	Yes	Yes
Turbine 7	No	Yes	No
Turbine 9	No	Yes	Yes

Table 6-10 Turbine Specific Curtailment Strategy for High-risk Species

Operational Monitoring

As per NIEA and NatureScot Guidance, at least 3 years of post-construction monitoring is required to assess the effects of construction related habitat modification on bat activity i.e. the 50 metre separation between the proposed turbine blade tips and the nearest landscape feature. For example, it may be that the construction of wind turbines reduces bat activity patterns at the site relative to that recorded preconstruction, due to the implementation of the 50-metre buffer described above, and to a level at which there is no longer potential for significant effects on bats (NatureScot, 2021).

Post-construction monitoring will include static detector surveys, walked survey transects and corpse searching to record any bat fatalities resulting from collision. At a minimum, monitoring will be conducted for 3 years post-construction.

The results of post-construction monitoring shall be utilised to assess changes in bat activity patterns post-construction and to monitor the implementation of the mitigation strategy. The performance of the curtailment programme in terms of its ability to respond to the changes in bat abundance based on temperature and wind speed would be analysed to confirm the efficacy of the curtailment during different periods of bat activity. At the end of each year, the efficacy of the curtailment programme will



be reviewed, and any identified efficiencies incorporated into the curtailment programme. This approach allows for an evidence-based review of the potential or bat fatalities at the site, post construction, to ensure that the necessary measures, based on a new baseline post-construction, are implemented for the protection of bat species locally.

The below subsections provide additional detail on the proposed survey effort, timing, and mitigation.

Monitoring Year 1

Bat activity surveys

The post-construction surveys will be carried out as per the pre-construction survey effort. Static monitoring will take place at each turbine during the bat activity season (between April and October) (NatureScot, 2021, NIEA, 2021). Full spectrum recording detectors will be utilised for the same duration as during pre-application surveys and at the same density (NatureScot, 2021). The assessment of bat activity levels will include the use of 'Ecobat' (or similar alternative), a web-based interface, allowing uploaded activity data to be contrasted with a comparable reference range, allowing objective and robust interpretation. Walked survey transects will also be conducted.

Key weather parameters and other factors that are known to influence collision risk will be monitored and shall include:

- > Windspeed in m/s (measured at nacelle height)
- ➤ Temperature (^oC)
- > Precipitation (mm/hr)

Carcass searches

Carcass searches, to monitor and record bat fatalities, shall be conducted at each turbine in accordance with NatureScot/NIEA Guidance. This shall include searcher efficiency trials and an assessment of scavenger removal rates to determine the appropriate correction factor to be applied in relation to determining an accurate estimate of collision mortality. Surveys should cover all activity seasons and the use of a trained dog detection team will be carried out to ensure maximum efficiency.

Monitoring Years 2 & 3

Monitoring surveys shall continue in Year 2 and 3, and the success of the curtailment strategy shall be assessed in line with the baseline data collected in the subsequent year(s).

The performance of the curtailment programme in terms of its ability to respond to the changes in bat abundance based on temperature and wind speed shall be analysed to confirm it is neither significantly over- nor under- curtailing during different periods of bat activity.

At the end of each year, the efficacy of the mitigation/curtailment programme shall be reviewed, and any identified efficiencies incorporated into the programme. The requirement for continued postconsent monitoring will also be considered. Should no bat fatalities be recorded in Year 1, curtailment (where applicable) in Year 2 and Year 3 could be reduced/re-evaluated or removed with monitoring continuing to inform this strategy. A monitoring programme will be submitted to, and agreed with, the Planning Authority. Any subsequent changes will be agreed with the Planning Authority.



6.2.2 **Potential for Indirect Effects on the European Sites**

6.2.2.1 Lesser Horseshoe Bat

6.2.2.1.1 Habitat Loss

A potential for indirect effect on the Lesser Horseshoe Bat Qualifying Interest roosts designated under the following SACs was identified:

- > Danes Hole, Poulnalecka SAC
- Ratty River Cave SAC

The Proposed Development is located within the mapped potential core foraging range of the summer and winter roosts designated under Danes Hole, Poulnalecka SAC, as shown on Map 3 of the site-specific conservation objectives¹⁸. The foraging range overlaps with the Proposed Development site to the west of the site where turbines T01, T02 and T03 and associated infrastructure are proposed, as well as a parcel of land proposed for hen harrier habitat enhancement.

The Proposed Development boundary is located adjacent to the mapped core foraging range of the QI Lesser Horseshoe Bat roost designated under Ratty River Cave SAC as documented in the site-specific conservation objectives¹⁹. None of the proposed site infrastructure is located within the core foraging range of this QI roost, however given the proximity of the Proposed Development to the mapped core foraging range, the potential for adverse effect is assessed on a precautionary basis.

In absence of appropriate design, the loss or degradation of commuting/foraging habitat associated with construction of infrastructure for the Proposed Development has potential to reduce feeding opportunities and/or displace bat populations. The species was not recorded during manual transect surveys, however Lesser Horseshoe Bat activity was recorded during static detector surveys within the section of the Proposed Development site which overlaps with the core foraging ranges of the QI roosts as shown in the site-specific conservation objectives.

The Proposed Development, where it overlaps with the core foraging areas, will include the construction of Turbines T01, T02 and T03 and the construction or widening of access roads and tracks across the forestry, as well as other associated infrastructure, which will require the felling of existing trees. The proposed roads will not significantly sever existing commuting routes along forestry edges within the potential foraging range of Danes Hole, Poulnalecka SAC or Ratty River Cave SAC.

Bat buffers will be created around the turbines located within the mapped core foraging grounds for Lesser horseshoe bat. The creation of buffers will not sever existing corridors but has the potential to create additional habitat for foraging and commuting Lesser horseshoe bats along proposed keyholes, where trees are not harvested by ongoing forestry operations.

Given the extensive area of habitat that will remain undisturbed throughout the site and the avoidance of the most significant areas of faunal habitat (i.e. natural hedgerows and scrub), no adverse effects with regard to loss of commuting and foraging habitat for any of the QI Lesser Horseshoe Bat roosts of Danes Hole, Poulnalecka SAC or Ratty River Cave SAC are anticipated.

The proposed enhancement measures for Hen Harrier will not undermine the conservation objective for lesser horseshoe bat from Danes Hole, Poulnalecka SAC or Ratty River Cave SAC. Part of the lands selected for hen harrier habitat enhancement are mapped as potential foraging grounds for the roosts designated under Danes Hole, Poulnalecka SAC, however, as shown on Figure 6-1, vegetation along the perimeter of the conifer plantation, consisting of treelines, hedgerows and scrub will be retained; in addition to 1- 2 rows of conifer trees along the southeast boundary. The retention of these features will ensure that lesser horseshoe bat potentially utilising the edges of the conifer plantation for foraging and commuting can continue to do so even after the plantation is felled to facilitate peatland



restoration. Access for felling operations will be via the existing access to the plot along the road to the northwest of the site and will not require removal / fragmentation of the vegetation to be retained along the perimeter of the plantation.

The enhancement measures proposed for hen harrier include gapping up of hedgerows, retention and enhancement of scrub and land use management measures such as cessation of the use of pesticides, reduction in fertiliser application and lower stocking density. These enhancement measures will also benefit lesser horseshoe bat in the wider landscape around the proposed wind farm site through improved ecological and landscape connectivity but also through increased invertebrate availability as the diversity of plants within the plot and linear features increases. The existing linear features depicted in Figure 6-1 be gapped up using native tree and hedgerow species that are representative of the species present in the local area. Where it is possible to do so the species will be sourced locally and will be of local provenance.

The proposed retention of the perimeter vegetation along with the proposed habitat enhancement measures will ensure that any effect on lesser horseshoe bat will be short-term and that there will be no adverse effects on the integrity of Danes Hole, Poulnalecka SAC or Ratty River Cave SAC as a result of the proposed wind farm.

According to the Lesser Horseshoe Bat Species Action Plan 2022-2026 (NPWS & VWT 2022),

The optimal foraging habitats for this species are deciduous woodlands, riparian vegetation and mature hedgerows within a few kilometres of a roost. In the absence of woodland, areas of scrub close to roosts are important and should be retained. Conifer plantations are used for commuting and some foraging, where there are deciduous trees associated with the plantation, but are less suitable than mixed and deciduous stands. Dietary studies have highlighted the importance of grazed pastures, particularly in winter.

The Plan includes the following Action:

4.2c ACTION: Incentivise farmers to plant suitable hedgerows under AECM and AECM Co-operative Projects especially within 2.5km of a roost. Incentives should also be available for the retention and enhancement of existing hedgerows associated with roosts

In line with the Lesser Horseshoe Bat Action Plan quoted above, it is proposed to replace edge habitat comprising monocultural stands of sitka spruce with native species. This will be of greater benefit than the currently existing forestry plot which is of a continuous age structure. This will provide greater foraging potential with the planting of native deciduous species which will attract pollinators and other insects.

There is therefore no potential for residual adverse effect on Lesser Horseshoe Bat as a result of construction of the Proposed Development.

6.2.2.1.2 Displacement/Disturbance of Individuals or Population

Construction

The Proposed Development is predominantly located within conifer plantation. There will be no net loss of linear landscape features for commuting and foraging Lesser Horseshoe Bat within the SAC core foraging ranges, and there will be no loss of any roosting sites.

However, lighting might be required during construction associated with infrastructure located within the mapped foraging grounds for Lesser Horseshoe Bat associated with the SAC. This has potential to result in an adverse effect to the species due to displacement effects given that Lesser Horseshoe Bat are a light sensitive species and avoid lit-up areas.



Mitigation

Where lighting is required, directional lighting will be used to prevent overspill on to forestry edges. Exterior lighting during construction, shall be designed to minimize light spillage, thus reducing the effect on areas outside the Proposed Development, and consequently on bats i.e. Lighting will be directed away from mature trees/treelines around the periphery of the site boundary to minimize disturbance to bats. Directional accessories can be used to direct light away from these features, e.g. through the use of light shields (Stone, 2013). The luminaries will be of the type that prevent upward spillage of light and minimize horizontal spillage away from the intended lands.

The proposed lighting around the site shall be designed in accordance with the Institute of Lighting Professionals Guidance Note 08/23 Bats and artificial lighting at Night.

In addition, the applicant commits to the use of lights during construction (such that they are necessary) in line with the following guidance that is provided in the Dark Sky Ireland Lighting Recommendations:

- > Every light needs to be justifiable,
- Limit the use of light to when it is needed,
- > Direct the light to where it is needed,
- > Reduce the light intensity to the minimum needed,
- > Use light spectra adapted to the environment,
- When using white light, use sources with a "warm" colour temperature (less than 3000K).

Residual Effect

With the above mitigations in place, there is no potential for residual adverse effect on Lesser Horseshoe Bat as a result of construction of the Proposed Development.

Operation

The operation of the Proposed Development will not result in any additional habitat loss or deterioration, nor will it result in a significant increase in anthropogenic activity due to its location and scale.

With regard to the potential for lighting to increase collision risk, it is noted that there will be some illumination of the turbines in the form of aviation lighting, and whilst this lighting is unlikely to result in any significant increase in collision risk, a comprehensive and site-specific mitigation and monitoring programme for a period of at least 3 years post construction is proposed. If in the course of this monitoring, any potential for significant effects on bats is identified, specific measures including curtailment, will be implemented to avoid any such impacts.

No other lighting is proposed for the Proposed Development site within the foraging range of the QI Lesser horseshoe bat roosts other than aviation lighting. No potential for adverse effect due to barrier effect or displacement as a result of this lighting is anticipated given that it is of red colour and located at the top of the turbine above flight level of the species.





6.2.2.2 Deterioration in Water Quality

A potential for indirect effect on the following QI species/habitats of Lower River Shannon SAC was identified in the form of water quality deterioration and habitat degradation via surface and ground water pathways during construction and operation of the Proposed Development:

Species:

- Sea Lamprey *Petromyzon marinus*
- Brook Lamprey *Lampetra planeri*
- River Lamprey Lampetra fluviatilis
- > Atlantic Salmon Salmo salar (only in fresh water)
- > Bottlenose Dolphin *Tursiops truncatus*
- > Otter Lutra lutra

Habitats

- Estuaries
- Mudflats and sandflats not covered by seawater at low tide
- > *Coastal lagoons
- > Reefs
- Salicornia and other annuals colonizing mud and sand
- Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
- Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation
- Mediterranean salt meadows (*Juncetalia maritimi*)
- *Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)

A potential for indirect effect on the following SCI species/habitats of River Shannon and River Fergus Estuaries SPA was identified in the form of water quality deterioration and supporting habitat degradation via surface and ground water pathways during construction and operation of the Proposed Development:

- A017 Cormorant *Phalacrocorax carbo* breeding + wintering
- A038 Whooper Swan *Cygnus cygnus* wintering
- A046 Light-bellied Brent Goose Branta bernicla hrota wintering
- A048 Shelduck *Tadorna tadorna* wintering
- > A050 Wigeon Anas penelope wintering
- > A052 Teal Anas crecca wintering
- > A054 Pintail Anas acuta wintering
- > A056 Shoveler Anas clypeata wintering
- > A062 Scaup *Aythya marila* wintering
- > A137 Ringed Plover *Charadrius hiaticula* wintering
- > A140 Golden Plover *Pluvialis apricaria* wintering
- > A141 Grey Plover *Pluvialis squatarola* wintering
- > A142 Lapwing Vanellus vanellus wintering
- > A143 Knot *Calidris canutus* wintering
- > A149 Dunlin *Calidris alpina* wintering
- > A156 Black-tailed Godwit Limosa limosa wintering
- > A157 Bar-tailed Godwit Limosa lapponica wintering
- > A160 Curlew *Numenius arquata* wintering
- > A162 Redshank *Tringa totanus* wintering
- > A164 Greenshank Tringa nebularia wintering
- > A179 Black-headed Gull *Chroicocephalus ridibundus* wintering
- > A999 Wetlands



6.2.2.2.1 Construction Phase Mitigations

As discussed in Section 6.1.3 and Section 6.1.4, a potential for adverse effect on downstream QI habitats and species of Lower River Shannon SAC, and the downstream SCI supporting habitat of River Shannon and River Fergus Estuaries SPA, has been identified as a result of deterioration in water quality during construction of the Proposed Development.

Specific mitigation is provided in relation to water quality by Hydro-environmental Services (HES) in Chapter 9: 'Hydrology and Hydrogeology' of the EIAR. These mitigations are repeated below in the context of protection of local waterbodies which will in turn protect the water quality within downstream European Sites.

The below measures include mitigation by avoidance, mitigation by design, mitigation against release of suspended solids, hydrocarbons, cementitious materials, dewatering works controls, prevention of contamination from wastewater disposal, directional drilling controls associated with the grid connection route, mitigations associated with Turbine Delivery Route works and transition compound, and clear-felling of coniferous plantation mitigations. In addition, mitigation is provided for the installation of new watercourse crossings for internal access roads. These mitigations are provided below.

Clear Felling of Coniferous Plantation

The tree felling activities required as part of the Proposed Development will be the subject of a Felling Licence application to the Forest Service, in accordance with the Forestry Act 2014 and the Forestry Regulations 2017 (SI 191/2017) and as per the Forest Service's policy on granting felling licenses for wind farm developments. Forestry operations will conform to current best practice Forest Service regulations, policies and strategic guidance documents as well as Coillte and DAFM guidance documents, including the specific guidelines listed below, to ensure that felling, planting and other forestry operations result in minimal potential negative effects to the receiving environment.

- > Forestry Standards Manual (Forest Service, 2015)
- > Environmental Requirements for Afforestation (Forest Service, 2016a)
- Land Types for Afforestation (Forest Service, 2016b)
- > Forest Protection Guidelines (Forest Service, 2002)
- > Forest Operations and Water Protection Guidelines (Coillte, 2013)
- > Forestry and Water Quality Guidelines (Forest Service, 2000b)
- > Forestry and the Landscape Guidelines (Forest Service, 2000c)
- > Forestry and Archaeology Guidelines (Forest Service, 2000d)
- > Forest Biodiversity Guidelines (Forest Service, 2000e)
- Forests and Water, Achieving Objectives under Ireland's River Basin Management Plan 2018-2021 (DAFM, 2018)
- Coillte Planting Guideline SOP
- A Guide to Forest Tree Species Selection and Silviculture in Ireland (Horgan et al., 2003)
- Management Guidelines for Ireland's Native Woodlands. Jointly published by the National Parks & Wildlife Service (Cross and Collins, 2017)
- > Native Woodland Scheme Framework (Forest Service, 2018)
- > Code of Best Forest Practice (Forest Service, 2000)

Mitigation by Avoidance:

There is a requirement in the Forest Service Code of Practice and in the FSC Certification Standard for the installation of buffer zones adjacent to aquatic zones at planting stage. Minimum buffer zone widths recommended in the Forest Service (2000) guidance document "Forestry and Water Quality Guidelines" are shown in Table 6-11.

With moderate slopes existing across much of the Wind Farm Site, a 10m setback for felling will be established along all aquatic zones. Buffer zone widths will be increased at vulnerable hydrological features where deemed necessary. This will ensure water quality is protected during the felling operations. However, most of the Proposed Development infrastructure is located outside of the 50m hydrological buffer zone, thereby limiting the felling which will occur in close proximity to natural watercourses.

The setback distance from sensitive hydrological features means that adequate room is maintained for the proposed mitigation measures (discussed below) to be properly installed and operate effectively. The buffer/setback zone will:

- > Avoid physical damage (river/stream banks and river/stream beds) to watercourses and the associated release of sediment;
- Avoid peat/soil disturbance and compaction within close proximity to surface watercourses;
- > Avoid the entry of suspended sediment from works into watercourses; and,
- > Avoid the entry of suspended sediment from the drainage system into watercourses, achieved in part by ending drain discharge outside the buffer zone and allowing percolation across the vegetation of the buffer zone.

Average slope leading to the aquatic zone		Buffer zone width on either side of the aquatic zone	Buffer zone width for highly erodible soils
Moderate	(0 – 15%)	10 m	15 m
Steep	(15 - 30%)	15 m	20 m
Very steep	(>30%)	20 m	25 m

Table 6-11 : Minimum Buffer Zone Widths (Forest Service, 2000)

In addition to the application of buffer/setback zones, the following supplementary mitigation measures will be employed during felling works:

Mitigation by Design:

Mitigation measures which will reduce the risk of entrainment of suspended solids and nutrient release in surface watercourses comprise best practice methods which are set out as follows:

- Checking and maintenance of roads and culverts will be on-going through any felling operation. No tracking of vehicles through watercourses will occur, as vehicles will use road infrastructure and existing watercourse crossing points. Where possible, existing drains will not be disturbed during felling works;
- > Machines will traverse the site along specified off-road routes (referred to as racks);
- > The location of racks will be chosen to avoid wet and potentially sensitive areas;
- Brash mats will be placed on the racks to support the vehicles on soft ground, reducing peat and mineral soil disturbance and erosion and avoiding the formation of rutted areas, in which surface water ponding can occur. Brash mat renewal will take place when they become heavily used and worn. Provision will be made for brash mats along all off-road routes, to protect the soil from compaction and rutting. Where there is risk of severe erosion occurring, extraction will be suspended during periods of high rainfall. An ECoW will monitor forecasts and determine when works should be suspended;
- Silt fences will be installed at the outfalls of existing drains downstream of felling areas. No direct discharge of such drains to watercourses will occur. Sediment traps and silt fences will be installed in advance of any felling works and will provide surface water settlement for runoff from work areas and will prevent sediment from



entering downstream watercourses. Accumulated sediment will be carefully disposed of at pre-selected peat disposal areas. Where possible, all new silt traps will be constructed on even ground and not on sloping ground;

- In areas particularly sensitive to erosion it will be necessary to install double or triple sediment traps and increase buffer zone width. These measures will be reviewed on site during construction;
- > Double silt fencing will also be put down slope of felling areas which are located in close proximity to streams and/or relevant watercourses;
- > Drains and silt traps will be maintained throughout all felling works, ensuring that they are clear of sediment build-up and are not severely eroded;
- Timber will be stacked in dry areas, and outside watercourse buffer zones. Straw bales and check dams to be emplaced on the down gradient side of timber storage/processing sites;
- Works will be carried out during periods of no, or low rainfall, in order to minimise entrainment of exposed sediment in surface water runoff (refer to Pre-Emptive Site Drainage Management below);
- Refuelling or maintenance of machinery will not occur within 50m of an aquatic zone or within 20m of any other hydrological feature. Mobile bowser, drip kits, qualified personnel will be used where refuelling is required; and,
- Branches, logs or debris will not be allowed to build up in aquatic zones. All such material will be removed when harvesting operations have been completed, but care will be taken to avoid removing natural debris deflectors.

Silt Traps:

Silt traps will be strategically placed down-gradient within forestry drains near streams. The main purpose of the silt traps and drain blocking is to slow water flow, increase residence time, and allow settling of silt in a controlled manner.

Pre-emptive Site Drainage Management :

The works programme for the felling operations will also take account of weather forecasts and predicted rainfall in particular. Operations will be suspended or scaled back if heavy rain is forecast. The extent to which works will be scaled back or suspended will relate directly to the amount of rainfall forecast.

The following forecasting systems are available and will be used on a daily/weekly basis and reviewed by an EcoW, as required, to allow site staff to direct proposed and planned construction activities:

- > General Forecasts: Available on a national, regional and county level from the Met Éireann website (www.met.ie/forecasts). These provide general information on weather patterns including rainfall, wind speed and direction but do not provide any quantitative rainfall estimates;
- MeteoAlarm: Alerts to the possible occurrence of severe weather for the next 2 days. Less useful than general forecasts as only available on a provincial scale;
- > 3-hour Rainfall Maps: Forecast quantitative rainfall amounts for the next 3 hours but does not account for possible heavy localised events;
- Rainfall Radar Images: Images covering the entire country are freely available from the Met Éireann website (www.met.ie/latest/rainfall_radar.asp). The images are a composite of radar data from Shannon and Dublin airports and give a picture of current rainfall extent and intensity. Images show a quantitative measure of recent rainfall. A 3-hour record is given and is updated every 15 minutes. Radar images are not predictive; and,
- Consultancy Service: Met Éireann provide a 24-hour telephone consultancy service. The forecaster will provide an interpretation of weather data and give the best available forecast for the area of interest.


Using the safe threshold rainfall values will allow planned works to be safely executed (from a water quality perspective) in the event of forecasting of an impending high rainfall intensity event.

Works will be suspended if forecasting suggests any of the following is likely to occur:

- >10 mm/hr (i.e. high intensity local rainfall events);
- > >25 mm in a 24-hour period (heavy frontal rainfall lasting most of the day); or,
- > >half monthly average rainfall in any 7 days.

Timing of Site Felling Works:

Felling will only be carried out during periods of low rainfall, and therefore minimum runoff rates. This will minimise the risk of entrainment of suspended sediment in surface water runoff, and transport via this pathway to surface watercourses.

Drain Inspection and Maintenance:

The following items will be carried out during pre-felling inspections and after:

- Communication with tree felling operatives will be undertaken in advance to determine whether any areas have been reported where there is unusual water logging or bogging of machines;
- > Inspection of all areas reported as having unusual ground conditions;
- > Inspection of main drainage ditches and outfalls. During pre-felling inspections the main drainage ditches will be identified. Ideally the pre-felling inspection will be carried out during rainfall;
- > Following tree felling all main drains will be inspected to ensure that they are functioning;
- > Extraction tracks nears drains need to be broken up and diversion channels created to ensure that water in the tracks spreads out over the adjoining ground;
- > Culverts on drains exiting the site will be unblocked; and,
- > All accumulated silt will be removed from drains and culverts, and silt traps, and this removed material will be deposited away from watercourses to ensure that it will not be carried back into the trap or stream during subsequent rainfall.

Surface Water Quality Monitoring:

Sampling will be completed by the ECoW before, during (if the operation is conducted over a protracted time) and after the felling activity. The 'before' sampling will be conducted within 4 weeks of the felling activity commencing, preferably in medium to high water flow conditions. The "during" sampling will be undertaken once a week or after rainfall events. The 'after' sampling will comprise as many samplings as necessary to demonstrate that water quality has returned to pre-activity status (i.e. where an impact has been shown).

Criteria for the selection of water sampling points include the following:

- > Avoid man-made ditches and drains, or watercourses that do not have year round flows, i.e. avoid ephemeral ditches, drains or watercourses;
- > Select sampling points upstream and downstream of the forestry activities;
- > It is advantageous if the upstream location is outside/above the forest in order to evaluate the impact of land-uses other than forestry;
- Downstream locations will be selected: one immediately below the forestry activity, the second at exit from the forest, and the third some distance from the second (this allows demonstration of no impact through dilution effect or contamination by other land-uses where impact increases at third downstream location relative to second downstream location); and,



> The above sampling strategy will be undertaken for all on-site sub-catchments streams where tree felling is proposed.

Also, daily surface water monitoring forms will also be utilised at every works site near any watercourse. These will be taken daily and kept on site for record and inspection.

Earthworks Resulting in Suspended Solids Entrainment in Surface Waters

Construction phase activities including access road construction, turbine base/hardstanding construction, construction compound construction, met mast construction, substation construction, grid cable route works and TDR works will require varying degrees of earthworks resulting in excavation of peat and mineral subsoil where present. Potential sources of sediment-laden water include:

- > Drainage and seepage water resulting from excavations;
- Stockpiled excavated material providing a point source of exposed sediment; and,
- > Erosion of sediment from emplaced site drainage channels.

These activities can result in the release of suspended solids to surface water and could result in an increase in the suspended sediment load, resulting in increased turbidity which in turn could affect the water quality and fish stocks of downstream water bodies. Potential effects on all watercourses downstream of the Wind Farm Site could be significant if not mitigated against.

Mitigation by Avoidance

The key mitigation measure during the construction phase is the avoidance of sensitive hydrological features where possible, by application of suitable buffer zones (i.e. 50m to main watercourses).

The majority of the key Proposed Development works areas are located outside of the delineated 50m natural watercourse (river and stream) buffer zones. However there some locations were Proposed Development works areas encroach upon these buffer zones and additional specific mitigation measures are detailed below for these locations.

The large setback distance from sensitive hydrological features means that adequate room is maintained for the proposed drainage mitigation measures (discussed below) to be properly installed and operate effectively. The proposed buffer zone will:

- Avoid physical damage (river/stream banks and river/stream beds) to watercourses and associated release of sediment;
- > Avoid excavations within close proximity to surface watercourses;
- > Avoid the entry of suspended sediment from earthworks into watercourses; and,
- > Avoid the entry of suspended sediment from the construction phase drainage system into watercourses, achieved in part by ending drain discharge outside the buffer zone and allowing percolation across the vegetation of the buffer zone.

Mitigation by Design:

The following types of controls and treatment system will be implemented to prevent release of suspended solids in surface waters:

- > Source controls:
 - Interceptor drains, vee-drains, diversion drains, flume pipes, erosion and velocity control measures such as use of sand bags, oyster bags filled with gravel, filter fabrics, and other similar/equivalent or appropriate systems.
 - Small working areas, covering stockpiles, weathering off stockpiles, cessation
 of works in certain areas or other similar/equivalent or appropriate measures.
- > In-Line controls:

- Interceptor drains, vee-drains, oversized swales, erosion and velocity control measures such as check dams, sand bags, oyster bags, straw bales, flow limiters, weirs, baffles, silt bags, silt fences, sedimats, filter fabrics, and collection sumps, temporary sumps, sediment traps, pumping systems, settlement ponds, temporary pumping chambers, or other similar/equivalent or appropriate systems.
- > Treatment systems:
 - Temporary sumps and ponds, temporary storage lagoons, sediment traps, and settlement ponds, and proprietary settlement systems such as Siltbuster, and/or other similar/equivalent or appropriate systems.

It should be noted for this Wind Farm Site that an extensive network of forestry and roadside drains already exists, and these will be integrated and enhanced as required and used within the wind farm development drainage system. The integration of the existing forestry drainage network and the proposed wind farm network is relatively simple. The key elements being the upgrading and improvements to water treatment elements, such as in line controls and treatment systems, including silt traps, settlement ponds and buffered outfalls.

The main elements of interaction with existing drains will be as follows:

- Apart from interceptor drains, which will convey clean runoff water to the downstream drainage system, there will be no direct discharge (without treatment for sediment reduction, and attenuation for flow management) of runoff from the proposed wind farm drainage into the existing site drainage network. This will reduce the potential for any increased risk of downstream flooding or sediment transport/erosion;
- Silt traps will be placed in the existing drains upstream of any streams where construction works / tree felling is taking place, and these will be diverted into proposed interceptor drains, or culverted under/across the works area;
- Runoff from individual turbine hardstanding areas will not be discharged into the existing drain network but discharged locally at each turbine location through settlement ponds and buffered outfalls onto vegetated surfaces;
- Buffered outfalls which will be numerous over the site will promote percolation of drainage waters across vegetation and close to the point at which the additional runoff is generated, rather than direct discharge to the existing drains of the site; and,
- Drains running parallel to the existing roads requiring widening will be upgraded, widening will be targeted to the opposite side of the road. Velocity and silt control measures such as check dams, sand bags, oyster bags, straw bales, flow limiters, weirs, baffles, silt fences will be used during the upgrade construction works. Regular buffered outfalls will also be added to these drains to protect downstream surface waters.

It should be noted that 3.3km of the Proposed Wind Farm access roads already exist (as forestry tracks) and are proposed for upgrade. The upgrading of these forestry tracks, albeit presents a potential short-term potential non-significant effect on surface water quality during construction, will be a positive effect in the long-term with regard to improved drainage controls.

Pre-commencement Temporary Drainage Works

Prior to the commencement of forestry track upgrades (or new road/hardstand or turbine base installs) the following key temporary drainage measures will be installed:

- > All existing dry forestry drains that intercept the proposed works area will be
- temporarily blocked down-gradient of the works using forestry check dams/silt traps;
- Clean water diversion drains will be installed upgradient of the works areas;



- Check dams/silt fence arrangements (silt traps) will be placed in all existing forestry drains that have surface water flows and also along existing forestry roadside drains; and,
- A double silt fence perimeter will be placed down-slope of works areas that are located inside the watercourse 50m buffer zone.

Silt Fences:

Silt fences will be emplaced within drains down-gradient of all construction areas. Silt fences are effective at removing heavy settleable solids such as those present in the subsoils/sandstone tills that overlie the site. This will act to prevent entry to water courses of sand and gravel sized sediment, released from excavation of mineral sub-soils of glacial and glacio-fluvial origin, and entrained in surface water runoff. Inspection and maintenance of these structures during construction phase is critical to their functioning as stated purpose. They will remain in place throughout the entire construction phase.

Silt Bags:

Silt bags will be used where small to medium volumes of water need to be pumped from excavations. As water is pumped through the bag, the majority of the sediment is retained by the geotextile fabric allowing filtered water to pass through. Silt bags will be used with natural vegetation filters or sedimats. Sediment entrapment mats, consisting of coir or jute matting, will be placed at the silt bag location to provide further treatment of the water outfall from the silt bag. Sedimats will be secured to the ground surface using stakes/pegs. The sedimat will extend to the full width of the outfall to ensure all water passes through this additional treatment measure.

Settlement Ponds:

The Proposed Development footprint will be divided into drainage catchments (based on topography, outfall locations, catchment size) and stormwater runoff rates based on the 10-year return period rainfall event will be calculated for each catchment. These flows will then be used to design settlement ponds for each drainage catchment. The settlement ponds will either be designed for 6hr or 24hr retention times used to settle out medium silt (0.01mm) and fine silt (0.004mm) respectively (EPA, 2006)³¹. Settlement pond at borrow pits will be designed to allow 24hr retention and settlement ponds along access roads and at turbine hardstands will have 6hr retention as there is additional in-line drainage controls proposed along access tracks and at hardstands.

Level Spreaders and Vegetation Filters:

The purpose of level spreaders is to release treated drainage flow in a diffuse manner, and to prevent the concentration of flows at any one location thereby avoiding erosion. Level spreaders are not intended to be a primary treatment component for development surface water runoff. They are not sand alone but occur as part of a treatment train of systems that will reduce the velocity of runoff prior to be released at the level spreader. In the absence of level spreaders, the potential for ground erosion is significantly greater than not using them.

Vegetation filters are essentially end-of-line polishing filters that are located at the end of the treatment train. In fact, vegetation filters are ultimately a positive consequence of not discharging directly into watercourses which is one of the mitigation components of the drainage philosophy. This makes use of the natural vegetation of the site to provide a polishing filter for the wind farm drainage prior to reaching the downstream watercourses.

³¹ Environmental Management Guidelines - Environmental Management in the Extractive Industry (Non-Scheduled Minerals) (EPA, 2006).



Again, vegetation filters are not intended to be a single or primary treatment component for treatment of works area runoff. They are not sand alone but are intended as part of a treatment train of water quality improvement/control systems (i.e. source controls→check dams→silt traps→settlement ponds→level spreaders →silt fences→vegetation filters).

Water Treatment Train:

A final line of defence will be provided by a water treatment train such as a "Siltbuster". If the discharge water from construction areas fails to be of a high quality during regular inspections, then a filtration treatment system, such as a 'Siltbuster' or similar equivalent treatment train (sequence of water treatment processes), will be used to filter and treat all surface discharge water collected in the dirty water drainage system. This will apply for all of the construction phase.

Pre-emptive Site Drainage Management

The works programme for the entire construction stage of the development will also take account of weather forecasts, and predicted rainfall in particular. Large excavations and movements of soil/subsoil or vegetation stripping will be suspended or scaled back if heavy rain is forecast. The extent to which works will be scaled back or suspended will relate directly to the amount of rainfall forecast.

The following forecasting systems are available and will be used on a daily and weekly basis at the site to direct proposed construction activities:

- General Forecasts: Available on a national, regional and county level from the Met Eireann website (www.met.ie/forecasts). These provide general information on weather patterns including rainfall, wind speed and direction but do not provide any quantitative rainfall estimates;
- MeteoAlarm: Alerts to the possible occurrence of severe weather for the next 2 days. Less useful than general forecasts as only available on a provincial scale;
- > 3-hour Rainfall Maps: Forecast quantitative rainfall amounts for the next 3 hours but does not account for possible heavy localised events;
- Rainfall Radar Images: Images covering the entire country are freely available from the Met Eireann website (www.met.ie/latest/rainfall_radar.asp). The images are a composite of radar data from Shannon and Dublin airports and give a picture of current rainfall extent and intensity. Images show a quantitative measure of recent rainfall. A 3-hour record is given and is updated every 15 minutes. Radar images are not predictive; and,
- Consultancy Service: Met Eireann provide a 24-hour telephone consultancy service. The forecaster will provide interpretation of weather data and give the best available forecast for the area of interest.

Using the safe threshold rainfall values will allow work to be safely controlled (from a water quality perspective) in the event of forecasting of an impending high rainfall intensity event.

Works will be suspended if forecasting suggests either of the following is likely to occur:

- > >10 mm/hr (i.e. high intensity local rainfall events);
- >25 mm in a 24-hour period (heavy frontal rainfall lasting most of the day); or,
- > >half monthly average rainfall in any 7 days.

Prior to works being suspended the following control measures will be completed:

- > All active excavations will be secured and sealed off;
- > Temporary or emergency drainage will be installed to prevent back-up of surface runoff; and,



> No works will be completed during heavy rainfall and for up to 24 hours after heavy events to ensure drainage systems are not overloaded.

Timing of Site Construction Works:

Construction of the site drainage system will only be carried out during periods of low rainfall, and therefore minimum runoff rates. This will minimise the risk of entrainment of suspended sediment in surface water runoff, and transport via this pathway to surface watercourses. Construction of the drainage system during this period will also ensure that attenuation features associated with the drainage system will be in place and operational for all subsequent construction works.

Monitoring:

An inspection and maintenance plan for the on-site construction drainage system will be prepared in advance of commencement of any works. Regular inspections of all installed drainage systems will be undertaken by the ECoW, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water in parts of the systems where it is not intended. Inspections will also be undertaken after tree felling.

Any excess build-up of silt levels at dams, the settlement pond, or any other drainage features that may decrease the effectiveness of the drainage feature, will be removed. Checks will be carried out on a daily basis.

During the construction phase field testing and laboratory analysis of a range of parameters with relevant regulatory limits and Environmental Quality Standards (EQSs) will be undertaken for each primary watercourse, and specifically following heavy rainfall events.

Allowance for Climate Change

Climate Change rainfall projections are typically for a mid-century (2050) timeline. The projected effects of climate change on rainfall are therefore modelled towards the end of the life cycle of the Proposed Development, as the turbines have a life span of ~30 years. It is likely that the long-term effects of climate change on rainfall patterns will not be observed during the lifetime of the proposed wind farm. As outlined in the above sections settlement ponds have been designed for a 1 in 10 year return flow. This approach is conservative given that the project will likely be built over a much shorter period (12-18 months), and therefore this in-built redundancy in the drainage design more than accounts for any potential short term climate change rainfall effects.

Potential Effects Associated with Works Within Hydrological Buffer Zones

Whilst the majority of the proposed work areas within the Wind Farm Site are located outside of the delineated 50m natural watercourse, the following work areas encroach upon the 50m buffer zones:

- > The cut and fill associated with T05;
- > The cut and fill associated with T01;
- > Several sections of existing roads, totalling 320m, which will be upgraded;
- Section of the new proposed site roads, totalling 650m; and,
- > At new and existing crossings over natural watercourses.

Due to the close proximity of these works to rivers and streams, these works could result in the release of suspended solids to surface waters and could result in an increase in the suspended sediment load, resulting in increased turbidity which in turn could affect the water quality and fish stocks of downstream water bodies. Potential effects could be adverse if not mitigated against.

Mitigation by Avoidance:



The Wind Farm Site layout has been designed to limit the amount of works within the delineated hydrological buffer zones. Several consultations between Hydro-Environmental Services (HES), MKO and Fehily Timoney (FT) and the project design team completed in the spring of 2023 resulted in several design iterations which had the overall aim of reducing the volume of works within the buffer zones. These consultations particularly concentrated on T01 and T05, with all hardstand areas located outside of the buffer zones for the final layout. However, the cut and fill associated with these turbines will encroach upon the buffer zone and will require specific mitigation measures.

In relation to proposed Wind Farm access tracks, where possible, the Proposed Development utilises the existing forestry road network at Knockshanvo.

Mitigation by Design:

All mitigation measures detailed in Section 6.2.2.2.2 above will be implemented at these work locations.

The following additional mitigation measures will also be implemented:

- > Double silt fences will be placed downgradient of all work locations within the hydrological buffer zones.
- > All works will be completed during the summer months and works will be postponed in the event of heavy rainfall.

Excavation Dewatering and Potential Effects on Surface Water Quality

Some minor groundwater/surface water seepages will likely occur in turbine base excavations, the borrow pits, substation and construction compound excavations and in the internal cabling trenches. This will create additional volumes of water to be treated by the runoff management system. Inflows will likely require management and treatment to reduce suspended sediments. No contaminated land was noted at the site and therefore pollution issues are not anticipated.

With respect to the Grid Connection route, some minor groundwater/surface water seepages will likely occur in trench excavations and this will create additional volumes of water to be treated by the runoff management system. Inflows will require management and treatment to reduce suspended solids. No contaminated land was noted along the Grid Connection route and therefore pollution issues are not anticipated.

Management of groundwater seepages and subsequent treatment prior to discharge into the drainage network will be undertaken as follows:

- > Appropriate interceptor drainage, to prevent upslope surface runoff from entering excavations will be put in place;
- > If required, following periods of heavy rainfall, pumping of excavation inflows will prevent build-up of water in the excavation;
- > The interceptor drainage will be discharged to the site constructed drainage system or onto natural vegetated surfaces and not directly to surface waters;
- > The pumped water volumes will be discharged via volume and sediment attenuation ponds adjacent to excavation areas, or via specialist treatment systems such as a Siltbuster unit;
- > The borrow pit settlement ponds have been designed to allow a 24hr retention time as per EPA guidance (2006) which is highest level of protection recommended by the EPA with regard to retention time;
- > There will be no direct discharge to surface watercourses, and therefore no risk of hydraulic loading or contamination will occur;



- Daily monitoring of excavations by a suitably qualified person will occur during the construction phase. If high levels of seepage inflow occur, excavation work will immediately be stopped and a geotechnical assessment undertaken; and,
- A mobile 'Siltbuster' or similar equivalent specialist treatment system will be available on-site for emergencies in order to treat sediment polluted waters from settlement ponds or excavations should they occur. Siltbusters are mobile silt traps that can remove fine particles from water using a proven technology and hydraulic design in a rugged unit. The mobile units are specifically designed for use on construction-sites. They will be used as final line of defence if needed.

Potential Release of Hydrocarbons during Construction and Storage

Accidental spillage during refuelling of construction plant with petroleum hydrocarbons is a significant pollution risk to groundwater, surface water and associated ecosystems, and to terrestrial ecology. The accumulation of small spills of fuels and lubricants during routine plant use can also be a pollution risk. Hydrocarbon has a high toxicity to humans, and all flora and fauna, including fish, and is persistent in the environment. It is also a nutrient supply for adapted micro-organisms, which can rapidly deplete dissolved oxygen in waters, resulting in death of aquatic organisms.

Hydrocarbon storage will not occur during the Grid Connection construction as the works are transient. Vehicles will be refuelled before reaching the Grid Connection route.

Some small volumes of hydrocarbons may be stored at the Temporary Transition Compound along the TDR.

Mitigation measures to be implemented to avoid release of hydrocarbons at the Proposed Development site are as follows:

- > All plant will be inspected and certified to ensure that they are leak free and in good working order prior to use at the Proposed Development site.
- > On site re-fuelling of machinery will be carried, as required, out using a mobile double skinned fuel bowser:
 - The fuel bowser, a double-axel custom-built refuelling trailer will be re-filled off site, and will be towed around the site by a 4x4 jeep to where machinery is located.
 - The 4x4 jeep will also carry fuel absorbent material and pads in the event of any accidental spillages.
 - The fuel bowser will be parked on a level area in the construction compound when not in use and only designated trained and competent operatives will be authorised to refuel plant on site.
 - Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations;
- > Onsite refuelling will be carried out by trained personnel only;
- > A permit to fuel system will be put in place;
- > Fuels stored on site will be minimised. Fuel storage areas if required will be bunded appropriately for the fuel storage volume for the time period of the construction and fitted with a storm drainage system and an appropriate oil interceptor;
- > The plant used during construction will be regularly inspected for leaks and fitness for purpose; and,
- > An emergency plan for the construction phase to deal with accidental spillages will be included within the CEMP. Spill kits will be available to deal with and accidental spillage in and outside the re-fuelling area and the amount of materials kept onsite will be proportional to the amount of potentially pollutive material present on site at any one time.



Release of Cement-Based Products

Concrete and other cement-based products are highly alkaline and corrosive and can have significant negative impacts on water quality. They generate very fine, highly alkaline silt (pH 11.5) that can physically damage fish by burning their skin and blocking their gills. A pH range of $\geq 6 \leq 9$ is set in S.I. No. 293 of 1988 Quality of Salmonid Water Regulations, with artificial variations not in excess of ± 0.5 of a pH unit. Entry of cement-based products into the site drainage system, into surface water runoff, and hence to surface watercourses or directly into watercourses represents a risk to the aquatic environment.

Peat ecosystems are dependent on low pH hydrochemistry. They are extremely sensitive to the introduction of high pH alkaline waters into the system. Batching of wet concrete on site and washing out of transport and placement machinery are the activities most likely to generate a risk of cement-based pollution. Placed concrete in turbine bases and foundations can also have minor local effects on groundwater quality over time. However, due to the limited surface area of exposed concrete, the anoxic conditions below ground, and the high rate of dilution from the wider groundwater system relative to the small volumes of groundwater that would come in contact with the concrete, the potential for impacts are low.

Proposed Mitigation Measures:

- No batching of wet-cement products will occur on the Wind Farm Site. Ready-mixed supply of wet concrete products and/or emplacement of pre-cast elements will take place;
- > Pre-cast elements for culverts and concrete works will be used;
- No washing out of any plant used in concrete transport or concreting operations will be allowed on-site;
- > Where concrete is delivered on the Wind Farm Site, only the chute will be cleaned, using the smallest volume of water possible. No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be allowed. Chute cleaning water is to be isolated in temporary lined wash-out pits located near proposed wind farm site compound. These temporary lined wash-out pits will be removed from the wind farm site at the end of the construction phase;
- > The contractor will use weather forecasting to plan dry days for pouring concrete; and,
- > The contractor will ensure pour site is free of standing water and plastic covers will be ready in case of sudden rainfall event.

Groundwater and Surface Water Contamination from Wastewater Disposal

Release of effluent from on-site (Wind Farm Site and along the Grid Connection) temporary wastewater treatment systems has the potential to impact on groundwater and surface water quality if conditions are not suitable for an on-site percolation unit. Impacts on surface water quality could affect fish stocks and aquatic habitats.

Proposed Mitigation Measures:

- > During the construction phase, a self-contained port-a-loo with an integrated waste holding tank will be used at each of the site compounds, maintained by the providing contractor, and removed from site on completion of the construction works;
- > Water supply for the site office and other sanitation will be brought to site and removed after use from the Wind Farm Site to be discharged at a suitable off-site treatment location; and,
- > No water or wastewater will be sourced on the site, nor discharged to the site.



New Watercourse Crossings

Diversion, culverting and bridge crossing of surface watercourses can result in morphological changes, changes to drainage patterns and alteration of aquatic habitats. Construction of structures over water courses has the potential to significantly interfere with water quality and flows during the construction phase.

Within the Wind Farm Site, there are a total of 6 no. crossing locations over natural watercourses (rivers and streams). Several sections of these watercourses have not been mapped by the EPA but have been digitised based on site walkover surveys and inspection of historical maps of the local area. The crossing locations are outlined below:

- > A new crossing over the Gortadroma stream (EPA Name Not locally named) to the northeast of T01;
- A new crossing over a tributary of the Snaty stream (EPA Name Not locally named) 750m to the northeast of T03;
- A new crossing over the Snaty Stream 1.2km to the northeast of T03;
- A new crossing over the Knockshanvo Stream (EPA Name = Sruffaunageeragh Stream) to the east of T04;
- > Existing crossing over the Mountrice River 500m to the east of T05; and,
- > New crossing over the Glenomra Wood stream in the east of the Wind Farm Site and near the new proposed site entrance.

In addition to the natural watercourses, there is a high density of manmade forestry drains within the Wind Farm Site. However, these are not considered to be a significant constraint and can be rerouted around the proposed infrastructure and/or integrated into the proposed drainage design.

Proposed Mitigation Measures

New watercourse crossings will comprise pre-cast concrete bottomless box culverts or clear span culverts and will be constructed in accordance with guidance from Inland Fisheries Ireland (IFI). The IFI (2016) document: *Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters*, and the Scottish Natural Heritage (SNH) *Good Practice During Wind Farm Construction* (SNH, 2019, 4th Edition) will also be adhered to. This will minimise the risk of entrainment of suspended sediment in surface water runoff, and transport via this pathway to surface watercourses (any deviation from this will be done in discussion with the IFI). All new road river/stream crossings will require a Section 50 application (Arterial Drainage Act, 1945). The river/stream crossings will be designed in accordance with OPW guidelines/requirements on applying for a Section 50 consent.

Further to this:

- > All proposed new stream crossings will be bottomless or clear span culverts and the existing banks will remain undisturbed. No in-stream excavation works are proposed and therefore there will be no direct impact on the stream at the proposed crossing location;
- > Where the proposed underground cabling route follows an existing road or road proposed for upgrade, the cable will pass over or below the culvert within the access road;
- As a further precaution near stream construction work will only be carried out during the period permitted by Inland Fisheries Ireland (IFI) for in-stream works according to the guidance document "*Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters*" (IFI 2016), that is, May to September inclusive. This time period coincides with the period of lowest expected rainfall, and therefore minimum runoff rates. This will minimise the risk of entrainment of suspended sediment in surface water runoff, and transport via this pathway to surface watercourses;
- During the near stream construction work double row silt fences will be emplaced immediately down-gradient of the construction area for the duration of the construction phase. There will be no batching or storage of cement allowed on-site



Morphological Changes to Surface Watercourses along the Grid Connection

The Grid Connection includes a total of 4 no. watercourse crossings over EPA mapped watercourses. In addition, there are several smaller crossings over unmapped drains.

The proposed crossing methodologies are as follows:

- Horizontal Direction Drilling is proposed over the existing crossings at Trough Bridge over the Blackwater River and along a tributary of the Mountrice Stream in the townland of Drumsillagh. Directional Drilling is a method of drilling under obstacles such as bridges, culverts, railways, water courses, etc. in order to install cable ducts under the obstacle. This method is employed where installing the ducts using standard installation methods is not possible.
- > Elsewhere, existing culverts will be crossed using open trenching with either an undercrossing or an overcrossing depending on the depth of the culvert:
 - <u>Option A</u>: Where adequate cover exists above a culvert, the standard trench arrangement will be used where the cable ducts pass over a culvert without any contact with the existing culvert or water course. The cable trench will pass over the culvert in a standard trench.
 - <u>Option B</u>: Where the culvert consists of a socketed concrete or sealed plastic pipe and sufficient depth is not available over the crossing, a trench will be excavated beneath the culvert, and cable ducts will be installed in the standard formation 300mm below the existing pipe.

Proposed Mitigation Measures

Prior to the commencement of cable trenching or crossing works the following key temporary drainage measures will be installed:

- All existing roadside drains that intercept the proposed works area will be temporarily blocked down-gradient of the works using check dams/silt traps;
- > Culverts, manholes and other drainage inlets will also be temporarily blocked;

A double silt fence perimeter will be placed along the road verge on the down-slope side of works areas that are located inside the watercourse 50m buffer zone. The following mitigation measures are proposed for the Grid Connection crossing works:

- > No stockpiling of construction materials will take place along the grid route;
- > No refuelling of machinery or overnight parking of machinery is permitted in this area (within 50m of the watercourse crossings);
- > No concrete truck chute cleaning is permitted in this area (within 50m of the watercourse crossing);
- > Works will not take place at periods of high rainfall, and will be scaled back or suspended if heavy rain is forecast;
- Local road drainage, culverts and manholes will be temporarily blocked during the works;
- Machinery deliveries will be arranged using existing structures along the public road;
- All machinery operations will take place away from the stream and ditch banks, apart from where crossings occur. Although no instream works are proposed or will occur;
- > Any excess construction material will be immediately removed from the area and sent to a licenced waste facility;
- No stockpiling of materials will be permitted in the constraint zones;
- > Spill kits will be available in each item of plant required to complete the stream crossing; and,
- Silt fencing will be erected on ground sloping towards watercourses at the stream crossings if required.



Surface water quality effects on local watercourses and the downstream Blackwater River may occur during drilling and groundworks associated with potential directional drilling at the bridge crossing locations along the Grid Connection route to Ardnacrusha.

It is proposed that directional drilling under the bridge will be undertaken to prevent direct impacts on the watercourse. However, there is a risk of indirect impacts from sediment laden runoff during the launch pit and reception pit excavation works. There is also the unlikely risk of fracture blow out and contamination of the watercourse with drilling fluid.

Proposed Mitigation Measures:

- Although no in-stream works are proposed, the drilling works will only be done over a dry period between July and September (as required by IFI for in-stream works) to avoid the salmon spawning season and to have more favourable (dryer) ground conditions;
- > The crossing works area will be clearly marked out with fencing or flagging tape to avoid unnecessary disturbance;
- > There will be no storage of material / equipment or overnight parking of machinery inside the 15m buffer zone;
- > Before any ground works are undertaken, double silt fencing will be placed upslope of the watercourse channel along the 15m buffer zone boundary;
- Additional silt fencing or straw bales (pinned down firmly with stakes) will be placed across any natural surface depressions / channels that slope towards the watercourse;
- > Silt fencing will be embedded into the local soils to ensure all site water is captured and filtered;
- > The area around the bentonite batching, pumping and recycling plant will be bunded using terram (as it will clog) and sandbags in order to contain any spillages;
- > Drilling fluid returns will be contained within a sealed tank / sump to prevent migration from the works area;
- > Spills of drilling fluid will be cleaned up immediately and stored in an adequately sized skip before been taken off-site;
- > If rainfall events occur during the works, there will be a requirement to collect and treat small volumes of surface water from areas of disturbed ground (i.e. soil and subsoil exposures created during site preparation works);
- > This will be completed using a shallow swale and sump down slope of the disturbed ground; and water will be pumped to a proposed percolation area at least 50m from the watercourse;
- > The discharge of water onto vegetated ground at the percolation area will be via a silt bag which will filter any remaining sediment from the pumped water. The entire percolation area will be enclosed by a perimeter of double silt fencing;
- > Any sediment laden water from the works area will not be discharged directly to a watercourse or drain;
- > Works shall not take place during periods of heavy rainfall and will be scaled back or suspended if heavy rain is forecasted;
- > Daily monitoring of the compound works area, the water treatment and pumping system and the percolation area will be completed by a suitably qualified person during the construction phase. All necessary preventative measures will be implemented to ensure no entrained sediment, or deleterious matter is discharged to the watercourse;
- If high levels of silt or other contamination is noted in the pumped water or the treatment systems, all construction works will be stopped. No works will recommence until the issue is resolved and the cause of the elevated source is remedied;
- > On completion of the works, the ground surface disturbed during the site preparation works and at the entry and exit pits will be carefully reinstated and re-seeded at the soonest opportunity to prevent soil erosion;



- > The silt fencing upslope of the river will be left in place and maintained until the disturbed ground has re-vegetated;
- > There will be no batching or storage of cement allowed at the watercourse crossing;
- > There will be no refuelling allowed within 50m of the watercourse crossing; and,
- > All plant will be checked for purpose of use prior to mobilisation at the watercourse crossing.

The following Fracture Blow-out (Frac-out) Prevention and Contingency Plan will be in place:

- > The drilling fluid/bentonite will be non-toxic and naturally biodegradable (i.e., Clear Bore Drilling Fluid or similar will be used);
- > The area around the drilling fluid batching, pumping and recycling plants will be bunded using terram and/or sandbags to contain any potential spillage;
- > One or more lines of silt fencing will be placed between the works area and the adjacent river;
- > Spills of drilling fluid will be cleaned up immediately and transported off-site for disposal at a licensed facility;
- Adequately sized skips will be used where temporary storage of arisings are required;
- The drilling process / pressure will be constantly monitored to detect any possible leaks or breakouts into the surrounding geology or local watercourse;
- This will be gauged by observation and by monitoring the pumping rates and pressures. If any signs of breakout occur then drilling will be immediately stopped;
- > Any frac-out material will be contained and removed off-site;
- > The drilling location will be reviewed, before re-commencing with a higher viscosity drilling fluid mix; and,
- > If the risk of further frac-out is high, a new drilling alignment will be sought at the crossing location.

Impacts to Peat Stability

With regard to the potential risk of peat slides at the Proposed Wind Farm site, a Peat Stability Risk Assessment³² has been completed for the Proposed Development which concludes that with implementation of proposed mitigation measures that the risk of peat failure at the Proposed Development site is low. A Peat and Spoil Management Plan is in place³³. This Plan includes procedures to be undertaken throughout construction of the Proposed Development in order to avoid any significant impacts on peat stability.

Roles and responsibilities

The contractor appointed to construct the proposed development will be required to designate a member of staff, or engage a specific person, to assume responsibility for implementation of all environmental protective measures during the construction phase. The appointed works contractor will be responsible for the implementation of good working practice during construction and mitigation measures as set out in this document. The appointed contractor will be responsible for providing a briefing on environmental protection measures and ecological sensitivities of the Proposed Development Site to all site personnel in advance of commencement of enabling works. The appointed contractor and developer will be responsible for ensuring all mitigation measures set out in this document, in the Construction Environmental Management Plan (CEMP) to be developed by the contractor and any site-specific method statements are fully and correctly implemented. The responsibility for environmental protection and compliance with the required protective measures will be assigned to an experienced site worker or an environmental manager as appointed by the

³² Fehily Timoney (2024): Geotechnical and Peat Stability Risk Assessment: Knockshanvo Wind Farm

³³ Fehily Timoney (2024): Peat and Spoil Management Plan: Knockshanvo Wind Farm.



contractor. The mitigation measures are tried and tested standard measures applied at construction sites to protect surface water and groundwater.

On completion of construction, FuturEnergy Ireland, or their appointed agents, will be responsible for managing and operating the development in line with the requirements of the planning conditions. The names and contact details of the individuals with responsibility for implementation and supervision of mitigation measures during all phases of the development will be clearly identified and set out in documents such as the CEMP and site- specific method statements as appropriate.

Residual Effect

With the above mitigations in place for protection of water quality during construction of the Proposed Development, there is no potential for residual adverse effect on downstream aquatic QI habitats and species of Lower River Shannon SAC, or on SCI species or SCI supporting habitat of River Shannon and River Fergus Estuaries SPA.

6.2.2.2.2 Potential for Water Quality Deterioration During Operation

Progressive Replacement of Natural Surface with Lower Permeability Surfaces

Progressive replacement of the peat or vegetated surface with impermeable surfaces could potentially result in an increase in the proportion of surface water runoff reaching the surface water drainage network. This could potentially increase runoff from the site and increase flood risk downstream of the development. In reality, the access roads will have a higher permeability than the underlying peat. However, it is conservatively assumed in this assessment that the proposed access roads and hardstands are impermeable. The assessed footprint comprises turbine bases and hardstandings, access roads, amenity links, site entrances, substation and temporary construction compounds. During storm rainfall events, additional runoff coupled with increased velocity of flow could increase hydraulic loading, resulting in erosion of watercourses and impact on aquatic ecosystems.

The emplacement of the proposed permanent development footprint, assuming emplacement of impermeable materials as a worst-case scenariocould result in an average total site increase in surface water runoff of approximately 5,365m³/month. This represents a potential increase of approximately 0.6% in the average daily/monthly volume of runoff from the Wind Farm Site area in comparison to the baseline pre-development site runoff conditions. This is a very small increase in average runoff and results from the naturally high surface water runoff rates and the relatively small area of the Wind Farm Site being developed, the proposed total permanent development footprint being, representing 1.7% of the Wind Farm Site area of 1,072ha.

The additional volume is low due to the fact that the runoff potential from the Wind Farm Site is naturally high. Also, the calculation assumes that all hardstanding areas will be impermeable which will not be the case as access tracks will be constructed of permeable stone aggregate. Furthermore, the above assessment does not consider the presence of existing site roads within the Wind Farm Site. Overall, this is a very conservative assessment. The increase in runoff from the Proposed Development will, therefore, be negligible. This is prior to mitigation measures being put in place.

Proposed Mitigation by Design:

The operational phase drainage system of the Proposed Development will be installed and constructed in conjunction with the road and hardstanding construction work as described below and as shown on the Drainage drawings submitted with this planning application:

> Interceptor drains will be installed up-gradient of all proposed infrastructure to collect clean surface runoff, in order to minimise the amount of runoff reaching areas where



suspended sediment could become entrained. It will then be directed to areas where it can be re-distributed over the ground by means of a level spreader;

- Swales/road side drains will be used to collect runoff from access roads and turbine hardstanding areas of the site, likely to have entrained suspended sediment, and channel it to settlement ponds for sediment settling;
- > On steep sections of access road transverse drains ('grips') will be constructed in the surface layer of the road to divert any runoff off the road into swales/road side drains;
- Check dams will be used along sections of access road drains to intercept silts at source. Check dams will be constructed from a 4/40mm non-friable crushed rock;
- Settlement ponds, emplaced downstream of road swale sections and at turbine locations, will buffer volumes of runoff discharging from the drainage system during periods of high rainfall, by retaining water until the storm hydrograph has receded, thus reducing the hydraulic loading to watercourses; and,
- > Settlement ponds will be designed in consideration of the greenfield runoff rate.

As described above, the proposed integration of the wind farm drainage with the existing forestry drainage is a key component of the proposed drainage management within the development. By integration, this means maintaining surface water flowpaths where they already exist, avoid creation of new or altered surface water flowpaths, and maintaining the drainage regime (i.e. normal flow) within each forestry compartment. There will be no alternation of the catchment size contributing to each of the main downstream watercourses. All wind farm drainage water captured within individual site subcatchments will be attenuated and released within the same sub-catchments that it was captured.

Runoff Resulting in Contamination of Surface Waters

During the operational phase, the potential for silt-laden runoff is much reduced compared to the construction phase. In addition, all permanent drainage controls will be in place and the disturbance of ground and excavation works will be complete. Some minor maintenance works may be completed, such as maintenance of site entrances, internal roads and hardstand areas. These works would be of a very minor scale and would be very infrequent. Potential sources of sediment laden water would only arise from surface water runoff from small areas where new material is added during maintenance works.

These minor activities could, however, result in the release of suspended solids to surface water and could result in an increase in the suspended sediment load, resulting in increased turbidity which in turn could affect the water quality and fish stocks of downstream water bodies. Potential effects could be significant if not mitigated against.

During such maintenance works there is a small risk associated with release of hydrocarbons from site vehicles, although it is not envisaged that any significant refuelling works will be undertaken on site during the operational phase.

Maintenance works will likely be contained within the Wind Farm Site and no maintenance works will be required along the Grid Connection.

Proposed Mitigation Measures:

Mitigation measures for sediment control are the same as those outlined above for the construction phase.

Mitigation measures for control of hydrocarbons during maintenance works are identical to those outlined in Section 6.2.2.2.1.

During the operational phase, it is proposed to manage wastewater from the staff welfare facilities in the control buildings by means of a sealed storage tank, with wastewater being tankered off site by a permitted waste collector to wastewater treatment plants. wastewater storage tank will be fitted with an



automated alarm system that will provide sufficient notice that the tank requires emptying. The wastewater storage tank alarm will be part of a continuous stream of data from the site's turbines, wind measurement devices and electricity substation that will be monitored remotely 24 hours a day, 7 days per week. Only waste collectors holding valid waste collection permits under the Waste Management (Collection Permit) Regulations, 2007(as amended), will be employed to transport wastewater away from the site.

Residual Effect

With the above mitigations in place for protection of water quality during operation of the Proposed Development, there is no potential for residual adverse effect on downstream aquatic QI habitats and species of Lower River Shannon SAC, or on SCI species or SCI supporting habitat of River Shannon and River Fergus Estuaries SPA.

6.2.2.3 Disturbance to Otter

6.2.2.3.1 **Construction**

The potential for adverse effect on the QI population of Otter designated under Lower River Shannon SAC is considered below.

As described in Section 4.2, no evidence of otter holts or resting places were found in the vicinity of any of the proposed works. The smaller, upland 1st and 2nd order watercourses found throughout the Proposed Wind Farm site are suboptimal for otter given the paucity of prey species, however larger watercourses such as the Mountrice River in the east of the site and downstream stretches of river provide suitable otter habitat and evidence of otter activity was found in these areas. No instream works are proposed within any watercourses. There is therefore no potential for direct effect on habitat that is significant for otter.

Proposed internal wind farm roads will require the construction of 5 no. new watercourse crossings and the upgrade of a road which crosses an existing crossing over the Mountrice River. The new water crossings will be bottomless culverts and are located on small upland streams which do not offer significant foraging habitat for otter. However, taking a precautionary approach, the construction of these watercourse crossings has the potential for indirect effects in the form of disturbance to otter. Similarly, the construction/ installation of the proposed grid connection route will also have the potential for disturbance/displacement where it crosses over the Blackwater River.

The Proposed Development also has the potential to result in indirect effects on otter habitat in the form of water pollution resulting from construction activity as described above. Specific mitigation with regard to prevent of impacts to otter as a result of water quality deterioration and impacts on prey species is provided in Section 6.2.2.2 above.



Proposed Mitigation Measures

Prior to the commencement of construction works associated with the installation of watercourse crossings, the following measures will be undertaken for the avoidance of disturbance/displacement and direct mortality and to ensure that no otter holts/breeding sites have been established since the original surveys undertaken (NRA, 2007):

- From a precautionary basis, a pre-commencement otter survey will be undertaken in accordance with standard best practice guidance prior to the commencement of site works. In the unlikely event that an otter holt is identified within or immediately adjacent to the Proposed Development footprint, consultation will be undertaken with the National Parks and Wildlife Service and a derogation licence applied for.
- > All conditions of a derogation licence will be implemented in full.
- No works should be undertaken within 150m of any holts at which breeding females or cubs are present.
- No wheeled or tracked vehicles (of any kind) should be used within 20m of active, but nonbreeding, otter holts. Light work, such as digging by hand or scrub clearance should also not take place within 15m of such holts, except under licence (NRA, 2006³⁴).

All of the above works will be undertaken or supervised by an appropriately qualified ecologist.

6.2.2.3.2 Residual Effect

With the above mitigations in place for disturbance of Otter during construction of the Proposed Development, there is no potential for residual adverse effect on the QI Otter population of Lower River Shannon SAC.

6.2.2.4 **Operation**

The operation of the Proposed Development will not result in any additional habitat loss or deterioration, nor will it result in a significant increase in anthropogenic activity due to its location and scale.

The potential for significant effects on prey species for otter during operation is restricted to indirect effects on their habitat resulting from water pollution. This has been assessed in Section 6.2.2.2.2 above.

Therefore, there is no potential for adverse effect on Otter during operation of the Proposed Development.

³⁴ NRA, 2006. Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes. Dublin: Transport Infrastructure Ireland. Available at: <u>www.tii.ie/tii-library/environment/construction-guidelines/Guidelines-for-the-Treatment-of-Otters-prior-to-the-Construction-of-National-Road-Schemes.pdf</u>



6.2.3 **Decommissioning of the Proposed Development**

The wind turbines proposed as part of the Wind Farm Site are expected to have a lifespan of 35 years. Following the end of their useful life, the wind turbines may be replaced with a new set of turbines, subject to planning permission being obtained, or the Proposed Development will be decommissioned fully. The onsite 110kV electrical substation and 110kV electrical cabling will remain in place as it will be under the ownership of the ESB and will form a permanent part of the national electricity grid.

Upon decommissioning of the Proposed Development, the wind turbines will be disassembled in reverse order to how they were erected. All above ground turbine components will be separated and removed off-site for recycling.

Turbine hardstands and foundations will remain in place underground and will be left to revegetate naturally. Leaving the turbine hardstands and foundations in-situ is considered a more environmentally prudent option, as to remove that volume of reinforced concrete from the ground could result in significant environment nuisances such as noise, dust and/or vibration.

Site roadways will be left in situ, as appropriate to facilitate on-going forestry operations. Underground cables, including grid connection, will be removed and the ducting left in place.

A decommissioning plan will be agreed with the local authorities three months prior to decommissioning the Proposed Development. The principles that will inform the final decommissioning plan are contained in the Decommissioning Plan in Appendix 4-6 of the EIAR.

The potential effects associated with decommissioning of the Proposed Development will be similar to those associated with construction but of a reduced magnitude, due to the reduced scale of the proposed decommissioning works in comparison to construction phase works.

During decommissioning, it will be possible to reverse or at least reduce some of the potential effects caused during construction, and to a lesser extent operation, by rehabilitating constructed areas such as turbine bases and hard standing areas. This will be done by covering with vegetation to encourage vegetation growth and reduce run-off and sedimentation.

The Wind Farm Site roadways will be kept and maintained following decommissioning of the wind farm infrastructure, as these will be utilised by ongoing forestry works and by local farmers.

The electrical cabling connecting the site infrastructure to the on-site substation will be removed, while the ducting itself will remain in-situ rather than excavating and removing it, as this is considered to have less of a potential environmental impact, in terms of soil exposure, and thus on the possibility of the generation of suspended sediment which could enter nearby watercourses.

Other impacts such as possible soil compaction and contamination by fuel leaks will remain but will be of reduced magnitude than the construction phase because of the smaller scale of the works and reduced volumes on-site.

Mitigation measures to avoid deterioration of water quality and disturbance of QI fauna will be implemented as per the construction phase mitigation measures.

No adverse effects to European Sites will occur during the decommissioning stage of the Proposed Development.



7. ASSESSMENT OF RESIDUAL ADVERSE EFFECTS

The potential for residual adverse effects on each of the individual relevant Qualifying Features of the Screened In European Sites following the implementation of mitigation, is assessed in this section of the report.

Based on the above, in view of best scientific knowledge, on the basis of objective information, there is no potential for adverse effect on the identified QIs/SCIs and their associated targets and attributes, or on any European Site Potential pathways for effect have been robustly blocked through measures to avoid impacts and the incorporation of best practice/mitigation measures into the project design.

Taking cognisance of measures to avoid impacts and best practice/mitigation measures incorporated into the project design which are considered in the preceding section, the Proposed project will not have an adverse effect on the integrity of any European Site.

The proposed project will not prevent the QIs/SCIs of European Sites from achieving/maintaining favourable conservation status in the future as defined in Article 1 of the EU Habitats Directive. A definition of Favourable Conservation Status is provided below:

'conservation status of a species means the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its populations within the territory referred to in Article 2; The conservation status will be taken as 'favourable' when:

- > Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- > The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- > There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.'

Based on the above, it can be concluded in view of best scientific knowledge, on the basis of objective information that the Proposed Development will not adversely affect the Qualifying Interests/Special Conservation Interests associated with any European Site.



8. ASSESSMENT OF CUMULATIVE EFFECTS

A search and review in relation to plans and projects that may have the potential to result in cumulative and/or in-combination impacts on European Sites was conducted. This assessment focuses on the potential for cumulative in-combination effects on the European Sites where potential for adverse effects was identified in Section 6.1 of this report. This included a review of online Planning Registers, development plans and other available information and served to identify past and future plans and projects, their activities and their predicted environmental effects. A list of the plans and projects considered is provided in the Appendix. The following Development Plans have been reviewed and taken into consideration as part of this assessment and the review is provided in the Appendix.

- Clare County Development Plan 2023-2029
- > Ireland's 4th National Biodiversity Action Plan 2023-2030
- Northern and Western Regional Assembly Regional Spatial and Economic Strategy 2020-2032

The review focused on policies and objectives that relate to European sites.

8.1 **Other Projects**

The projects considered include those listed in the Appendix. The residual construction, operational and decommissioning impacts of the Proposed Development are considered cumulatively with other plans and projects. Particular focus has been placed on those plans and projects that are in closest proximity to the Proposed Development, such as the proposed Oatfield Wind Farm, and those that could potentially result in impacts on SCI bird species, surface water, groundwater and QI habitats and species.

8.1.1 Other Projects and Land-uses within the Hydrological Study Area

The following paragraphs in Section 8.1.1.1 – 8.1.1.4 are extracted from the hydrological cumulative impact assessment from the Chapter 9 'Water' of the accompanying EIAR which delineates and rationalises the hydrological study area for cumulative impact assessment. The cumulative impact assessment on hydrological receptors has been assessed in the context of aquatic-dependent QI and SCI habitats and species of the European Sites identified in this NIS as being within the Zone of Influence of the Proposed Development, namely, the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA.

Given the hydrogeological setting of the Proposed Development on low permeability, locally important bedrock aquifer, and the near surface nature of construction activities, cumulative effects on European Sites via groundwater pathways due to effects on quality or quantity of groundwater are not predicted. The main likelihood of cumulative effects is associated with surface water quality. As discussed in Chapter 9 of the accompanying EIAR, the extent of the geographic area, beyond which no cumulative effects as a result of the Proposed Development could occur, has been delineated based on flow volumes obtained EPA HydroTool Nodes in the vicinity and downstream of the Proposed Development site. As described in Chapter 9 of the EIAR, in the context of hydrological effects,

There will be no potential for cumulative effects beyond this cumulative study area due to increases in flow volumes (as the catchment area increases) and increasing distance from the Proposed Development.



Thus, the hydrological study area boundary for the assessment of cumulative effects in the EIAR Chapter 9 is considered appropriate for consideration of the potential for cumulative effects via hydrological pathways to downstream European Sites.

8.1.1.1 Cumulative Effects with Agriculture

Chapter 9 of the accompanying EIAR goes on to state the following with regard to potential for hydrological cumulative effects in combination with agricultural activities,

The delineated cumulative study area is a largely agricultural area.

Agriculture is the largest pressure on water quality in Ireland. Agricultural practices such as the movement of soil and the addition of fertilizers and pesticides can lead to nutrient losses and the entrainment of suspended solids in local surface watercourses. This can have a negative effect on local and downstream surface water quality.

In an unmitigated scenario the Proposed Development would have the potential to interact with these agricultural activities and contribute to a deterioration of downstream surface water quality through the emissions of elevated concentrations of suspended solids and ammonia.

However, the mitigation measures detailed above in (Section 6.2) for the construction, operation and decommissioning phases of the Proposed Development will ensure the protection of downstream surface water quality.

For these reasons it is concluded that there will not be a cumulative effect on European Sites associated with agricultural activities.

8.1.1.2 **Cumulative Effects with Forestry**

The Wind Farm Site is situated in an area of coniferous forestry on the Slieve Bernagh Mountain Range in east Co. Clare.

The most common water quality problems arising from forestry relate to the release of sediment and nutrients to the aquatic environment, and impacts from acidification. Forestry may also give rise to modified stream flow regimes caused by associated land drainage.

Due to the close proximity of these forested areas to the Proposed Development site and given that they drain to the same watercourses as the Wind Farm Site, the potential cumulative effects on downstream water quality and quantity need to be assessed. However, the mitigation measures detailed in Section 6.2 for the construction, operation and decommissioning phases of the Proposed Development will ensure the protection of downstream surface water quality.

For these reasons it is concluded that there will not be a cumulative effect on downstream European Sites associated with commercial forestry activities.

8.1.1.3 **Cumulative Effects with Other Wind Farm Developments**

With regard to the potential for cumulative effect with regard to water quality in-combination with other wind farm developments, Chapter 9 of the EIAR states,

Only 1 no. existing / permitted and or proposed wind farms have been identified within the cumulative study area. This is the proposed Oatfield Wind Farm and includes 10 no. proposed turbines. The application for Oatfield Wind Farm was submitted on 22nd December 2023 and is currently under consideration by An Bord Pleanála. It is possible that the construction phase of the Proposed Development and the construction of the proposed Oatfield Wind Farm could overlap. This would



result in potential cumulative hydrological effects on downstream watercourses in the absence of mitigation measures.

Please note that nearby wind farms including the permitted Carrownagowan Wind Farm and the proposed Lackeragh, Ballycar and Fahybeg Wind Farms are located outside of the cumulative study area and therefore there is no potential for (hydrological) cumulative effects to occur (due to lack of hydrological connectivity).

The EIAR for the above Oatfield wind farm development details potential hydrological and hydrogeological issues relating to the operation and decommissioning phases of these developments and propose a suite of best practice mitigation measures designed to ensure that the developments do not in any way have a negative effect on downstream surface water quality and quantity. Similarly, the mitigation and best practice measures proposed in this EIAR chapter (EIAR Chapter 9 'Water') will ensure that the Proposed Development does not have the potential to result in significant effects on the hydrological/hydrogeological environment.

Therefore, with the implementation of the proposed mitigation measures (both for the Proposed Development and for the other wind farms there will be no cumulative effects associated with the construction, operational or decommissioning phases of the Proposed Development and other wind farms within the cumulative study area.

8.1.1.4 Cumulative Effects with Other Developments

Chapter 9 of the EIAR states,

A detailed cumulative assessment has been carried out for all planning applications (granted and awaiting decisions) within the cumulative assessment area for the Wind Farm Site and the Grid Connection described above.

The planning applications identified within the study area for new dwellings or renovations of existing dwellings, as well as for the erection of farm buildings. Based on the scale of the works, their proximity to the Proposed Development site and the temporal period of likely works, no cumulative effects will occur as a result of the Proposed Development (construction, operation and decommissioning phases).

Thus, in light of the above conclusions made with regard to the potential for cumulative effect on water quality, when considered in the context of the potential for cumulative effects on European Sites downstream of the Proposed Development, no potential for cumulative effects are predicted.

8.1.2 Proposed Grid Connection Underground Cabling Route

Projects within 500m of the Proposed Grid Connection Route are listed in the Appendix and the cumulative assessment is provided below.

Planning applications within 500m of the proposed Grid Connection route were reviewed. Fourty-seven planning applications were found (listed in the Appendix) which comprised works to existing single dwelling houses, single-storey extensions, construction of agricultural sheds, demolition of small structures, upgrades to the electricity network at Ardnacrusha, construction of a preschool facility, construction of a medical centre, private wastewater treatment systems. Also included is a proposal to infill land with topsoil, subsoil, stone and inorganic construction material to raise the land level for which an NIS was prepared (Southern Scientific Services Ltd 2022) and was reviewed as part of this assessment. In addition, there is a proposal for a solar farm on a site of 70ha consisting of 309,008 sqm of solar photovoltaic panels and 38kV substation for which an NIS was prepared (Aecom 2023) and which was reviewed as part of this assessment.



In addition, a study was completed to identify any grid connection routes associated with other wind farm developments which overlap with the proposed Grid Connection. From this study, the following overlaps were recorded:

- ~800m overlap with the grid connection underground cabling route associated with the proposed Lackareagh Wind Farm in the townland of Castlebank. The overlap occurs along the L3056 and along existing ESB access tracks in the vicinity of Ardnacrusha 110kV substation;
- > ~5km overlap with the grid connection underground cabling route associated with the proposed Carrownagowan Wind Farm. The overlap extends from the R471 at Cloghera as far as Ardnacrusha 110kV substation.
- > ~150m overlap with the grid connection underground cabling route associated with the permitted Fahybeg Wind Farm. The overlap occurs in the vicinity of Ardnacrusha 110kV substation.

There is no overlap associated the proposed grid connection for Oatfield Wind Farm as this is a loop in connection to an existing overhead line.

As discussed in the Water Chapter (Chapter 9 of the EIAR), the greatest potential for cumulative effects to occur would be if the construction phase of the underground grid connection routes overlapped with each other. In an unmitigated scenario, there may be some cumulative effects on the downstream receiving watercourses. However, practicalities will make it highly unlikely that the construction phase of the overlapping sections of the grid connections would occur at the same time as this would result in road closures (two trenches being excavated). Therefore, the overlapping sections of the grid connections cannot be built at the same time.

Furthermore, the NISs for the above wind farm developments detail effects relating to the construction of the grid connection underground cabling routes. The NISs propose a suite of best practice mitigation measures designed to ensure that the construction of the grid connection underground cabling routes do not result in adverse effects on downstream European sites. Similarly, the mitigation and best practice measures proposed in this NIS will ensure that the construction of the proposed Grid Connection does not have the potential to result in adverse effects on downstream European Sites. Therefore, there is no potential for cumulative effects.

8.1.3 **Other Wind Farm Projects**

For the purposes of this cumulative assessment, wind farms within a 25-kilometre radius of the Proposed Development area were considered in further detail below. A total of five wind farms and two one off turbines were identified within the cumulative study boundary. These are listed in the Appendix and details of the cumulative assessment are provided below.

8.1.3.1 **Oatfield Wind Farm**

The EIAR Biodiversity Chapter and NIS for the Proposed Development (RSK 2023) were reviewed.

The NIS³⁵ concluded as follows:

It has been objectively concluded that, following an examination, analysis and evaluation of relevant information, including in particular the nature of the predicted impacts from the Proposed Development and the implementation of mitigation measures, the Proposed Development will not

³⁵ https://orstedcdn.azureedge.net//media/www/docs/corp/ireland/oatfieldplanning/part-4/nis-report-final-forprint.pdf?rev=29cf513b9f3a434aa4324413b628c0c5&hash=73674DB306F1F2203441A581262E7DAF



adversely affect (either directly or indirectly) the integrity of any European site, either alone or in combination with other plans or projects.

Lesser Horseshoe Bat

Surveys of the Oatfield Development included bat habitat appraisals, manual and static surveys. Lesser Horseshoe Bat *(Rhinolophus hipposideros)* was recorded during bat activity surveys at Negligible to Low levels of activity. The NIS for Oatfield states,

Regarding potential effects on the integrity of Danes Hole, Poulnalecka SAC through effects on hibernating Lesser Horseshoe Bats, core foraging habitat for Lesser Horseshoe Bats in winter is considered to be within 1.2km of the hibernation roost. As the Proposed Development is 2km from the SAC at its nearest point, the Proposed Development is significantly outside of the core winter foraging range for this species regarding this hibernation roost site. As such, habitat loss, degradation or fragmentation, or disturbance occurring within the Proposed Development site during construction, operation and decommissioning will not affect foraging habitat used by hibernating Lesser Horseshoe Bats. The Proposed Development design includes embedded mitigation to minimise disturbance, including the minimisation of noise, dust, light and vibration...which will be sufficient to avoid significant adverse effects on hibernating bats using the roost and adjacent foraging habitat during construction, operation or decommissioning.

No roosts of Lesser Horseshoe Bat were recorded within or adjacent to the Proposed Development, and no suitable roosting habitat for Lesser Horseshoe Bat was identified.

The Proposed Development design includes mitigation measures...to minimise the potential for effects on foraging Lesser Horseshoe bats during construction, operation and decommissioning. In particular, this includes measures to prevent light spill onto suitable foraging and commuting habitat (e.g., hedgerows woodland edges, watercourses), avoid pollution of watercourses, and minimise the loss of suitable foraging and commuting habitat. Considering the distance of the Proposed Development from the SAC (i.e., towards the outer limit of the core foraging area around the maternity roost), the Negligible to Low level of Lesser Horseshoe Bat foraging and commuting activity recorded during the field surveys of the Proposed Development, and the embedded mitigation measures within the Proposed Development design, significant effects on foraging and commuting Lesser Horseshoe Bats belonging to the SAC population are not anticipated. As Lesser Horseshoe Bat is deemed to be a species of low collision risk (NatureScot, 2021), considering the factors described above (notably the distance between the Proposed Development turbines and the SAC, and the level of Lesser Horseshoe Bat activity recorded during field surveys), no significant effects through turbine fatalities are anticipated.

Similarly, with regard to Ratty River Cave SAC, the NIS concludes as follows,

Taking into consideration the mitigation outlined above, and the distance of the Proposed Development from the relevant qualifying features (notably in the context of known Lesser Horseshoe Bat movement patterns), adverse effects on the integrity of Ratty River Cave SAC will not occur as a result of the Proposed Development. These conclusions apply to all potential Turbine options with no difference in adverse effects identified between them.

Similarly, while evidence of Lesser Horseshoe Bat activity was recorded on the Proposed Development site (Knockshanvo), appropriate mitigation measures are in place such that there is no potential for residual adverse effects. Thus, no potential for cumulative effects to Lesser Horseshoe Bat incombination with the Proposed Development at Knockshanvo are predicted.



Special Conservation Interest Bird Species

The potential for the Proposed Development to result in significant cumulative or in combination effects to SCI bird species when assessed alongside Oatfield Wind Farm was considered. The NIS assessed collision risk and displacement for the operational phase of this development. The collision risk was assessed to be not significant for all SCI species. Displacement/barrier effect, post mitigation, was assessed to be not significant.

Regarding SCI bird species of River Shannon and River Fergus Estuaries SPA, the NIS for Oatfield Wind Farm states the following,

Seven of these eight species (i.e., all except Golden Plover) were recorded in very low numbers and distantly from the Proposed Development. As such, the Proposed Development and adjacent land is not considered to be of significant value to these species, either in isolation or with regard to River Shannon and River Fergus Estuaries SPA. Similarly, field survey results indicated that land within and adjacent to the Proposed Development site was not used by significant numbers of waterbirds with regard to the designated waterbird assemblage of the SPA. inclusive, modelled Golden Plover collision fatalities from Proposed Development turbines are estimated as 0.04 birds per year, equating to one Golden Plover collision every 24.46 to 27.63 years. Considering this figure in the context of the cited SPA population (5,664 Golden Plovers), and typical background mortality rates for this species (27% annually in the UK according to the BTO (2023)), this is not considered to represent sufficient collisions such that adverse effects on the SPA population are possible, even if all Golden Plovers flying over the Proposed Development form part of the SPA population.

Considering the above assessments and the lack of potential for residual adverse effect as a result of the Proposed Development (Knockshanvo), no potential for cumulative effects on the above discussed European Site exists.

Otter

According to the NIS for the Oatfield development, no otter breeding or resting places were identified during the surveys undertaken. Otter activity was recorded within the Proposed Oatfield site but mitigation measures are prescribed such that no significant effects on otter are predicted. Similarly, while evidence of otter activity was recorded on the Proposed Development site (Knockshanvo), appropriate mitigation measures are in place such that no cumulative effects are predicted.

Aquatic Habitats and Fauna

Results of aquatic surveys carried out along rivers in the vicinity of the Oatfield development are analogous to the results of baseline aquatic surveys undertaken for the Proposed Development, being the same watercourses.

The NIS for the above Oatfield wind farm development details potential hydrological and hydrogeological issues relating to the operation and decommissioning phases of these developments and propose a suite of best practice mitigation measures designed to ensure that the developments do not in any way have a negative effect on downstream surface water quality and quantity. Similarly, the mitigation and best practice measures proposed within this NIS will ensure that the Proposed Development does not have the potential to result in cumulative effects on the hydrological/hydrogeological environment and aquatic habitats and species even if construction periods for both developments were to overlap.

Conclusion

In conclusion, taking account of the potential for cumulative effects, and exacerbation of identified individual effects, and the potential for synergistic effects as result of the combination of the



construction and operational phases of Oatfield Wind Farm and Knockshanvo Wind Farm, no potential for cumulative effect on European Sites are predicted, once the prescribed mitigations for both developments are in place as detailed in their respective Natura Impact Statements.

8.1.3.1.2 RWE Fahybeg Wind Farm

The potential for the Proposed Development to result in significant cumulative effects when assessed alongside Fahybeg Wind Farm, which is c.4.3km from the nearest proposed turbine, was considered. The NIS³⁶ for Fahybeg Wind Farm was consulted. Lower River Shannon SAC, River Shannon and River Fergus Estuaries SPA, Curraghchase Woods SAC and Danes Hole, Poulnalecka SAC were identified as being within the Zone of Likely Influence.

With the mitigation prescribed for the proposed development (Knockshanvo), there is no potential for adverse cumulative effects on any European Site.

8.1.3.1.3 Ballycar Wind Farm

The potential for the Proposed Development to result in significant cumulative or in combination effects when assessed alongside Ballycar Wind Farm, which is c.4.8km from the nearest proposed turbine, was considered. The NIS for this development was reviewed³⁷. The Lower River Shannon SAC and the River Shannon and River Fergus SPA were screened in for Appropriate Assessment. With implementation of mitigation, the NIS concluded that there is no potential for residual adverse effect on European Sites. Given the range of mitigations prescribed for the proposed development (Knockshanvo Wind Farm), no potential for cumulative effects in-combination with the permitted Ballycar Wind Farm development are predicted.

8.1.3.1.4 Lackareagh WF

The potential for the Proposed Development to result in significant cumulative or in combination effects when assessed alongside Lackaereagh Wind Farm, which is c.5km from the nearest proposed turbine, was considered. The NIS for Lackareagh Wind Farm (MKO 2024) was reviewed during the assessment. Lackareagh Wind Farm is located within agricultural grassland and commercial forestry. A potential for likely adverse effect on Lower River Shannon SAC and River Fergus and River Shannon Estuaries SPA was identified. However, with the mitigation prescribed within the NIS for Lackareagh Wind Farm, it is concluded that there is no potential for residual adverse effect. Similarly, with the mitigation prescribed within this NIS to block the potential for adverse effect to the above listed European Sites, there is no potential for cumulative effect as a result of the Lackareagh Wind Farm and Knockshanvo Wind Farm.

8.1.3.1.5 Carrownagown Wind Farm

The potential for the Proposed Development to result in significant cumulative or in combination effects when assessed alongside Carrownagowan Wind Farm, which is c.5.7km from the nearest proposed turbine, was considered. The NIS³⁸ for Carrownagowan Wind Farm was consulted. No potential for residual adverse effect on European sites was identified. Given the range of mitigations prescribed for the proposed development (Knockshanvo Wind Farm), no potential for adverse cumulative effects in-combination with this permitted development are predicted.

³⁶ https://www.eplanning.ie/ClareCC/AppFileRefDetails/23148/0

³⁷ https://ballycargreenenergyplanning.ie/wp-content/uploads/2024/01/Natura-Impact-Statement.pdf

³⁸ https://www.pleanala.ie/publicaccess/EIAR-NIS/308799/CD/Planning/Natura%20Impact%20Statement.pdf?r=537472189957



8.1.3.1.6 Parteen Turbine

The potential for the Proposed Development to result in significant cumulative or in combination effects when assessed alongside Knockballynameath turbine, which is c.8.9km from the nearest proposed turbine, was considered. The planning files³⁹ on the Clare County Council website was reviewed. Given the size of the development, it did not fall under the mandatory requirement for EIA and no NIS is provided. However, this turbine is located within improved agricultural grassland and given the small size of the Parteen development and the distance from the Proposed Knockshanvo Development, no potential for cumulative effect is predicted.

8.1.3.1.7 Vistakon Wind Turbine

The potential for the Proposed Development to result in significant cumulative or in combination effects when assessed alongside Vistakon Turbine, which is c.12.1km from the nearest proposed turbine, was considered. The EIS⁴⁰ for the Vistakon Turbine was consulted as no NIS is available. No significant impacts on biodiversity were identified in the EIS. Given the small scale of the Vistakon wind turbine development, and the large separation in distance, no potential for cumulative effects in combination with the proposed Knockshanvo Wind Farm have been identified.

8.2 **Conclusion of Cumulative Impact Assessment**

Following the detailed assessment provided in the preceding sections, it is concluded that, the Proposed Development will not result in any residual adverse effects on any of the European Sites, their integrity or their conservation objectives when considered on its own. There is therefore no potential for the Proposed Development to contribute to any cumulative adverse effects on any European Site when considered in-combination with other plans and projects.

In the review of the projects that was undertaken, no connection, that could potentially result in additional or cumulative impacts was identified. Neither was any potential for different (new) impacts resulting from the combination of the various projects and plans in association with the Proposed Development.

Taking into consideration the reported residual impacts from other plans and projects in the area and the predicted impacts with the current proposal, no residual cumulative impacts have been identified with regard to any European Site.

³⁹ https://www.eplanning.ie/ClareCC/AppFileRefDetails/15812/0

⁴⁰ https://www.eplanning.ie/LimerickCCC/AppFileRefDetails/13746/0



9. CONCLUDING STATEMENT

This NIS has provided an assessment of all potential direct or indirect adverse effects on European Sites.

Where the potential for any adverse effect on any European Site has been identified, the pathway by which any such effect may occur has been robustly blocked through the use of avoidance, appropriate design and mitigation measures as set out within this report and its appendices. The measures ensure that the construction and operation of the Proposed Development does not adversely affect the integrity of European sites.

Therefore, it can be objectively concluded that the Proposed Development, individually or in combination with other plans or projects, will not adversely affect the integrity of any European Site.



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Proposed Knockshanvo Wind Farm, Co. Clare NIS F – 2024.08.29 - 200513



1. PLANS AND PROJECTS

1.1 Plans

The following development plans have been reviewed and taken into consideration as part of this assessment:

- > Clare County Development Plan 2023-2029
- > Ireland's 4th National Biodiversity Action Plan 2023-2030
- > Northern and Western Regional Assembly Regional Spatial and Economic Strategy 2020-2032

The review focused on policies and objectives that relate to Natura 2000 sites and natural heritage. Policies and objectives relating to sustainable land use were also reviewed and are provided in the table below.

Plans	Key Policies/Issues/Objectives Directly Related To European Sites, Biodiversity and Sustainable Development In The Zone of Influence	Assessment of development compliance with policy
Clare County	CDP3.3 It is an objective of the Clare County Council:	
Development	a) To require compliance with the objectives and requirements of the Habitats Directive, specifically	Having reviewed Clare County Development Plan, the
Plan 2023-2029	Article 6(3) and where necessary 6(4), Birds, Water Framework, and all other relevant EU Directives and	Proposed Development is in accordance with the
	all relevant transposing national legislation;	objectives described in relation to biodiversity and
	b) To require project planning to be fully informed by ecological and environmental constraints at the earliest stage of project development and any necessary	Natura 2000 sites.
	assessment to be undertaken, including assessments of disturbance to species, where required together	On review of the Plan, no notential for cumulative
	with the preparation of both statutory and non-Statutory Ecological Impact Assessments (EcIA);	impacts on European Sites in combination with the
	c) To protect, manage and enhance ecological connectivity and improve the coherence of the Natura	Proposed Development was identified.
	2000 Network;	
	d) To require all proposals to ensure there is 'no net loss' of biodiversity within developments	
	CDP15.3 - It is an objective of Clare County Council:	
	a) To afford the highest level of protection to all designated European sites in accordance with the	
	relevant Directives and legislation on such matters;	
	b) To require all planning applications for development that may have (or cannot rule out) likely	
	significant effects on European Sites in view of the site's Conservation Objectives, either in isolation or in	
	combination with other plans or projects, to submit a Natura Impact Statement in accordance with the	
	requirements of the EU Habitats Directive and the Planning and Development Act, 2000 (as amended);	
	identified during the lifetime of this Development Plan through the planning application process hearing	
	in mind proposals for development outside of a European site may also have an indirect effect.	
	CDP15.4 - It is an objective of Clare County Council: a) To implement Article 6(3) and where necessary	
	6(4) of the Habitats Directive and to ensure that Appropriate Assessment is carried out in relation to	
	works, plans and projects likely to impact on European sites (SACs and SPAs), whether directly or	
	indirectly or in combination with any other plan(s) or project(s); and b) To have regard to Appropriate	
	Assessment of Plans and Projects in Ireland – Guidelines for Planning Authorities 2009 or any updated	
	version.	
	CDP15.12	

Plans	Key Policies/Issues/Objectives Directly Related To European Sites, Biodiversity and Sustainable Development In The Zone of Influence	Assessment of development compliance with policy
	It is an objective of Clare County Council: a) To protect and promote the sustainable management of the natural heritage, flora and fauna of the County both within protected areas and in the general landscape through the promotion of biodiversity, the conservation of natural habitats, the enhancement of new and existing habitats, and through the integration of Green Infrastructure (GI), Blue Infrastructure and ecosystem services including landscape, heritage, biodiversity and management of invasive and alien species into the Development Plan; b) To promote the conservation of biodiversity through the protection of sites of biodiversity importance and wildlife corridors, both within and between the designated sites and the wider Plan area; c) To support the implementation of the All Ireland Pollinator Plan, National Biodiversity Action Plan and National Raised Bog SAC Management Plan; d) To ensure there is no net loss of potential Lesser Horseshoe Bat feeding habitats, treelines and hedgerows within 2.5km of known roosts; e) To implement and monitor the actions as set out in the Clare County Biodiversity Plan; and f) To promote biodiversity net gain in any new plans/projects/policies to promote development that leaves biodiversity in a better state than before.	
	 CDP11.42 It is an objective of Clare County Council: a) To require proposals for development that include the provision of external lighting, to clearly demonstrate that the lighting scheme is the minimum needed for security and working purposes; b) To ensure that external lighting and lighting schemes are designed so that the incidence of light spillage is minimised ensuring that the amenities of adjoining properties, wildlife and the surrounding environment are protected; and c) To require that external lighting is designed taking the Bat Conservation Ireland Guidance Notes for: planners, engineers, architects and developers on bats and lighting into consideration, together with EUROBATS Guidelines for consideration of bats in lighting projects. 	The proposed external lighting schemes for the Proposed Wind Farm site have been designed in line with the most up to date bat mitigation guidelines, and designed such that there will be no potential for adverse effects on QI bat populations.
4th National Biodiversity Action Plan 2023-2030	 Objective 1: Adopt a Whole-of Government, Whole of Society Approach to Biodiversity. Proposed actions include capacity and resource reviews across Government; determining responsibilities for the expanding biodiversity agenda providing support for communities, citizen scientists and business; and mechanisms for the governance and review of this National Biodiversity Action Plan. Objective 2: Meet Urgent Conservation and Restoration Needs. Supporting actions will build on existing conservation measures. Efforts to tackle Invasive Alien Species will be elevated. The protected area network will be expanded to include the Marine Protected Areas. The ambition of the EU Biodiversity Strategy will be considered as part of an evolving work programme across Government. 	No cumulative impacts were identified upon review of the Plan in conjunction with the Proposed Development. The Proposed Development will not contravene the proposed objectives of the NBAP.

Plans	Key Policies/Issues/Objectives Directly Related To European Sites, Biodiversity and Sustainable Development In The Zone of Influence	Assessment of development compliance with policy
	 Objective 3: Secure Nature's Contribution to People. Actions highlight the relationship between nature and people in Ireland. These include recognising the tangible and intangible values of biodiversity, promoting nature's importance to our culture and heritage and recognising how biodiversity supports our society and our economy. Objective 4: Enhance the Evidence Base for Action on Biodiversity. This objective focuses on biodiversity research needs, as well as the development and strengthening of long-term monitoring programmes that will underpin and strengthen future decision-making. Action will also focus on 	
	collaboration to advance ecosystem accounting that will contribute towards natural capital accounts. Objective 5: Strengthen Ireland's Contribution to International Biodiversity Initiatives. Collaboration with other countries and across the island of Ireland will play a key role in the realisation of this Objective. Ireland will strengthen its contribution to international biodiversity initiatives and international governance processes, such as the United Nations Convention on Biological Diversity.	
Northern and Western Regional Assembly Regional Spatial and Economic Strategy 2020-2032	Regional Policy Objective 5.5 – Ensure efficient and sustainable use of all our natural resources, including inland waterways, peatlands, and forests in a manner which ensures a healthy society a clean environment and there is no net contribution to biodiversity loss arising from development supported in this strategy. Conserve and protect designated areas and natural heritage area. Conserve and protect European sites and their integrity. Regional Policy Objective 5.7 - Ensure that all plans, projects and activities requiring consent arising from the RSES are subject to the relevant environmental assessment requirements including SEA, EIA and AA as appropriate	The strategy was reviewed, with particular reference to Policies and Objectives that relate to European Sites. No potential for cumulative impacts when considered in conjunction with the current proposal were identified.
1.2 **Other Projects**

Assessment material for this in-combination impact assessment was compiled on the relevant developments within the vicinity of the Proposed Development. The material was gathered through a search of relevant online Planning Registers, reviews of relevant documents, planning application details and planning drawings, and served to identify past and future projects, their activities, and their environmental impacts. All relevant projects were considered in relation to the potential for in-combination effects. All relevant data was reviewed (e.g., individual NIS/EIARs, layouts, drawings etc.) for all relevant projects where available. The projects considered include those listed below.

1.2.1 **Projects within 500m of the Proposed Grid Connection**

Fourty-seven planning applications within 500m of the Proposed Grid Connection were found which include those listed in the table below.

Application No.	Description	Address	Туре	Decision	Distance to Grid Connection
1615	to demolish an existing dwelling, construct a replacement two storey dwelling on the same site and upgrade existing waste water treatment system to include package treatment system and raised polishing filter	Parkroe , Ardnacrusha , Co. Clare	Permission	Conditional	0.28
16397	to Extend the Appropriate Period of Planning Permission P11- 481 for the construction of a dwelling house w/w treatment system	Roo East , Ardnacrusha , Co Clare	Extension of duration	Unconditional	0.42
16304	for development which consists of the construction of a silage slab and associated site works	Ballykeelaun , Parteen , Co. Clare	Permission	Conditional	0.47
1533	to continue the use of the existing 36m high, free standing mini birdcage communication structure within an existing 2.4m high pallisade compound, previously granted temporary permission	Ballykeelaun , Parteen , Co. Clare	Permission	Conditional	0.33

Table 2 Projects within 500m of Proposed Grid Connection

	P10-80 at lands forming part of ESB's Ardnacrusha Generating Station at Ballykeelaun				
16415	for Retention for a dwelling and associated site works.	28 A Parkroe , Ardnacrusha , Co Clare	Retention	Conditional	0.51
16644	for RETENTION Permission to retain 2 No. single storey extensions to rear of existing property, roof light to front elevation of dwelling, revised onsite foul drainage system to mains supply and associated site works	No. 4 Castlebank , Ardnacrusha , Co. Clare	Retention	Conditional	0.08
16434	to construct a Slatted/Cubicle Shed, Calf Shed, Manure Pit and associated site works	Glenlon House , Ardnacrusha , Co. Clare	Permission	Conditional	0.49
16970	to demolish 180m2 of existing structure and construct a Dairy Parlour and extend cubicle house, along with ancillary site works	Sallybank , Truagh , Kilmore	Permission	Conditional	0.01
16713	for the demolition of existing lean-to extension to rear of dwelling house, construction of a new bedroom extension to rear of dwelling house to include internal alterations and modifications, alterations to windows on existing elevations and construction of a single storey granny flat extension to the rear of existing dwelling house and all associated site works	Lackyle , Ardnacrusha , Co. Clare	Permission	Conditional	0.01
18816	for development comprising the following works: a) Demolition of existing single storey conservatory to rear of existing dwelling and construction of new single storey sunroom, b) Alterations to rear and side of existing dwelling, including new single storey extension to rear to increase existing bedroom, c) RETENTION permission for existing single storey detached domestic garage/play area as constructed, d) All associated site works and services	Sallybank , Kilmore , Co. Clare	Retention	Conditional	0.24

191013	to RETAIN a development at Cois Sionna, Lackyle, Ardnacrusha, Co Clare. The development consists of a) The connection of an unauthorized garage and home office/study to an existing dwelling, b) an unauthorized extension linking the existing unauthorized garage to the existing dwelling house, c) an unauthorized enclosed porch to the front of the dwelling house, d) an unauthorized connection to an existing foul sewer. The Permission to RETAIN is being sought for an unspecified period of time	Lackyle , Ardnacrusha , Co Clare	Retention	Conditional	0.00
19638	for the construction of a single storey extension to the rear of existing dwelling, the replacement of the existing roof structure with installation of rooflights to both front and rear pitches, alterations to the existing front façade and ancillary site works	Castlebank , Ardnacrusha , Co. Clare	Permission	Conditional	0.00
19539	to construct a bungalow residence, including rain water retention system, treatment unit and associated site development works	Glenlon North , Ardnacrusha , Co. Clare	Permission	Conditional	0.31
16804	for an Extension to the front and sides of dwelling, new roof with attic accommodation and dormer windows, alterations to the existing elevations and all ancillary site works	Castlebank , Ardnacrusha , Co Clare	Permission	Conditional	0.14
19118	to construct garage and all associated site works	Castlebank , Ardnacrusha , Co. Clare	Permission	Conditional	0.00
21451	to construct dwelling house, garage, bored well, waste water treatment system, percolation area, entrance and all associated site works	Roo West , Ardnacrusha , Co Clare	Permission	Conditional	0.00
20303	to construct a dwelling house, garage, waste water treatment system, percolation area, entrance and all associated site works	Roo East , Ardnacrusha , Co Clare	Permission	Conditional	0.45

211232	for development on lands located within the site of the	Ardnacrusha Generating	Permission	Conditional	0.11
	Ardnacrusha Generating Station, Castlebank, Ardnacrusha, Co.	Station, Castlebank,			
	Clare, Eircode V94 VR0K, in the townland of Ballykeelaun.	Ardnacrusha Co Clare			
	The development consists of upgrading works to the electricity				
	network within the site comprising: (a) 1 No. new 38kV				
	line/cable interface mast (with a maximum height of c.16m				
	above ground) on the existing Ardnacrusha Nenagh-Birdhill				
	38kV line; (b) 1 No. new 38kV line/cable interface mast (with a				
	maximum height of c.16m above ground) on the existing				
	Ardnacrusha - Moylish line and an additional c. 30m of				
	overhead line connecting to an existing overhead line; (c) 1 No.				
	temporary 38kV structure (with a maximum height of c.16.55 m				
	above ground) on the existing Ardnacrusha - Tulla $\!/$				
	Ardnacrusha - Birdhill 38kV line to remain in place for up to 5				
	years while works area ongoing (d) all ancillary development.				
	For information purposes only: associated development works				
	include the removal of existing overhead line structures and the				
	undergrounding and/or relocation of existing overhead lines on				
	the site. Such works comprise exempted development, having				
	regard to the provisions of Section $4(1)(g)$ of the Planning Act				
	(as amended) and Class 28 of the Planning and Development				
	Regulations 2001 (as amended) respectively, and as such are not				
	subject to this application. The proposed works are to existing				
	networks assets located within the site at Ardnacrusha				
	Generating Station - a Protected Structure (Reference No 311)				
	under the Clare County Development Plan, 2017-2023. No				
	works are proposed to the Protected Structure				
20282	to construct a dwelling house, garage, wastewater treatment	Blackwater , Ardnacrusha	Permission	Conditional	0.43
	system, entrance and associated site works	Co Clare			
21111	to construct garage and all associated site works	Roo East , Ardnacrusha ,	Permission	Conditional	0.24
		Co Clare			

20961	for a dwelling house, entrance and all associated site works	Sallybank , Kilmore , Co Clare	Permission	Conditional	0.01
20103	for a dwelling house, entrance and all associated site works	Castlebank , Ardnacrusha , Co Clare	Permission	Conditional	0.07
19957	for the construction of a link corridor at the rear of the dwelling to connect the dwelling and garage, conversion of a garage into an en-suite bedroom and construction of a garden and fence to the front of the dwelling. RETENTION permission is also being sought for the replacement of a door and window with a single window to the front of the dwelling	Lakyle , Ardnacrusha , Co Clare	Permission	Conditional	0.01
211098	for a dwelling house, access roadway and all associated site works	Castlebank , Ardnacrusha , Co Clare	Permission	Conditional	0.06
221033	for change of house design, from that permitted under planning Ref No P21-844	Roo West , Ardnacrusha , Co Clare	Permission	Conditional	0.11
2298	for a preschool facility, entrance and all associated site works	Castlebank , Ardnacrusha , Co Clare	Permission	Conditional	0.01
21844	to construct dwelling house, garage, bored well, waste water treatment system, percolation area, shared entrance and all associated site works	Roo West , Ardnacrusha , Co Clare	Permission	Conditional	0.11
221126	to construct dwelling house, garage, bored well, waste water treatment system, percolation and sheared entrance and all associated site works	Roo West , Ardnacrusha , Co Clare	Permission	Conditional	0.08
21745	of an accessible bedroom, stables, outhouse and associated site works	Roo West , Ardnacrusha , Co Clare	Retention	Conditional	0.18
21864	for development, the development consists of the construction of an underslat tank, dairy store and associated site works	Ballykeelaun , Parteen , Co Clare	Permission	Conditional	0.46

23209	to construct dwelling house, garage, waste water treatment system, percolation area, entrance and all associated site works	Roo West , Ardnacrusha , Co Clare	Permission	Conditional	0.00
21940	to demolish existing substandard dwelling and construct new replacement dwelling house, garage, bored well, wastewater treatment system, percolation area, new front boundary wall, entrance, demolish and rebuild part of neighbouring boundary wall to achieve sight distance and all associated site works	Roo East , Ardnacrusha , Co Clare	Permission	Conditional	0.47
211326	to construct dwelling house, bored well, garage, waste water treatment system, percolation area, entrance and all associated site works	Roo East , Ardnacrusha , Co. Clare	Permission	Conditional	0.49
22991	to construct dwelling house, garage, waste water treatment system, percolation area, entrance and all associated site works	Roo East , Ardnacrusha , Co Clare	Permission	Conditional	0.49
21843	to construct dwelling house, garage, bored well, waste water treatment system, percolation area, entrance and all associated site works	Roo West , Ardnacrusha , Co Clare	Permission	Conditional	0.00
21799	for the construction of a new fully serviced two storey detached dwelling house, new single storey detached garage, new vehicular entrance landscaping and boundary treatments, new connection to existing Roo West group water scheme and installation of a new wastewater treatment system and percolation area together with all ancillary and associated site works	Roo West , Ardnacrusha , Co Clare	Permission	Conditional	0.00
23221	to contract a slatted slurry tank and all ancillary concrete works	Glenlon House , Ardnacrusha , Co Clare	Permission	Conditional	0.49
2460249	to RETAIN a ground floor extension with alterations to existing house and for planning permission to construct a detached garage building with new entrance, for insertion of dormer windows and alterations to existing attic space, and a yoga	Coire Meala Castlebank , Ardnacrusha , Co. Clare	Permission		0.20

	studio extension to first floor flat roof to existing house, solar panels and all associated site development works				
2414	to RETAIN two existing stables and PERMISSION for change of use of permitted stables (04-1563 refers) to dwelling house, install new waste water treatment system with percolation and all associated site works	Sallybank , Kilmore , Co Clare	Permission	Conditional	0.38
22716	for a dwelling house and all associated site works	Castlebank , Ardnacrusha , Co Clare	Permission	Conditional	0.03
2360419	for the construction of a detached single storey dwelling, detached domestic garage, new entrance, onsite wastewater treatment system, together with all associated ancillary and incidental site works	Roo East , Ardnacrusha , Co. Clare	Permission	Conditional	0.49
2360583	to RETAIN changes to original house plans submitted for grant of planning permission P8/18299 and planning PERMISSION to raise the front boundary wall and entrance to 2 metres with finish to match existing wall finish and associated site development works	Archways , Roo East , Ardnacrusha	Retention	Conditional	0.43
2348	for a Medical Centre and all associated site works	Castlebank , Ardnacrusha , Co Clare	Permission	Conditional	0.01
2337	to fill land with topsoil, subsoil, stone and inorganic construction material to raise the level of the land for agricultural purposes. A Natura Impact Statement is included with the application.	Cloghera , Co Clare	Permission	Conditional	0.00
2360390	for the construction of single storey extensions to the side and rear of existing dwelling house, installation of new upgraded waste water treatment system with polishing filter together with all associated site works	Greystones , Lackyle , Ardnacrusha	Permission	Conditional	0.23
2360249	a solar farm on a site of 70 hectares consisting of the following: 309,008 sq. m. of solar photovoltaic panels on ground mounted	Land to the west/north- west of Ardnacrusha	Permission	Conditional	0.01

	steel frames: a 38 kV electrical substation with electrical control	within the townlands of			
	building and associated compound with palisade fence; the	Castlebank Drummin ,			
	installation of 21 electrical skids within 7 no. electrical	Glenlon North Glenlon			
	compounds (with acoustic barrier fencing); underground power	South and Ballykeelaun ,			
	and communication cables and ducts, including underground	Co Clare			
	cabling along the L3056 public road; new and upgraded				
	internal access tracks (including stream crossings as required); 3				
	no. upgraded site entrances to the public road (one entrance to				
	L-3054 (Lackyle Heights), and 2 no. entrances to L-30541);				
	boundary fencing (including 607m of acoustic barrier fencing on				
	the eastern boundary); landscaping and biodiversity				
	enhancement measures; and all associated ancillary				
	development, site works and services. The solar farm will be				
	operational for 40 years. A Natura Impact Statement (NIS) has				
	been prepared in respect of the proposed development and will				
	be submitted to the planning authority with the application.				
			-	~	0.40
2360069	tor development consisting of the change of roof material on the	Roo West, Ardnacrusha,	Permission	Conditional	0.18
	dwelling house from Thatch to Slate	Co.Clare			

1.2.2 **Other Wind Farms within 25km of the Proposed Wind Farm**

For the purposes of this cumulative assessment, wind farms within a 25-kilometre radius of the Proposed Development area were considered in further detail below. A total of five wind farms and two one off turbines were identified within the cumulative study boundary.

Pl. Ref.	Distance from Proposed Development	Separation distance between nearest turbines	Wind Farm	Status	Turbine No.
ABP- 315239	Adjacent to the proposed development boundary	500m	Oatfield	Proposed	11
ABP- 317227	Approx. 3.4km east of proposed wind farm site boundary	4.3km	RWE Fahybeg WF	Permitted	8
Pre- plannin g	Approx 4km northeast of proposed wind farm site boundary	5km	Lackareagh WF	Proposed	7
ABP- 312193- 21	4.4km south of proposed wind farm site boundary	4.8km	Ballycar Wind Farm	Proposed	12
ABP.308 799	Approx. 4.7km northeast of proposed wind farm site boundary	5.7km	Carrownagown Wind Farm	Permitted	19
10/453 (EOD 15/812), 22254, ABP- 314887- 22	Approx. 7.8km south of proposed wind farm site boundary	8.9km	Parteen Turbine	Existing	1
13/746	Approx 10.7km southeast of proposed wind farm site boundary	12.1km	Vistakon Wind Turbine	Existing	1

Table 3 Wind farm projects within 25k of the Proposed Development

1.2.3 **Other Forestry Operations**

Other proposed forestry operations located within the subcatchment were also reviewed and include the following:

Property Name	Hectares	Percentage	Nature of Operation
Cratloe	356.74	1-10%	Thinning
Cratloe	356.74	11-20%	Clearfell
Bunnabinna	95.6	1-10%	Clearfell
Glennagross	78.66	21-30%	Clearfell
Ballycannan	56.5	1-10%	Clearfell
Reaskcamoge	60.7	1-10%	Thinning
Derrynaveagh	12.95	11-20%	Thinning
Ballyroe	27.78	51-60%	Thinning
Derrynaveagh	176.36	1-10%	Clearfell
Corlea	114.6	1-10%	Clearfell
Coolevcasev	44 11	11-20%	Thinning
Castlecrine	32.80	31-40%	Thinning
Ballworgal	05.74	31.40%	Cloarfell
Spoty	205 02	91 20%	Clearfell & Thinning
Classifier	7 5	01 100%	Clearfell
	104 55	91-100%	Cleariell
Knockshanvo	104.55	11-20%	Clearfell
Formoyle	139.43	1-10%	Cleartell & Thinning
Kilbane	17.27	41-50%	Clearfell
Ballykelly	20.01	11-20%	Thinning
Ballykelly	20.01	61-70%	Clearfell
Doon	26.96	21-30%	Thinning
Doon	26.96	1-10%	Clearfell

Table 4 Other Forestry Operations (2021-2025) within the Subcatchment

Property Name	Hectares	Percentage	Nature of Operation
Violet Hill	12.72	31-40%	Clearfell
Violet Hill	46	11-20%	Thinning
Lackareagh	19.05	51-60%	Clearfell
Killokennedy	71.08	41-50%	Clearfell
Gortatrassa	12.39	31-40%	Thinning
Inchalughoge	122.63	1-10%	Thinning
Ballydonaghan	38.03	1-10%	Thinning
Killokennedy	231.38	1-10%	Thinning
Kilbane	101.09	1-10%	Thinning
Carrownagowan	400.94	1-10%	Clearfell & Thinning
Coumnagun	337.07	1-10%	Thinning