

6. BIODIVERSITY

6.1 Introduction

This EIAR chapter assesses the potential for the operation and decommissioning of the constructed Cleanrath wind farm development to result in significant effects on Biodiversity, Flora and Fauna.

Potential effects during construction, the short-term operational phase and the current Sleep Mode period pending the outcome of the Substitute Consent process were assessed in the rEIAR that also accompanies this application. The findings of the Biodiversity Chapter of the rEIAR are summarised in this chapter.

The assessment considers all aspects of the development. This chapter provides a comprehensive description of the pre-construction and current ecological environment. This is based on an appropriate level of desk and field survey work that was carried out in accordance with the most appropriate guidelines and methodologies. This survey work was undertaken prior to, during and after construction of the development. Following this description, there is a thorough assessment of the impacts of the development on biodiversity that may occur during the operation and decommissioning of the wind farm. Where likely ecologically significant effects were identified, measures were prescribed and implemented to avoid or minimise or compensate for such effects.

Particular attention has been paid to species and habitats of ecological importance. These include species and habitats with national and international protection under the Wildlife Acts 1976-2017, EU Habitats Directive and the EU Birds Directive among other relevant legislation (detailed assessment of birds is provided in Chapter 7: Biodiversity, Birds). The full description of the Cleanrath wind farm development is provided in Chapter 4 of this EIAR.

The chapter is structured as follows:

- The Introduction provides a description of the legislation, guidance and policy context regarding Biodiversity, Flora and Fauna.
- This is followed by a comprehensive description of the ecological survey and impact assessment methodologies that were followed to inform the robust assessment of likely significant effects on ecological receptors.
- A description of the pre-commencement and current ecological conditions and receptor evaluation is then provided.
- This is followed by a summary of the effects of the Cleanrath wind farm development during the construction phase and up to the date of this application in August 2020, a more detailed assessment is provided in chapter 6 Biodiversity of the rEIAR which accompanies this application.
- The potential for the development to result in significant effects during the period of operation that could occur following a grant of substitute consent and during decommissioning that could occur at any time is then assessed.
- Potential Cumulative effects that have the potential to occur in combination with other projects are fully assessed.
- The mitigation and best practice measures that will be implemented to ameliorate the identified effects are described and discussed. This is followed by an assessment of the identified residual effects taking into consideration the effect of the mitigation and best practice measures employed.
- Finally, the chapter provides a conclusion with regard to the effects of the operation and decommissioning of the Cleanrath wind farm development on biodiversity and the ecological significance of those effects.

The potential for effects on birds is addressed separately, in Chapter 7 of this EIAR.

The following defines terms utilised in this chapter:

- For the purposes of this EIAR, where the ‘development site’ or ‘the site’ is referred to, this relates to the Cleanrath wind farm development site, as delineated in red on the EIAR figures (maps) and includes a cable connection between the Cleanrath wind farm development and the Coomattagart substation which is referred to as the ‘grid connection’ see Figure 6-1.
- The ‘Study Area’ refers to both the development area (including the turbine delivery route) and the grid connection route.
- ‘Development Footprint’ refers to the construction envelope - the area that is directly affected by the development.
- “Key Ecological Receptor” (KER) is defined as a species or habitat occurring within the zone of influence of the development upon which likely significant effects are anticipated.
- “Zones of Influence” (ZOI) for individual ecological receptors refers to the zone within which potential effects are anticipated. ZOIs differ depending on the sensitivities of particular habitats and species and were assigned following best available guidance and adopting a precautionary approach.

6.2

Requirements for Ecological Impact Assessment

National Legislation

The Wildlife Act, 1976–2018, is the principal piece of legislation governing protection of wildlife in Ireland. The Wildlife Act provides strict protection for species of conservation value. The Wildlife Act conserves wildlife (including game) and protects certain wild creatures and flora. These species are therefore considered in this report as ecological receptors. Natural Heritage Areas (NHAs) and Proposed Natural Heritage Areas (pNHAs) are heritage sites that are designated for the protection of flora, fauna, habitats and geological sites. Only NHAs are designated under the Wildlife (Amendment) Act 2017. These sites do not form part of the Natura 2000 network of European sites and the AA process, or screening for same, does not apply to NHAs or pNHAs. Proposed Natural Heritage Areas (pNHAs) were published on a non-statutory basis in 1995 but have not since been statutorily proposed or designated¹ However, these sites are considered to be of significance for wildlife and habitats as they may form statutory designated sites in the future (NPWS, 2020).

The Flora (Protection) Order, 2015 (S.I. No. 356 of 2015) lists the species, hybrids and/or subspecies of flora protected under Section 21 of the Wildlife Acts. It provides protection to a wide variety of protected plant species in Ireland including vascular plants, mosses, liverworts, lichens and stoneworts. Under Flora Protection Order.

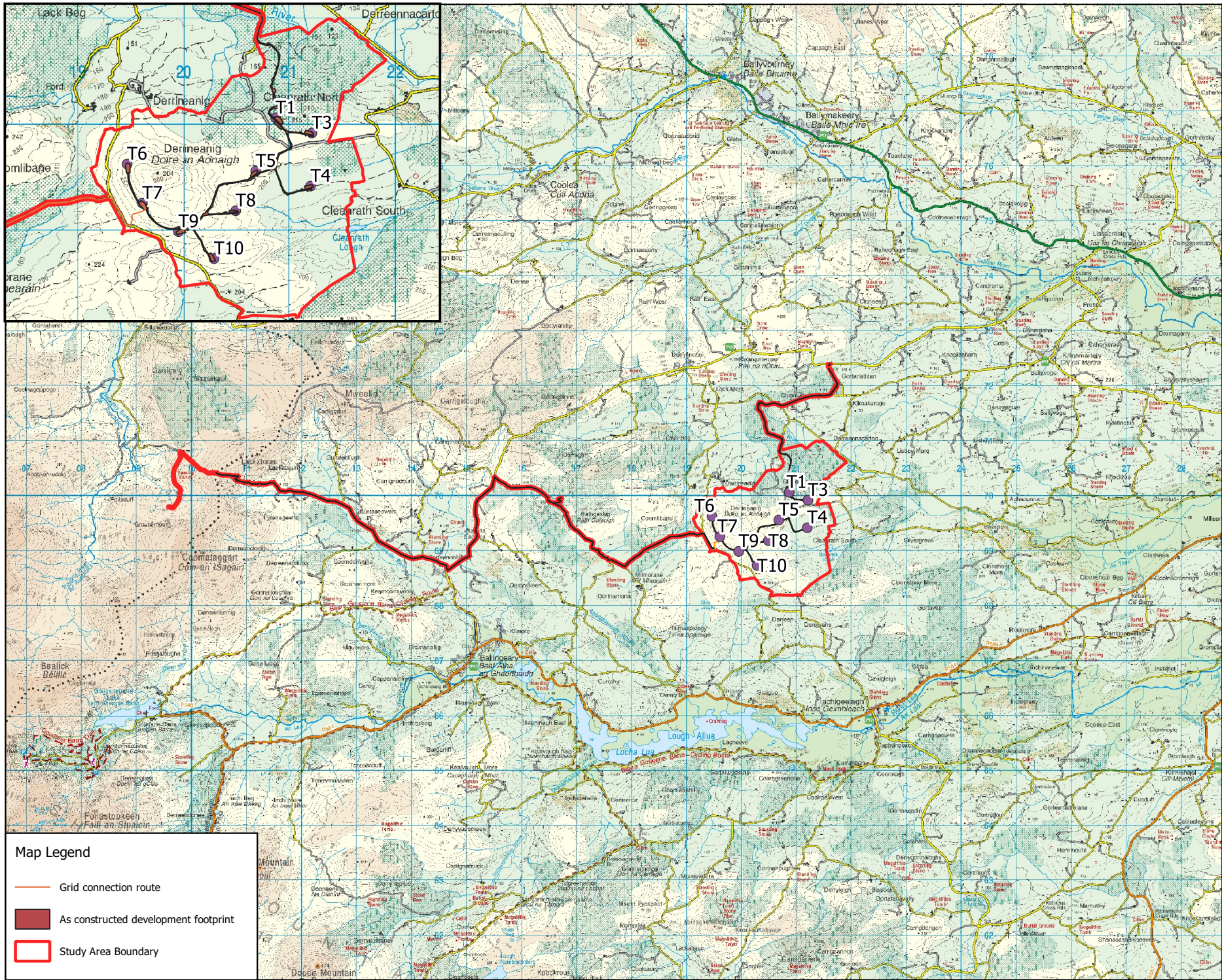
It is illegal to cut, pick, collect, uproot or damage, injure or destroy species listed or their flowers, fruits, seeds or spores or wilfully damage, alter, destroy or interfere with their habitat (unless under licence).

National Policy

The National Biodiversity Action Plan 2017-2021 (Department of Culture, Heritage and the Gaeltacht, 2017) (the “**Plan**”) demonstrates Ireland’s continuing commitment to meeting and acting on its obligations to protect Ireland’s biodiversity for the benefit of future generations through a series of targeted strategies and actions. The main objective of the Plan is to bring biodiversity into the mainstream of policy and decision-making. Objective 1 (*Mainstream biodiversity into decision-making across all sectors*) of the Plan identifies the following relevant measures in relation to future developments:

- “Incorporate into legislation the requirement for consideration of impacts on biodiversity to ensure that conservation and sustainable use of biodiversity are taken into account in all relevant plans and programmes and relevant new legislation;
- Public and Private Sector relevant policies will use best practice in SEA, AA and other assessment tools to ensure proper consideration of biodiversity in policies and plans;

¹ <https://www.npws.ie/protected-sites/nha> (accessed 23 January 2020).



Map Legend

- Grid connection route
- As constructed development footprint
- Study Area Boundary



Drawing Title	
Site location	
Project Title	
Cleanrath WindFarm	
Drawn By	PR
Project No.	PR
191223a	Figure 6-1
Scale	Date
1:90000	20.05.2020

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- All Public Authorities and private sector bodies move towards no net loss of biodiversity through strategies, planning, mitigation measures, appropriate offsetting and/or investment in Blue-Green infrastructure;
- Strengthen ecological expertise in local authorities and relevant Government Departments and agencies;
- Local Authorities will review and update their Biodiversity and Heritage Action Plans;
- Local Authorities will review and update their Development Plans and policies to include policies and objectives for the protection and restoration of biodiversity;
- Develop a Green Infrastructure at local, regional and national levels and promote the use of nature based solutions for the delivery of a coherent and integrated network;
- Continue to produce guidance on the protection of biodiversity in designated areas, marine and the wider countryside for Local Authorities and relevant sectors;
- Integrate Natura 2000 and Biodiversity financial expenditure tracking into Government Programmes internal paying agency management procedures including linkage to the Prioritised Action Framework and this NBAP;
- Develop a Natural Capital Asset Register and national natural capital accounts by 2020, and integrate these accounts into economic policy and decision-making;
- Initiate natural capital accounting through sectoral and small scale pilot studies, including the integration of environmental and economic statistics using the framework of the UN System of Experimental-Ecosystem Accounting (SEEA);
- Establish a national Business and Biodiversity Platform under the CBD's Global Business Partnership;
- Ensure Origin Green produces tangible benefits for biodiversity with increased emphasis on conservation and restoration of biodiversity;
- Implement actions from Ireland's Biodiversity Climate Change Sectoral Adaptation Plan;
- Identify and take measures to minimise the impact of incentives and subsidies on biodiversity loss, and develop positive incentive measures, where necessary, to assist the conservation of biodiversity;
- Establish and implement mechanisms for the payments of ecosystem services including carbon stocks, to generate increased revenue for biodiversity conservation and restoration;
- Develop and implement a National Biodiversity Finance Plan to set out in detail how the actions and targets of this NBAP will be delivered from 2017 and beyond; and
- Monitor the implementation of the Plan"

Such policies have informed the evaluation of ecological features recorded within the study area and the ecological assessment process.

European Legislation

The EU Habitats Directive (92/43/EEC) (together with the Birds Directive (79/409/EEC), as subsequently codified by Council Directive 2009/147/EC on the conservation of wild birds) forms the cornerstone of Europe's nature conservation within the EU. It is built around two pillars: the Natura 2000 network of protected sites and the strict system of species protection. The Habitats Directive protects over 1,000 animal and plant species and over 200 "habitat types" (e.g. special types of forests, meadows, wetlands, etc.), which are of European importance. The Habitats Directive and Birds Directive, which were transposed into Irish law through Part XAB of the Planning and Development Acts 2000-2019 (from a land use planning perspective) recognise the significance of protecting rare and endangered species of flora and fauna, and more importantly, their habitats.

Annex I of the Habitats Directive lists habitat types whose conservation requires the designation of Special Areas of Conservation (SAC). Priority habitats, such as Turloughs, which are in danger of disappearing within the EU territory are also listed in Annex I. Annex II of the Directive lists animal and plant species (e.g. marsh fritillary, Atlantic salmon, and Killarney fern) whose conservation also requires the designation of SAC. Annex IV lists animal and plant species in need of strict protection such as lesser horseshoe bat and otter, and Annex V lists animal and plant species whose taking in the wild and exploitation may be subject to management measures. In Ireland, species listed under Annex V include Irish hare, common frog and pine marten. Species can be listed in more than one Annex, as is the case with otter and lesser horseshoe bat which are listed on both Annex II and Annex IV. The disturbance of

species under Article 12 of the Habitats Directive (and in particular avoidance of deliberate disturbance of Annex IV species, particularly during the period of breeding, rearing, hibernation and migration and avoidance of deterioration or destruction of breeding sites or resting places) has been specifically assessed in this EIAR.

Council Directive 2009/147/EC on the conservation of wild birds (the “**Birds Directive**”) instructs Member States to take measures to maintain populations of all bird species naturally occurring in the wild state in the EU (Article 2). According to Recital 1 of the Birds Directive, Council Directive 79/409/EEC on the conservation of wild birds was substantially amended several times and in the interests of clarity and rationality, the Birds Directive codifies Council Directive 79/409/EEC. Such measures may include the maintenance and/or re-establishment of habitats in order to sustain these bird populations (Article 3). A subset of bird species has been identified in the Directive and are listed in Annex I as requiring special conservation measures in relation to their habitats. These species have been listed on account of inter alia: their risk of extinction; vulnerability to specific changes in their habitat; and/or due to their relatively small population size or restricted distribution. Special Protection Areas (SPAs) are to be identified and classified for these Annex I listed species and for regularly occurring migratory species, paying particular attention to the protection of wetlands (Article 4).

In summary, the species and habitats provided National and International protection under these legislative and policy documents have been considered in this Ecological Impact Assessment. A detailed assessment of the likelihood of the development having had either a significant effect or an adverse impact on any relevant European Sites (i.e. SACs, cSACs, SPAs) has been carried out in the Appropriate Assessment Screening Report and Natura Impact Statement. A separate assessment has not been carried out in this chapter, to avoid duplication of assessments. However, the relevant conclusions have been cross-referenced and incorporated.

6.3

Relevant Guidance

The assessment methodology is based primarily upon the National Road Authority (NRA)’s Guidelines for Assessment of Ecological Impacts of National Road Schemes Rev 2 (NRA, 2009) (referred to hereafter as the NRA Ecological Impact Assessment Guidelines), and the survey methodology is based on the NRA Guidelines on Ecological Surveying Techniques for Protected Flora and Fauna on National Road Schemes (NRA, 2009). Although these survey methodologies relate to road schemes, these standard guidelines are recognised survey methodologies that ensure good practice regardless of the development type.

In addition, the following guidelines were consulted in the preparation of this document to provide the scope, structure and content of the assessment:

- *Guidelines for Ecological Impact Assessment in the UK and Ireland*. Terrestrial, Freshwater and Coastal (CIEEM, 2018).
- SNH (2013) *Research and Guidance on Restoration and Decommissioning of Onshore Wind Farms*.
- SNH (2019) ‘*Bats and onshore wind turbines: survey, Assessment and mitigation*’
- Draft Revised guidelines on the information to be contained in Environmental Impact Statements (EPA, 2017).
- Guidelines for Planning Authorities and An Bord Pleanála on Carrying out Environmental Impact Assessment. Department of the Environment, Community and Local Government DoEHLG (2013).
- *Guidelines for assessment of Ecological Impacts of National Road Schemes*, (NRA, 2009).
- *Environmental Impact Assessment of National Road Schemes - A Practical Guide* (NRA, 2009).
- Environmental Assessment and Construction Guidelines (NRA, 2006).
- Advice Notes on Current Practice (in preparation of Environmental Impact Statements) (Environmental Protection Agency (EPA), 2003).
- Guidelines on the information to be contained in Environmental Impact Statements (EPA, 2002).

This assessment has been carried out in accordance with the Environmental Impact Assessment guidance as outlined in Chapter 1 of the EIAR.

In addition to the above, the following legislation applies with respect to habitats, fauna and water quality in Ireland and has been considered in the preparation of this report:

- The International Convention on Wetlands of International Importance especially Waterfowl Habitat (Concluded at Ramsar, Iran on 2 February 1971)
- S.I. No. 272 of 2009: European Communities Environmental Objectives (Surface Waters) Regulations 2009 and S.I. No. 722 of 2003 European Communities (Water Policy) Regulations 2003 which give further effect to EU Water Framework Directive (2000/60/EC).

The following legislation applies with respect to non-native species:

- Regulation 49 and 50 of European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477 of 2011).

This assessment has been prepared with respect to the various planning policies and strategy guidance documents listed below:

- Cork County Development Plan 2014 - 2020.
- Natura Impact Assessment Report on the Cork County Development Plan, Cork County Council, (2014)2.

6.3.1

Statement of Authority

Ecological surveys were conducted by McCarthy Keville O'Sullivan (MKO) ecologists; Pat Roberts (B.Sc., MCIEEM), David McNicholas (B.Sc., M.Sc., MCIEEM), Julie O'Sullivan (B.Sc., M.Sc.), Claire Stephens (B.Sc (Env.)) and Luke Dodebier (B.Sc. (Ecol.)) All surveyors have relevant academic qualifications and experience to complete the ecological surveys and assessments that they took responsibility for.

Ecological surveys were undertaken by Dixon Brosnan ecological consultants to inform the EIS for the project that was submitted for planning in 2015. These surveys and assessments are referred to in this document and were ground truthed and updated by the surveyors listed above.

This EIAR chapter has been prepared by Pat Roberts (B.Sc., MCIEEM), with input from Sarah Mullen (B.Sc., Ph.D.) and David McNicholas (B.Sc., M.Sc., MCIEEM). Sarah has 4 years professional ecological consultancy experience. David McNicholas has over 9 years' professional ecological consultancy experience and is a full member of the Chartered Institute of Ecology and Environmental Management (CIEEM). Pat is a highly experienced ecologist with over 15 years' professional experience in environmental management and ecological assessment.

6.4

Methodology

The following sections describe the methodologies followed to establish the baseline ecological condition of the development site and surrounding area. Assessing the impacts of any project and associated activities requires an understanding of the ecological baseline conditions prior to and at the time of the project proceeding. Ecological Baseline conditions are those existing in the absence of proposed activities (CIEEM, 2018).

² Cork Co Co. 2014, Volume 3: SEA Statement and Natura Impact Report Cork County Development Plan 2014, Online, available at: http://corkcocodevplan.com/wp-content/uploads/2017/10/CCDP_Volume_3.pdf Accessed, 06.05.2020

6.4.1 Desk Study

A comprehensive desk study was undertaken to inform this ecological impact assessment. This study included a thorough review of available information that is relevant to the ecology of the site of the Cleanrath wind farm development, which includes the turbine delivery route and the grid connection. This information provides valuable existing data and also helps in the assessing the requirement for additional ecological surveys.

The following list describes the sources of data consulted:

- Review of existing information on the Cleanrath Wind Farm Development site including the EIS prepared for the planning application from 2015 (ABP Ref. PL04.246742).
- Review of online web-mappers: National Parks and Wildlife Service (NPWS), Environmental Protection Agency (EPA), Water Framework Directive (WFD) and Inland Fisheries Ireland (IFI).
- Data on potential occurrence of protected bryophytes – as per NPWS online map viewer; Flora Protection Order Map Viewer – Bryophytes³.
- Review of the Bat Conservation Ireland (BCI) Private Database
- Review of the publicly available National Biodiversity Data Centre web-mapper
- Records from the NPWS web-mapper and review of specially requested records from the NPWS Rare and Protected Species Database for the hectads which overlap with the study area

6.4.2 Scoping and Consultation

MKO undertook a scoping exercise during preparation of this EIAR, as described in Chapter 2, Section 2.4 of this EIAR.

Copies of all scoping responses are included in Appendix 2-3 of this EIAR. The recommendations of the consultees have informed the EIAR preparation process and the contents of this chapter. Table 2-4 in Chapter 2 of this EIAR describes where the comments raised in the scoping responses received have been addressed in this assessment.

Table 6-1 provides a list of the organisations consulted with regard to biodiversity during the scoping process.

Table 6-1 Organisations consulted with regard to biodiversity

Consultee	Response
Department of Culture, Heritage and the Gaeltacht	<p>No response received as of 07.08.2020</p> <p>A response was received from the Department of Arts, Heritage and the Gaeltacht in February 2016 in relation to the development (Pl.Ref. 15/6966). The points raised within this submission were fully addressed during the construction and operation of the wind farm and have been taken into account in the current sleep mode. They will be taken into account in any future operation or decommissioning of the Wind Farm.</p> <p>In addition to the above, there was ongoing consultation with the Department in relation to surveying and mitigation for Kerry Slug.</p>

³ NPWS, 2020, Online map viewer; Flora Protection Order Map Viewer – Bryophytes. Online, Available at: <http://dahg.maps.arcgis.com/apps/webappviewer/index.html?id=71f8df33693f48cedbb70369d7fb26b7e>, Accessed: 06/05/2020.

	Surveying and translocation were undertaken under licence - <i>Der/Kerry Slug-2018-88</i>
Inland Fisheries Ireland - Shannon Region & Western Region	No response received as of 07.08.2020
Irish Peatland Conservation Council	No response received as of 07.08.2020
Cork County Council - Heritage	No response received as of 07.08.2020
An Taisce	No response received as of 07.08.2020
Bat Conservation Ireland	No response received as of 07.08.2020
Irish Wildlife Trust	No response received as of 07.08.2020
The Heritage Council	No response received as of 07.08.2020

In addition, a data request was sent to the National Parks and Wildlife Service, scientific data unit, and a response was received on the 30th March 2019. The information received is provided in Section 6.6.1.2 of the EIAR.

6.4.3 Field Surveys

Comprehensive surveys of the biodiversity of the entire study area (Cleanrath wind farm development site including the turbine delivery route and grid connection route) were undertaken on various dates between 2010 and 2020 by Dixon.Brosnan Environmental Consultants and by MKO ecologists. The following sections fully describe the ecological surveys that have been undertaken and provide details of the methodologies, dates of survey and guidance followed.

6.4.3.1 Multi-disciplinary ecological walkover surveys

Multi-disciplinary ecological walkover surveys were undertaken of the Cleanrath wind farm development site including the turbine delivery route and grid connection route on various dates between 2010 and 2020 in accordance with NRA Guidelines on Ecological Surveying Techniques for Protected Flora and Fauna on National Road Schemes (NRA, 2009). The walkover surveys were undertaken in October 2010, March, May and October, November and December 2011, January-March 2012, February-December 2015, 27th November 2018 and 20th December 2018. Additional surveys were also undertaken on the 3rd, 4th & 28th January 2019, 7th, 8th, 20th and 21st March 2019 and 30th March & 14th May 2020. The surveys provided baseline data on the ecology of the study area prior to, during and after construction. They enabled an assessment of whether further, more detailed habitat or species-specific ecological surveys were required. The multi-disciplinary ecological walkover surveys comprehensively covered the study area of the wind farm, including all elements of the development and grid connection.

Habitats were classified in accordance with the Heritage Council's '*A Guide to Habitats in Ireland*' (Fossitt, 2000). Habitat mapping was undertaken with regard to guidance set out in '*Best Practice Guidance for Habitat Survey and Mapping*' (Smith et al., 2011).

Plant nomenclature for vascular plants follows 'New Flora of the British Isles' (Stace, 2010), while mosses and liverworts nomenclature follow '*Mosses and Liverworts of Britain and Ireland - a field guide*' (British Bryological Society, 2010).

The walkover surveys were designed to detect the presence, or suitable habitat for a range of protected faunal species that may occur in the vicinity of the development.

During the multidisciplinary surveys, a search for Invasive Alien Species (IAS), with a focus on those listed under the Third Schedule of the European Communities Regulations 2011 (S.I. 477 of 2011), was also conducted.

6.4.3.2 Detailed Habitat Assessments

Detailed habitat surveys were undertaken in December 2015 and May 2020. Where relevant, correspondence with EU Annex I habitats types were assessed. Vegetation was sampled by taking botanical quadrats/Relevés within representative habitat areas at the development site. This allowed for accurate habitat classification. The location of each of the quadrats and the quadrat data is provided in Appendix 6-1, of the EIAR. The extent of each habitat on site was mapped on site using aerial photography, handheld GPS and smartphone technology. A representative photograph was also taken for each of the habitats recorded on site, including all relevés.

Habitats that correspond to EU Habitats Directive Annex I habitat types have been described and assessed in accordance with NPWS guidance from the relevant national Annex I habitat surveys/ Irish Wildlife Manuals and the EC (2013) '*Interpretation Manual of European Union Habitats*'⁴.

The habitat assessment surveys described in this report, including EU Habitats Directive Annex I classification and condition assessment, have been undertaken with reference to the following guidelines and interpretation documents:

- Perrin, P.M., Barron, S.J., Roche, J.R. & O'Hanrahan, B. (2014). *Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland*. Version 2.0. Irish Wildlife Manuals, No. 79. National Parks and Wildlife service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.
- NPWS (2013) *The Status of EU Protected Habitats and Species in Ireland*. Habitat Assessments Volume 2. Version 1.1. Unpublished Report, National Parks & Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.
- NPWS (2019), *The Status of EU Protected Habitats and Species in Ireland*. Volume 2: *Habitat Assessments*. Unpublished NPWS report. Edited by: Deirdre Lynn and Fionnuala O'Neill
- Commission of the European Communities (2007) *Interpretation manual of European Union habitats*. Eur 27. European Commission DG Environment.

6.4.3.3 Invasive Species Surveys

Field surveys to search for Invasive Alien Species (IAS), with a focus on those listed under the Third Schedule of the European Communities Regulations 2011 (S.I. 477 of 2011) were conducted by Pat Roberts on the 10th September 2018, Julie O'Sullivan (B.Sc., M.Sc) of MKO on 13th, 14th and 15th November 2018 and by Irene Sullivan (B.Sc.) and David McNicholas (B.Sc., M.Sc., MCIEEM) of MKO on 10th January 2018. The development footprint and grid connection route was walked and all Third Schedule invasive plant species recorded prior to the commencement of construction works. All results were recorded using a Garmin Montana 650 hand-held GPS to mark grid reference locations. However, invasive plant species were readily identifiable due to their respective characteristic features (e.g. dead flower heads, zig-zagged stems). MKO staff also supervised the treatment of invasive species during construction. Field surveys of the Derragh Wind Farm substation and the area of the cable from the public road were carried out by suitably qualified staff of Fehily Timoney and Company on 25/10/2018. Invasive species surveys were also carried out during the walkover surveys following construction in 2019 and 2020.

An Invasive Species Management Plan was undertaken for the development and is included as Appendix 6-2 to this chapter. This plan was implemented in full during construction and overseen by MKO ecologists.

⁴ European Commission (2013), *Interpretation Manual of European Union Habitats -EUR28*
http://ec.europa.eu/environment/nature/legislation/habitatsdirective/docs/Int_Manual_EU28.pdf

6.4.3.4 Terrestrial Fauna Surveys

The results of the desk study, scoping replies, incidental records of protected species during ecological survey work and multidisciplinary walkover surveys were used to inform the scope of targeted ecological surveys required.

Mammal surveys were carried out by Dixon. Brosnan in October 2010, with follow-up surveys in March and May 2011. These surveys focused on the development footprint and surrounding lands within the study area. Further mammal surveys were carried out in December 2015 by MKO ecologists. The surveys undertaken in 2015 included dedicated otter, badger and red squirrel surveys and the methodologies used are described in the relevant sections below. During the surveys, incidental sightings or evidence of other protected mammal species was also recorded.

Dedicated otter and badger surveys were undertaken again on 13th, 14th and 15th of November 2018 MKO as part of pre-commencement surveys for the wind farm. These surveys covered the entire wind farm study area, turbine delivery route and grid connection route. The methodologies and results of the pre-commencement surveys are described in the relevant sections below and in the Ecological Pre-Commencement Surveys report in Appendix 6-3 to this chapter.

Dedicated bat surveys were undertaken in 2015. Further surveys of the constructed wind farm (including during its period of operation and whilst in Sleep Mode pending the outcome of the Substitute Consent Process) have been undertaken in 2020 and are currently ongoing. The methodologies followed are described further below.

6.4.3.4.1 Otter Survey

Areas identified during the multidisciplinary walkover survey as providing potential habitat for otter were subject to targeted surveys. Dedicated otter surveys were undertaken in December 2015 by MKO ecologists and again on the 13th, 14th and 15th November 2018 by Julie O'Sullivan of MKO. Otter surveys were undertaken at all locations where the construction footprint occurs in close proximity to or crosses watercourses. Particular attention was paid to the River Toon within the development site. 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 survey 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, 2013⁵).

6.4.3.4.2 Badger Survey

Areas identified as providing potential habitat for badger were subject to specialist targeted survey. Dedicated badger surveys were conducted in December 2015 and again on the 13th, 14th and 15th November 2018 by Julie O'Sullivan of MKO.

The badger surveys were conducted in order to determine the presence or absence of badger signs within and outside (areas of identified suitable habitat) the development footprint and study area. This involved a search for all potential badger signs as per NRA (2009) (latrines, badger paths and setts). If encountered, setts would be classified as per the convention set out in NRA (2009) (i.e. main, annexe, subsidiary, outlier). No setts were encountered.

The badger survey was conducted adhering to best practice guidance (NRA, 2009) and followed the '*Guidelines for the Treatment of Badger Prior to the Construction of National Roads Schemes*' (NRA, 2006a) and CIEEM best practice competencies for species surveys (CIEEM, 2013).

⁵ CIEEM, 2013, *Technical Guidance Series - Competencies for Species Survey*, Online, Available at: <https://cieem.net/resource/competencies-for-species-survey-css/> Accessed: 20.06.2019

6.4.3.4.3 Squirrel Surveys

Dedicated squirrel surveys were undertaken in December 2015. Areas of conifer plantation within the development site were searched for signs of squirrel activity.

6.4.3.4.4 Bat Surveys

A detailed bat survey report is provided in Appendix 6-4 of this EIAR. This document provides a detailed description of survey methodologies undertaken at the site during the survey period; May, July and September 2015. The appendix also describes the surveys undertaken in respect of the Cleanrath wind farm development, which have been ongoing throughout 2020 and are continuing. Full details of the survey times and dates and the methodologies followed are provided in Appendix 6-4 along with details of all the surveyors.

The Bat surveys were undertaken in 2015 followed the most relevant best practice guidelines available at the time i.e. Chapter 10 of the Bat Conservation Trust '*Good Practice Guidelines, 2nd edition, 2012*' (Bat Conservation Trust, 2012).

Despite the finding of low levels of bat activity recorded during the 2015 surveys, dedicated bat surveys commenced at the constructed Cleanrath wind farm site in 2020 and are ongoing. These surveys have recorded bat activity during the period that the wind farm was operational and are continuing to monitor the wind farm whilst in Sleep Mode. Bat surveys in 2020 have been undertaken in accordance with Scottish Natural Heritage Guidance (SNH 2019), form the core dataset for the assessment of effects on bats. Surveys undertaken on the site in 2015 and were designed in accordance with the Bat Conservation Trust's guidelines for wind turbine developments (Hundt, 2012).

Bat surveys employed a combination of methods, including desktop study, habitat and landscape assessments, roost inspections, manual activity surveys and static detector surveys.

The results of these surveys are provided in Appendix 6-4. Dedicated walked transects of the built infrastructure, using handheld bat detectors, are undertaken along the development footprint. This has been undertaken along with the use of ground-level static detectors, which have been deployed at each of the 9 turbines. In addition to both walked transects and static bat detectors, corpse searching has been undertaken at the site between January and July 2020. This is undertaken using both hand searching and a trained search dog to detect any potential bat fatalities.

Survey design and effort in 2020 has been prepared in accordance with the guidelines set out in SNH (2019) '*Bats and onshore wind turbines: survey, Assessment and mitigation*'. This is in line with standard best practice industry guidelines.

6.4.3.5 Invertebrates

6.4.3.5.1 Watercourse Surveys

Sampling was carried out downstream of the study area at 11 sites on the 14th May 2020. All watercourses were assessed if they were located within or downstream of the wind farm development or the grid connection route and contained flowing water. The locations of each watercourse surveyed are provided in Figure 6-2.





Biological water quality was assessed through kick-sampling each of these watercourses. Macro-invertebrate samples were converted to Q-ratings as per Toner et al. (2005)⁶. The applied Q ratings followed the EPA water quality classes and Water Framework Directive status categories. All riverine samples were taken with a standard kick sampling hand net (250mm width, 500µm mesh size) from areas

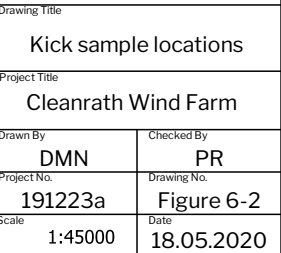
⁶ Toner, P., Bowman, J., Clabby, K., Lucey, J., McGarrigle, M., Concannon, C., & MacGarthaigh, M. (2005). *Water quality in Ireland*. Environmental Protection Agency, Co. Wexford, Ireland.

Map Legend

Kick sample locations

- Grid connection route
- Development footprint
- WFD water catchments
- WFD river waterbodies
- Site boundary

-  Grid connection route
-  Development footprint
-  WFD water catchment
- WFD river waterbodies
-  Site boundary



Cleanrath Wind Farm

Project No.	Drawing No.
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1.45000	18.05.2020


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of riffle/glide utilising a two-minute sample, as per ISO standards for water quality sampling (ISO 10870:2012). Large cobble was also washed at each site where present.

In addition to the biological water quality assessment, each watercourse was visually assessed for signs of pollution or instream activity that could be attributable to the construction of the wind farm.

The results of the surveys at all 11 sites are provided in Appendix 6-5.

6.4.3.5.2 *Freshwater Pearl Mussel*

An assessment of the potential for the streams on the Cleanrath wind farm development to provide habitat for freshwater pearl mussel was undertaken in May 2020. In addition, watercourses downstream of the site were also assessed for their potential to support freshwater pearl mussel during kick-sampling of watercourses on the 14th May 2020. Details of this assessment are provided in Appendix 6-5 of the EIAR.

6.4.3.5.3 *Marsh Fritillary Surveys*

During habitat surveys undertaken in December 2015, the presence of the larval food plant for marsh fritillary, devil's bit scabious (*Succisa pratensis*) was recorded and areas with the plant were assessed for their potential suitability for marsh fritillary. The survey methodology followed that described in the NRA (2009) best practice guidance document. This involved walked surveys to identify suitable areas of marsh fritillary habitat within or adjacent to the development footprint. In addition to the surveys undertaken in 2015, dedicated searches of the infrastructure footprint for suitable supporting habitat were also undertaken on the 25th September 2019. This survey involved a search for suitable habitat and for any larval webs within that habitat. The multi-disciplinary ecological walkover surveys undertaken at the site also surveyed for potential marsh fritillary habitat and for the presence of adult butterflies.

6.4.3.5.4 *Kerry Slug Surveys*

A Kerry Slug survey was carried out on 25th August and 6th September 2011 and followed the methodology specified by the National Roads Authority's guidelines on the Ecological Surveying Techniques of Protected Flora and Fauna During the Planning of National Road Schemes (NRA, 2008). Transects were searched at 20m intervals along three routes through bog, heath and oak woodland habitat around T3, T8 and T9, T10 and an area of heath to the east of T10. A total of 35 transects searched across these three areas.

Further dedicated Kerry slug surveys were undertaken between the 27th November 2018 and 20th December 2018 – prior to construction of the wind farm. Survey effort was conducted by undertaking both hand searches and refuge trapping (metric traps⁷) (McDonnell et al., 2013). The surveys were undertaken under licence from the NPWS and a copy of all survey licences is provided in Appendix 6-6. Hand searches were undertaken for approximately 45 minutes/ha (as per survey methods employed by Kelleher & O'Meara at Galway Wind Park). Initially, a walked transect was undertaken along the infrastructure footprint. During the initial walkover transect of the site, 18 metric traps were set out on a variety of features including; exposed rocky outcrop, vegetated heath, scattered trees or tree stumps within coniferous plantation forestry.

A derogation licence was issued by the NPWS on the 21st December 2018 (DER-KERRY SLUG94-Cleanrath Windfarm) for the translocation of Kerry slug from the construction footprint prior to the commencement of construction. The licence is provided in Appendix 6-6 of the EIAR. Translocation was undertaken using both hand-searching and the deployment of metric traps along the entire length of the infrastructure footprint. Surveys were undertaken on the 3rd, 4th & 28th January 2019, 7th, 8th, 20th and 21st March 2019. The surveys were undertaken on a staged basis as the development progressed, in order to minimise re-colonisation of the works area. A full description of all survey effort and methodologies is provided in a standalone Kerry slug survey report, see Appendix 6-6 of the EIAR.

⁷ Metric traps are a refuge trap technique. The metric traps (0.25 m²), manufactured by De Sangosse (Pont du Casse, France), are made up of absorbent material covered with a reflective upper surface and a black plastic on the underside. They are wetted in advance of being laid out.

Surveys of the cable route for were undertaken in 2016 and repeated/ground truthed prior to construction on the 10th September 2018.

6.4.4 Methodology for Assessment of Impacts and Effects

6.4.4.1 Determining Importance of Ecological Receptors

The importance of the ecological features identified within the study area was determined with reference to a defined geographical context. This was undertaken following a methodology that is set out in Chapter 3 of the 'Guidelines for Assessment of Ecological Impacts of National Roads Schemes' (NRA, 2009). These guidelines set out the context for the determination of value on a geographic basis with a hierarchy assigned in relation to the importance of any particular receptor. The guidelines provide a basis for determination of whether any particular receptor is of importance on the following scales:

- International
- National
- County
- Local Importance (Higher Value)
- Local Importance (Lower Value)

The Guidelines clearly set out the criteria by which each geographic level of importance can be assigned. Locally Important (lower value) receptors contain habitats and species that are widespread and of low ecological significance and of any importance only in the local area. Internationally Important sites are either designated for conservation as part of the Natura 2000 Network (SAC or SPA) or provide the best examples of habitats or internationally important populations of protected flora and fauna. Specific criteria for assigning each of the other levels of importance are set out in the guidelines and have been followed in this assessment. Where appropriate, the geographic frame of reference set out above was adapted to suit local circumstances. In addition, and where appropriate, the conservation status of habitats and species is considered when determining the significance of ecological receptors.

Any ecological receptors that are determined to be of Local Importance (Higher Value), County, National or International importance following the criteria set out in NRA (2009) are considered to be Key Ecological Receptors (KERs) for the purposes of ecological impact assessment if there is a pathway for effects thereon. Any receptors that are determined to be of Local Importance (Lower Value) are not considered to be Key Ecological Receptors.

6.4.4.2 Characterisation of Impacts and Effects

The development has resulted in a number of identified impacts on biodiversity. The ecological effects of these impacts are characterised as per the CIEEM 'Guidelines for Ecological Impact Assessment in the UK and Ireland (2018). The headings under which the impacts are characterised follow those listed in the guidance document and are applied where relevant. A summary of the impact characteristics considered in the assessment is provided below:

- **Positive or Negative.** Assessment of whether the development resulted in a positive or negative effect on the ecological receptor.
- **Extent.** Description of the spatial area over which the effect has the potential to have occurred.
- **Magnitude** to size, amount, intensity and volume. It should be quantified if possible and expressed in absolute or relative terms e.g. the amount of habitat lost, percentage change to habitat area, percentage decline in a species population.
- **Duration** is defined in relation to ecological characteristics (such as the lifecycle of a species) as well as human timeframes. For example, five years, which might seem short-term in the human context or that of other long-lived species, would span at least five generations of some invertebrate species.
- **Frequency and Timing.** This relates to the number of times that an impact occurs and its frequency. A small-scale impact can have a significant effect if it is repeated on numerous occasions over a long period.

- **Reversibility.** This is a consideration of whether an effect is reversible within a 'reasonable' timescale. What is considered to be a reasonable timescale can vary between receptors and is justified where appropriate in the impact assessment section of this report.

6.4.4.3 Determining the Significance of Effects

The ecological significance of the effects of the development are determined following the precautionary principle and in accordance with the methodology set out in Section 5 of CIEEM (2018).

For the purpose of EcIA, 'significant effect' is an effect that either supports or undermines biodiversity conservation objectives for 'important ecological features' or for biodiversity in general. Conservation objectives may be specific (e.g. for a designated site) or broad (e.g. national/local nature conservation policy) or more wide-ranging (enhancement of biodiversity). Effects can be considered significant at a wide range of scales from international to local (CIEEM, 2018).

When determining significance, consideration is given to whether:

- Any processes or key characteristics of key ecological receptors will be removed or changed
- There will be an effect on the nature, extent, structure and function of important ecological features
- There is an effect on the average population size and viability of ecologically important species.
- There is an effect on the conservation status of important ecological habitats and species.

The EPA draft guidelines on information to be included in Environmental Impact Statements (EPA, 2017) and the *Guidelines for assessment of Ecological Impacts of National Road Schemes*, (NRA, 2009) were also considered when determining significance and the assessment is in accordance with those guidelines.

The terminology used in the determination of significance follows the suggested language set out in the Draft EPA Guidelines (2017) as shown in Table 6-2 below.

Table 6-2 Criteria for determining significance of effect, based on (EPA, 2017) guidelines

Effect Magnitude	Definition
No change	No discernible change in the ecology of the affected feature.
Imperceptible effect	An effect capable of measurement but without noticeable consequences.
Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight effect	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate effect	An effect that alters the character of the environment that is consistent with existing and emerging trends.
Significant effect	An effect which, by its character, its magnitude, duration or intensity alters a sensitive aspect of the environment.
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
Profound effect	An effect which obliterates sensitive characteristics.

As per TII (NRA, 2009) and CIEEM (2018) best practice guidelines, the following key elements should also be examined when determining the significance of effects:

- The likely effects on 'integrity' should be used as a measure to determine whether an impact on a site is likely to be significant (NRA, 2009).
- A 'significant effect' is an effect that either supports or undermines biodiversity conservation objectives (CIEEM, 2018).

Integrity

In the context of EcIA, 'integrity' refers to the coherence of the ecological structure and function, across the entirety of a site, that enables it to sustain all of the ecological resources for which it has been valued (NRA, 2009). Impacts resulting in adverse changes to the nature, extent, structure and function of component habitats and effects on the average population size and viability of component species, would affect the integrity of a site, if it changes the condition of the ecosystem to unfavourable.

Conservation status

An impact on the conservation status of a habitat or species is considered to be significant if it will result in a change in conservation status. According to CIEEM (2018) guidelines the definition for conservation status in relation to habitats and species are as follows:

- Habitats – conservation status is determined by the sum of the influences acting on the habitat that may affect its extent, structure and functions as well as its distribution and its typical species within a given geographical area
- Species – conservation status is determined by the sum of influences acting on the species concerned that may affect its abundance and distribution within a given geographical area.

As defined in the EU Habitats Directive 92/43/EEC, the conservation of a habitat is favourable when:

- Its natural range, and areas it covers within that range, are stable or increasing
- The specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future
- The conservation status of its typical species is favourable.

The conservation of a species is 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
- The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future
- There is and will probably continue to be, a sufficiently large habitat to maintain its population on a long-term basis.

According to the NRA/CIEEM methodology, if it is determined that the integrity and/or conservation status of an ecological feature will be impacted on, then the level of significance of that impact is related to the geographical scale at which the impact will occur (i.e. local, county, national, international).

6.4.4.4 Incorporation of Mitigation

The development was designed to specifically avoid, reduce and minimise effects on all KERs. Section 6.7 of this chapter assesses the impacts of the development to ensure that all impacts on Key Ecological Receptors (KERs) have been adequately addressed. Where significant impacts on KERs were predicted, mitigation has been incorporated into the project design or layout to address such impacts. The implemented mitigation measures have ensured that there are no significant residual impacts post mitigation. Best practice design and mitigation measures were specifically set out and were realistic in terms of cost and practicality. They have been subject to detailed design and have effectively addressed the potential significant effects on the identified KERs.

6.4.4.5 Limitations

The information provided in this EIAR chapter comprehensively describes the baseline ecological environment; provides an assessment of the ecological effects that will result from the continued sleep mode operation from August 2020 any future full operation and decommissioning of the Cleanrath wind farm development (with a summary of construction effects also provided) and describes the best practice and mitigation employed and the residual ecological impacts. The specialist studies, analysis and reporting have been undertaken in accordance with the appropriate guidelines. The habitats and species on the site were readily identifiable and comprehensive assessments were made during the field and desk surveys. No significant limitations in the scope, scale or context of the assessment have been identified.

6.5 Establishing the Ecological Baseline

6.5.1 Desk Study

6.5.2 Designated Sites

The potential for the development to have impacted on sites that are designated for nature conservation was considered in this Ecological Impact Assessment.

Special Areas of Conservation (SACs) and Special Protection Areas for Birds (SPAs) are designated under EU Habitats Directive and are collectively known as 'European Sites'. The potential for effects on European Sites is fully considered in the Natura Impact Statement that accompanies this application and discussed also in this chapter of the EIAR.

Natural Heritage Areas (NHAs) are designated under Section 18 of the Wildlife (Amendment) Act 2000 and their management and protection is provided for by this legislation and planning policy. The potential for effects on these designated sites is fully considered in this chapter of the EIAR.

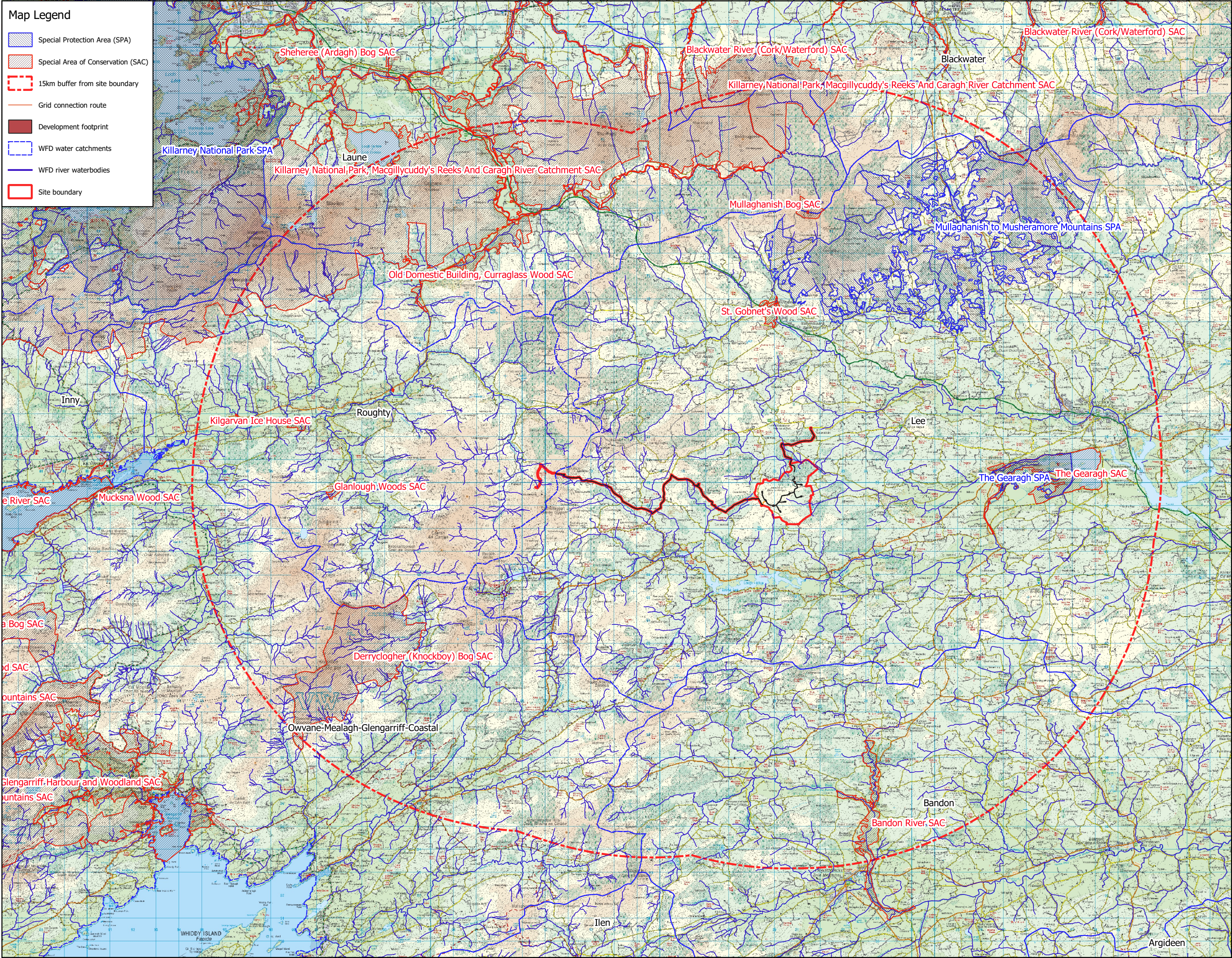
Proposed Natural Heritage Areas (pNHAs) were designated on a non-statutory basis in 1995 but have not since been statutorily proposed or designated. However, the potential for effects on these designated sites is fully considered in this EcIA.

The following methodology was used to establish which sites that are designated for nature conservation have potentially been impacted by the development:

- Initially the most up to date GIS spatial datasets for European designated sites and water catchments were downloaded from the NPWS website (www.npws.ie) and the EPA website (www.epa.ie) on the 26/05/2020. The datasets were utilized to identify Designated Sites which could feasibly have been affected by the development.
- All Designated Sites within a distance of 15km surrounding the development site were identified. In addition, the potential for connectivity with European Sites at distances of greater than 15km from the development was also considered in this initial assessment. In this case, no potential connectivity with sites located at a distance of over 15km from the development was identified.
- A map of all the European Sites within 15km is provided in Figure 6-3. All other designated sites within 15km are shown in Figure 6-4.
- Catchment mapping was used to establish or discount potential hydrological connectivity between the site of the development and any Designated Sites. The hydrological catchments are also shown in Figures 6-3 & 6-4.
- In relation to Special Protection Areas, in the absence of any specific European or Irish guidance in relation to such sites, 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 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.

- The results of the extensive bird surveys carried out in advance of the construction between February 2015 and March 2019 consulted in the course of this screening exercise and provided information on whether the birds recorded on the site could potentially be associated with any European Site. Additional pre-commencement and operational surveys undertaken in 2018, 2019 and 2020 were also considered.
- Table 6-3 provides details of all relevant Designated Sites as identified in the preceding steps and assesses which are within the likely Zone of Impact.
- The site synopses and conservation objectives of these sites, as per the NPWS website (www.npws.ie), were consulted and reviewed at the time of preparing this report 26/03/2020. Figure 6-3 shows the location of the development in relation to all European sites within 15km of the development.
- Where potential pathways for Significant Effect are identified, the site is included within the Likely Zone of Impact and further assessment is required.











Drawing Title	
Site in relation to EU designated sites	
Project Title	
Cleanrath Wind Farm	
Drawn By	Checked By
DMN	PR
Project No.	Drawing No.
191223a	Figure 6-3
Scale	Date
1:145606	18.05.2020



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Map Legend

-  Natural Heritage Area (NHA)
-  Proposed Natural Heritage Area (pNHA)
-  15km buffer from site boundary
-  Grid connection route
-  Development footprint
-  WFD water catchments
-  WFD river waterbodies
-  Site boundary

-
- This map provides a comprehensive view of the Glengarriff region in County Wick, Ireland. Key locations and features include:
- Towns and Villages:** Inny, Roughy, Lee, Bandon, Argideen, Carriganass Castle, Near Kealkill, and Glengarriff.
 - Water Bodies:** Roughy River, Roughy River Estuary, Lough Allua, Lough Nagarriva, Lough Namaddra And Lough West, Loughavaul, and the Gearagh.
 - Protected Areas (NHAs):** Sillahertane Bog NHA, Doughill Bog NHA, Slaheny River Bog NHA, Conigar Bog NHA, and Bandon Valley South Of Dunmanway.
 - Other Notable Features:** Kilgarvan Wood, Old Domestic Building, Curraglass Wood, St. Gobnet's Wood, Prohus Wood, Boylegrove Wood, The Gearagh, and various bogs and lakes.
- The map is overlaid with a grid and various colored lines indicating boundaries and routes, providing a detailed geographical context for the area.



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Table 6-3 Identification of Designated sites within the Likely Zone of Impact

Designated Sites and distance from development	Qualifying Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 17/06/2020)	Conservation Objectives	Likely Zone of Impact Determination
Special Area of Conservation			
<p>St. Gobnet's Wood cSAC (000106)</p> <p>Distance:</p> <p>4.6 km from Wind farm site</p> <p>7.5km from Grid Connection Route</p>	<p>➤ Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0]</p>	<p>This site has the generic conservation objective,</p> <p><i>'To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected.'</i></p> <p>(NPWS (2020) Generic Version 7.0)</p>	<p>There is no potential for, and there have been no direct effects as the development is located entirely outside and approximately 4.6km distant from the European Site, as no pathway for such effects exists.</p> <p>This site is designated for a terrestrial habitat and there is no connectivity between the development and the site by which any significant effect could occur. No potential pathway for indirect effects on the QI 'Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles' was identified.</p> <p>The site is not in the Likely Zone of Impact and no further assessment is required. It can be excluded, on the basis of objective information, that the Cleanrath wind farm development, individually or in combination with other plans or projects, could have any significant effect on this European site. Accordingly, a Stage Two Appropriate Assessment is not required.</p>
<p>The Gearagh cSAC (000106)</p> <p>Distance:</p> <p>7.4km by land & 9.4km via surface water from Wind farm site</p> <p>9.7km from Grid Connection Route</p>	<p>➤ Water courses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation [3260]</p> <p>➤ Rivers with muddy banks with <i>Chenopodium rubri</i> p.p. and <i>Bidenton</i> p.p. vegetation [3270]</p> <p>➤ Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0]</p>	<p>Detailed conservation objectives for this site (Version 1, Sept 2016) were reviewed as part of the assessment and are available at www.npws.ie</p>	<p>There is no potential for, and there have been no, direct effects as the development is located entirely outside and approximately 7.4km distant from the designated site, as no pathway for such effects exists.</p> <p>This cSAC is located hydrologically downstream of the development via the River Toon which flows through the</p>

Designated Sites and distance from development	Qualifying Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 17/06/2020)	Conservation Objectives	Likely Zone of Impact Determination
	<ul style="list-style-type: none"> ➤ Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, <i>Alnion incanae</i>, <i>Salicion albae</i>) [91E0] ➤ <i>Lutra lutra</i> (Otter) [1355] 		<p>development site and via the River Lee which is located downstream of the site and grid connection route. Therefore, taking a precautionary approach, a potential pathway for indirect effects to occur or have occurred on the following aquatic QI's was identified in the form of potential deterioration of surface water quality resulting from pollution, associated with the construction and operational phases of the development:</p> <ul style="list-style-type: none"> ➤ Water courses of plain to montane levels with the <i>Ranunculum fluitantis</i> and Callitricho-Batrachion vegetation [3260] ➤ Rivers with muddy banks with <i>Chenopodium rubri</i> p.p. and <i>Bidention</i> p.p. vegetation [3270] ➤ Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, <i>Alnion incanae</i>, <i>Salicion albae</i>) [91E0] ➤ <i>Lutra lutra</i> (Otter) [1355] <p>This site is considered to be within the Likely Zone of Impact. As there is potential for indirect effects on certain QIs of this European site to occur or have occurred via the Toon River and River Lee in the form of deterioration of surface water quality resulting from pollution associated with the construction and operational phases of the development, it cannot be excluded, on the basis of objective information, that the Cleanrath wind farm development, individually or in combination with other plans or projects, will not have in the future and has not had in the past, a significant effect on this European site. Accordingly, a Stage Two Appropriate Assessment is required.</p>

Designated Sites and distance from development	Qualifying Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 17/06/2020)	Conservation Objectives	Likely Zone of Impact Determination
			No potential for indirect effects to have occurred was identified for the terrestrial habitat 'Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]'.
<p>Derryclogher (Knockboy) Bog cSAC (001873)</p> <p>Distance:</p> <p>15.4 km from Wind farm site</p> <p>7.4km from Grid Connection Route</p>	<p>Blanket bogs (* if active bog) [7130]</p>	<p>Detailed conservation objectives for this site (Version 1, May 2017) were reviewed as part of the assessment and are available at www.npws.ie</p>	<p>There is no potential for, and there have been no, direct effects as the development is located entirely outside and approximately 15.4km distant from the designated site, as no pathway for such effects exists.</p> <p>There is no hydrological connectivity between the development and the European Site and they are in separate surface water catchments. Given the distance from the development and the absence of hydrological connectivity, there is no potential for indirect effects on the QI's of this cSAC, as there is no impact source-pathway-receptor chain was identified. The site is not in the Likely Zone of Impact and no further assessment is required. It can be excluded, on the basis of objective information, that the Cleanrath wind farm development, individually or in combination with other plans or projects, could have in the future or have had in the past, any significant effect on this European site. Accordingly, a Stage Two Appropriate Assessment is not required.</p>
<p>Glanlough Woods cSAC (002315)</p> <p>Distance:</p> <p>18.0 km from Wind farm site</p> <p>8.5km from Grid Connection Route</p>	<p><i>Rhinolophus hipposideros</i> (Lesser Horseshoe Bat) [1303]</p>	<p>Detailed conservation objectives for this site (Version 1, September 2018) were reviewed as part of the assessment and are available at www.npws.ie</p>	<p>There is no potential for, and there have been no, direct effects as the development is located entirely outside and approximately 8.5km distant from the designated site, as no pathway for such effects exists.</p>

Designated Sites and distance from development	Qualifying Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 17/06/2020)	Conservation Objectives	Likely Zone of Impact Determination
			<p>This site is designated for lesser horseshoe bat. The development is outside the identified 2.5km foraging range for the known lesser horseshoe roosts for which the site is designated as mapped in Map 2 of the detailed conservation objectives for the site. Therefore, there is no potential for indirect impacts as a result of disturbance to occur or have occurred.</p> <p>The site is not in the Likely Zone of Impact and no further assessment is required. It can be excluded, on the basis of objective information, that the Cleanrath wind farm development, individually or in combination with other plans or projects, could have in the future or have had in the past, any significant effect on this European site. Accordingly, a Stage Two Appropriate Assessment is not required.</p>
<p>Mullaghanish Bog cSAC (001890)</p> <p>Distance: 9.1 km from Wind farm site 12.4km from Grid Connection Route</p>	<p>Blanket bogs (* if active bog) [7130]</p>	<p>Detailed conservation objectives for this site (Version 1, May 2017) were reviewed as part of the assessment and are available at www.npws.ie</p>	<p>There is no potential for, and there have been no, direct effects as the development is located entirely outside and approximately 9.1km distant from the designated site, as no pathway for such effects exists.</p> <p>There is no hydrological connectivity between the development and the European Site and they are located in separate surface water sub-catchments. Given the distance from the development and the absence of connectivity there is no potential for indirect effects on the QI's of this cSAC to occur or have occurred.</p> <p>The site is not in the Likely Zone of Impact and no further assessment is required. It can be excluded, on the basis of objective information, that the Cleanrath wind farm</p>

Designated Sites and distance from development	Qualifying Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 17/06/2020)	Conservation Objectives	Likely Zone of Impact Determination
			development, individually or in combination with other plans or projects, could have in the future or have had in the past, any significant effect on this European site. Accordingly, a Stage Two Appropriate Assessment is not required.
<p>Killarney National Park, Macgillicuddy's Reeks and Caragh River Catchment cSAC (000365)</p> <p>Distance : 11.4 km from Wind farm site</p> <p>8.3km from Grid Connection Route</p>	<ul style="list-style-type: none"> ➤ Oligotrophic waters containing very few minerals of sandy plains (<i>Littorelletalia uniflorae</i>) [3110] ➤ Oligotrophic to mesotrophic standing waters with vegetation of the <i>Littorelletea uniflorae</i> and/or <i>Isoeto-Nanojuncetea</i> [3130] ➤ Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation [3260] ➤ Northern Atlantic wet heaths with <i>Erica tetralix</i> [4010] ➤ European dry heaths [4030] ➤ Alpine and Boreal heaths [4060] ➤ <i>Juniperus communis</i> formations on heaths or calcareous grasslands [5130] ➤ Calaminarian grasslands of the <i>Violetalia calaminariae</i> [6130] ➤ <i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinion caeruleae</i>) [6410] ➤ Blanket bogs (* if active bog) [7130] ➤ Depressions on peat substrates of the <i>Rhynchosporion</i> [7150] ➤ Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0] ➤ Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>) [91E0] 	<p>Detailed conservation objectives for this site (Version 1, October 2017) were reviewed as part of the assessment and are available at www.npws.ie</p>	<p>There is no potential for, and there have been no, direct effects as the development is located entirely outside and approximately 8.3km distant from the designated site, as no pathway for such effects exists.</p> <p>There is no hydrological connectivity between the development and the European Site and it is in a separate surface water catchment from the development. Given the distance from the development and the absence of connectivity there is no potential for indirect effects on the QI's of this cSAC to occur or have occurred.</p> <p>The development is outside the 2.5km identified foraging range of the known lesser horseshoe roosts for which the site is designated as mapped in Map 10 of the detailed conservation objectives for this cSAC. Therefore there is no potential for indirect impacts as a result of disturbance to occur or have occurred.</p> <p>The site is not in the Likely Zone of Impact and no further assessment is required. It can be excluded, on the basis of objective information, that the Cleanrath wind farm development, individually or in combination with other plans or projects, could have in the future or have had in the past, any significant effect on this European site.</p>

Designated Sites and distance from development	Qualifying Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 17/06/2020)	Conservation Objectives	Likely Zone of Impact Determination
	<ul style="list-style-type: none"> > <i>Taxus baccata</i> woods of the British Isles [91J0] > <i>Geomalacus maculosus</i> (Kerry Slug) [1024] > <i>Margaritifera margaritifera</i> (Freshwater Pearl Mussel) [1029] > <i>Euphydryas aurinia</i> (Marsh Fritillary) [1065] > <i>Petromyzon marinus</i> (Sea Lamprey) [1095] > <i>Lampetra planeri</i> (Brook Lamprey) [1096] > <i>Lampetra fluviatilis</i> (River Lamprey) [1099] > <i>Salmo salar</i> (Salmon) [1106] > <i>Rhinolophus hipposideros</i> (Lesser Horseshoe Bat) [1303] > <i>Lutra lutra</i> (Otter) [1355] > <i>Trichomanes speciosum</i> (Killarney Fern) [1421] > <i>Najas flexilis</i> (Slender Naiad) [1833] > <i>Alosa fallax killarzensis</i> (Killarney Shad) [5046] 		Accordingly, a Stage Two Appropriate Assessment is not required.
<p>Bandon River cSAC (002171)</p> <p>Distance:</p> <p>9.9 km from Wind farm site 11.2km from Grid Connection Route</p>	<ul style="list-style-type: none"> > Water courses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation [3260] > Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>) [91E0] > <i>Margaritifera margaritifera</i> (Freshwater Pearl Mussel) [1029] > <i>Lampetra planeri</i> (Brook Lamprey) [1096] 	<p>This site has the generic conservation objective,</p> <p><i>'To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected.'</i></p> <p>(NPWS (2018) Generic Version 6.0)</p>	<p>There is no potential for, and there have been no, direct effects as the development is located entirely outside and approximately 9.9km distant from the designated site, as no pathway for such effects exists.</p> <p>There is no hydrological connectivity between the development and the site and they are in separate surface water catchments. No potential pathway for indirect effects on the QI's of this site to occur or have occurred was identified.</p> <p>The site is not in the Likely Zone of Impact and no further assessment is required. It can be excluded, on the basis of objective information, that the Cleanrath wind farm development, individually or in combination with other plans or projects, could have in the future or have had in the past, any significant effect on this European site.</p>

Designated Sites and distance from development	Qualifying Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 17/06/2020)	Conservation Objectives	Likely Zone of Impact Determination
			Accordingly, a Stage Two Appropriate Assessment is not required.
<p>Kilgarvan Ice House cSAC (000364)</p> <p>Distance: 16.4km from Wind farm site 7.2km from Grid Connection Route</p>	<p>➤ <i>Rhinolophus hipposideros</i> (Lesser Horseshoe Bat) [1303]</p>	<p>Detailed conservation objectives for this site (Version 1, November 2018) were reviewed as part of the assessment and are available at www.npws.ie</p>	<p>There is no potential for, and there have been no, direct effects as the development is located entirely outside and approximately 7.2km distant from the designated site, as no pathway for such effects exists.</p> <p>This site is designated for lesser horseshoe bat. The development is outside the identified 2.5km foraging range of the known lesser horseshoe roosts for which the site is designated, as mapped in Map 2 of the detailed conservation objectives for the cSAC. Therefore there is no potential for indirect impacts to occur or have occurred as a result of disturbance.</p> <p>The site is not in the Likely Zone of Impact and no further assessment is required. It can be excluded, on the basis of objective information, that the Cleanrath wind farm development, individually or in combination with other plans or projects, could have in the future or have had in the past, any significant effect on this European site. Accordingly, a Stage Two Appropriate Assessment is not required.</p>
<p>Old Domestic Building, Curraglass Wood cSAC (002041)</p> <p>Distance: 17.5km from Wind farm site 9.8km from Grid Connection Route</p>	<p>➤ <i>Rhinolophus hipposideros</i> (Lesser Horseshoe Bat) [1303]</p>	<p>Detailed conservation objectives for this site (Version 1, August 2018) were reviewed as part of the assessment and are available at www.npws.ie</p>	<p>There is no potential for, and there have been no, direct effects as the development is located entirely outside and approximately 9.8km distant from the designated site, as no pathway for such effects exists.</p> <p>This site is designated for lesser horseshoe bat. The development is outside the identified 2.5km foraging range of the known lesser horseshoe roosts for which the site is</p>

Designated Sites and distance from development	Qualifying Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 17/06/2020)	Conservation Objectives	Likely Zone of Impact Determination
			<p>designated, as mapped in Map 2 of the detailed conservation objectives for the cSAC. Therefore there is no potential for indirect impacts to occur or have occurred as a result of disturbance.</p> <p>The site is not in the Likely Zone of Impact and no further assessment is required. It can be excluded, on the basis of objective information, that the Cleanrath wind farm development, individually or in combination with other plans or projects, could have in the future or have had in the past, any significant effect on this European site. Accordingly, a Stage Two Appropriate Assessment is not required.</p>
Natural Heritage Areas (NHAs)			
<p>Sillahertane Bog NHA (001882)</p> <p>Distance:</p> <p>7.3km from Development Site</p> <p>0km from Grid Connection Route</p>	<p>➤ N/A</p>	<p>➤ NA</p>	<p>The westernmost section of the grid connection route traverses the southern section of this NHA. The grid connection is located within an existing track. However, following the precautionary principle, a potential pathway for direct effects to occur or have occurred as a result of disturbance and/or temporary loss of habitat was identified.</p> <p>This site is considered to be within the Likely Zone of Impact.</p>
<p>Conigar Bog NHA (002386)</p> <p>Distance:</p>	<p>➤ N/A</p>	<p>➤ NA</p>	<p>The study area including the grid connection route is located entirely outside these designated sites and no potential for direct effects to have occurred exists. There</p>

Designated Sites and distance from development	Qualifying Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 17/06/2020	Conservation Objectives	Likely Zone of Impact Determination
12.4km from Development Site 5.9km from Grid Connection Route			can be no direct effects into the future as no pathway for such effects exists. There is no surface water connectivity between the development site and these NHAs and the NHAs are located in a separate surface water catchment than the development. No other pathway for effect was identified. Therefore, there is no potential for indirect impacts to occur or have occurred on these sites and no requirement for further assessment was identified.
Slaheny River Bog NHA (000383) Distance: 16.3km from Development Site 6.9km from Grid Conneciton Route	> N/A	> N/A	
Doughill Bog NHA (001948) Distance: 20.6km from Development Site 11.1km from Grid Connection Route	> N/A	> N/A	
Proposed Natural Heritage Area (pNHA)			
Prohus Wood pNHA (001248) Distance:	> N/A	> N/A	The study area including the grid connection route is located entirely outside this designated site and no potential for direct effects to have occurred exists . There

Designated Sites and distance from development	Qualifying Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 17/06/2020)	Conservation Objectives	Likely Zone of Impact Determination
<p>5.1km from Development Site</p> <p>8.5km from Grid Connection Route</p>			<p>can be no direct effects into the future as no pathway for such effects exists.</p> <p>There is no connectivity between the development and this woodland site. No potential pathway for indirect effects was identified. Therefore there is no potential for indirect impacts to occur or have occurred on this site and no requirement for further assessment was identified.</p>
<p>Lough Allua pNHA (001065)</p> <p>Distance:</p> <p>2.0km by land & 2.4km via surface water from Development Site</p> <p>1.6km from Grid Connection Route</p>	<p>➤ N/A</p>	<p>➤ N/A</p>	<p>The study area including the grid connection route is located entirely outside this designated site and no potential for direct effects to have occurred exists. There can be no direct effects into the future as no pathway for such effects exists.</p> <p>This site is located hydrologically downstream of the development. Therefore, taking a precautionary approach, a potential pathway for indirect effects on the pNHA, in the form of deterioration of surface water quality resulting from pollution associated with the construction and operational phases of the development was identified.</p> <p>This site is considered to be within the Likely Zone of Impact.</p>
<p>Ballagh Bog pNHA (001886)</p> <p>Distance:</p> <p>10.4km from Development Site</p>	<p>➤ N/A</p>	<p>➤ N/A</p>	<p>The study area including the grid connection route is located entirely outside these designated sites and no potential for direct effects to have occurred exists. There</p>

Designated Sites and distance from development	Qualifying Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 17/06/2020)	Conservation Objectives	Likely Zone of Impact Determination
2.0km from Grid Connection Route			can be no direct effects into the future as no pathway for such effects exists.
Gouganebarra Lake pNHA (001057) Distance: 10.3km from Development Site 3.2km from Grid Connection Route	> N/A	> N/A	There is no surface water connectivity between the development site and these pNHAs. No other pathway for effect was identified. Therefore there is no potential for indirect impacts to occur or have occurred on these sites and no requirement for further assessment was identified.
St. Gobnet's Wood pNHA (000106) Distance: 4.7km from Development Site 7.5km from Grid Connection Route	> N/A	> N/A	
The Gearagh pNHA (000108) Distance: 7.4km by land & 9.4km via surface water from Development Site 9.7km from Grid Connection Route	> N/A	> N/A	The study area including the grid connection route is located entirely outside this designated site and no potential for direct effects to have occurred exists . There can be no direct effects into the future as no pathway for such effects exists. This site is located hydrologically downstream of the development via the River Toon and River Lee. Therefore, taking a precautionary approach, a potential pathway for indirect effects on the pNHA was identified in the form of deterioration of surface water quality resulting

Designated Sites and distance from development	Qualifying Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 17/06/2020)	Conservation Objectives	Likely Zone of Impact Determination
			<p>from pollution, associated with the construction and operational phases of the development.</p> <p>Consequently, the potential for significant indirect effects on this Designated Site cannot be excluded at this stage. This site is considered to be within the Likely Zone of Impact.</p>
<p>Roughy River pNHA (001376)</p> <p>Distance:</p> <p>13.9km from Development Site</p> <p>5.7km from Grid Connection Route</p>	> N/A	> N/A	<p>The study area including the grid connection route is located entirely outside these designated sites and no potential for direct effects to have occurred exists. There can be no direct effects into the future as no pathway for such effects exists.</p> <p>There is no surface water connectivity between the development site and these pNHAs and no other pathway for effect was identified. Therefore there is no potential for indirect impacts to occur or have occurred on these sites and no requirement for further assessment was identified.</p>
<p>Kilgarvin Wood pNHA (001787)</p> <p>Distance:</p> <p>16.7km from Development Site</p> <p>7.4km from Grid Connection Route</p>	> N/A	> N/A	
<p>Boylegrove Wood pNHA (001854)</p> <p>Distance:</p> <p>7.6km from Development Site</p> <p>9.8km from Grid Connection Route</p>	> N/A	> N/A	

Designated Sites and distance from development	Qualifying Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 17/06/2020)	Conservation Objectives	Likely Zone of Impact Determination
<p>Derryclogher (Knockboy) Bog pNHA (001873)</p> <p>Distance:</p> <p>15.4km from Development Site</p> <p>7.4km from Grid Connection Route</p>	<p>➤ N/A</p>	<p>➤ N/A</p>	
<p>Mullaghanish Bog pNHA (001890)</p> <p>Distance:</p> <p>9.1km from Development Site</p> <p>12.3km from Grid Connection Route</p>	<p>➤ N/A</p>	<p>➤ N/A</p>	
<p>Killarney National Park, Macgillicuddy's Reeks and Caragh River Catchment pNHA (000365)</p> <p>Distance:</p> <p>11.6km from Development Site</p> <p>8.8km from Grid Connection Route</p>	<p>➤ N/A</p>	<p>➤ N/A</p>	
<p>Kilgarvin Ice House pNHA (000364)</p>	<p>➤ N/A</p>	<p>➤ N/A</p>	

Designated Sites and distance from development	Qualifying Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 17/06/2020)	Conservation Objectives	Likely Zone of Impact Determination
Distance: 16.4km from Development Site 7.2km from Grid Connection Route			
Old Domestic Building, Curraglass Wood pNHA (002041) Distance: 17.5km from Development Site 9.8km from Grid Connection Route	> N/A	> N/A	
Old Domestic Building, Lettir (002040) Distance: 20.1km from Development Site 10.7km from Grid Connection Route	> N/A	> N/A	
Carriganass Castle, Near Kealkill pNHA (002099) Distance: 19.1km from Development Site	> N/A	> N/A	

Designated Sites and distance from development	Qualifying Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 17/06/2020)	Conservation Objectives	Likely Zone of Impact Determination
14.0km from Grid Connection Route			

The grid connection route runs partially within the southern section of Sillahertane Bog NHA. Therefore, despite the fact that the grid connection is located within an existing track, following the precautionary principle, the potential for direct effects on this NHA has been identified and it is considered to be within the Likely Zone of Impact. Surface water connectivity was identified between the development and Lough Allua pNHA and the Gearagh pNHA. Therefore, the potential for indirect effects on this NHA has been identified and it is considered to be within the Likely Zone of Impact. An assessment of the potential for impacts on these designated sites to occur or have occurred is provided in Section 6.10.2 below

Surface water connectivity was identified between the development and The Gearagh cSAC and The Gearagh pSPA. Impacts on these designated sites are fully considered under the European designation within the NIS. This is further described in Section 6.10.1 of this Chapter.

6.5.2.1 NPWS Article 17 Reporting

A review of the Irish Reports for Article 17 of the Habitats Directive (92/42/EEC), including the Heath, Bogs and Mires, Irish Semi-Natural Grassland Survey datasets, National Survey of Native Woodlands and Ancient and Long Established Woodland datasets were conducted on the 3rd July 2020.

Available NPWS datasets were downloaded and overlain on the development study area.

Areas of the Annex I habitats *North Atlantic Wet Heaths with Erica tetralix* (4010), *European Dry Heaths* (4030) and *Blanket Bog* (7130) were mapped outside and adjacent to the southern boundary of the development site, approximately 95m from the nearest infrastructure. *North Atlantic Wet Heaths with Erica tetralix* was also mapped approximately 400m to the north-east of the main study area. These are all outside of the development footprint.

No Annex I woodland or areas of Annex I grassland were recorded within or in close proximity to the study area. The National Survey of Native Woodlands recorded an area of Oak-birch-holly / Wet willow-alder-ash woodland approximately 1.7km to the north-east of the northernmost section of the development with the oak-birch-holly woodland (WN1) corresponding to the *Annex I habitat Old sessile oak woods with Ilex and Blechnum in the British Isles* (91AO). An area of Oak-ash-hazel woodland was mapped approximately 2.2km to the east of the development with no affinities to Annex I woodland. The Annex I habitat *Alluvial forest with Alnus glutinosa and Fraxinus excelsior (Alno-padnion, Alnion incanae, Salicion albae)* (91E0) was mapped within the Gearagh, > 7km distance by land and >9km downstream of the development.

The nearest mapped areas of Annex I grassland from the Irish Semi-Natural Grassland Survey was the Annex I habitat *Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)* (6410) areas of which were recorded at Lough Allua, >4km from the development.

6.5.3 Vascular Plants

The development site lies within four hectads (W16, W17, W26 and W27). A search was made in the New Atlas of the British & Irish Flora (Preston et al., 2002) to investigate whether any rare or unusual plant species listed under Annex II of the EU Habitats Directive, the Flora (Protection) Order (1999, as amended 2015) or in The Irish Vascular Plants Redlist (Jackson et al. 2016) had been recorded in the relevant 10km squares (hectads) in which the Cleanrath wind farm development is situated. The results of the Atlas search are provided in Table 6-4 Records of species listed under the Flora Protection Order 2015 or the Irish Vascular Plants.

Table 6-4 Records of species listed under the Flora Protection Order 2015 or the Irish Vascular Plants Red List

Common Name	Scientific Name	Hectad	Status
Killarney fern	<i>Trichomanes speciosum</i>	W16*	Annex II, IV, FPO, LC
Annual knawel	<i>Scleranthus annuus</i>	W26*	FPO, VU
Bog orchid	<i>Hammarbya paludosa</i>	W26*	FPO, NT
Corncockle	<i>Agrostemma githago</i>	-	FPO, WL
Heath cudweed	<i>Guaphalium sylvaticum</i>	W17*	FPO, En
Irish lady's tresses	<i>Spiranthes romanzoffiana</i>	-	FPO, NT
Lanceolate spleenwort	<i>Asplenium obovatum</i> subsp. <i>lanceolatum</i>	W16*	FPO, VU
Lesser centaury	<i>Centaurium pulchellum</i>	W16*	FPO, NT
Mudwort	<i>Limosella aquatica</i>	W16+, W26+	FPO, LC
Pale Dog-violet	<i>Viola lactea</i>	W26+	FPO, VU
Slender cudweed	<i>Logfia minima</i>	W17*, W27*	FPO, NT

* = Pre 1970; + = 1987 - 1999

All records from Preston et al. (2002), except for the Mudwort record from W16, which is from the BSBI maps website; <http://bsbi.org/maps/>, accessed 03/12/2015). En = Endangered, Vu = Vulnerable, Ex = Extinct, DD = Data deficient, WL = Waiting List

6.5.3.1 Bryophytes

A search of the NPWS online data map for bryophytes (NPWS, 2020) was undertaken with no protected bryophytes recorded within or adjacent to the development site.

The National Biodiversity Data Centre's database contains a number of records of threatened or protected bryophytes from the four hectads that overlap the main study area (Table 6-5).

Table 6-5 Records of Threatened or Protected Bryophytes from Hectads W16, W17, W26 and W27

Scientific Name	Hectad	Status
<i>Andreaea megistospora</i>	W16*	V
<i>Campylopus atrovirens</i> var. <i>falcatus</i>	W16	NT
<i>Campylopus subulatus</i>	W16, W26	V
<i>Fissidens monguillonii</i>	W26	
<i>Grimmia funalis</i>	W16	NT
<i>Leucobryum glaucum</i>	W16, W17*, W27	Annex II
<i>Metzgeria leptoneura</i>	W16	NT
<i>Philonotis rigida</i>	W16*	V
<i>Plagiochila atlantica</i>	W16	FPO

<i>Radula carringtonii</i>	W17*	NT
<i>Radula holtii</i>	W16	FPO, NT
<i>Schistidium platyphyllum</i>	W26	V
<i>Schistidium strictum</i>	W26*	NT
<i>Sematophyllum denissum</i>	W16	NT
<i>Sphagnum strictum</i>	W16	DD

* Pre 1980 record

6.5.4

NPWS Records

NPWS online records were searched on 1st April 2020 determine if records of any rare or protected species of flora or fauna had been recorded within the hectads (W16, W17, W26 and W27). A data request was also sent to the NPWS and data received in relation to the relevant hectads on the 30th March 2020. Table 6-6 lists the rare and protected species records obtained from the NPWS during this study.

Table 6-6 Records for rare and protected species, NPWS.

Common Name	Scientific Name	Status	Hectad
Kerry slug	<i>Geomalacus maculosus</i>	Annex II, Annex V, WA	W16, W17, W26, W27
Otter	<i>Lutra lutra</i>	Annex II, IV, WA	W16, W26
Brook lamprey	<i>Lampetra planeri</i>	Annex II	W26, W27
Freshwater pearl mussel	<i>Margaritifera margaritifera</i>	Annex II, V, WA	W16, W17, W26, W27
Common frog	<i>Rana temporaria</i>	Annex V, WA	W16, W26, W27
Irish hare	<i>Lepus timidus subsp. hibernicus</i>	Annex V, WA	W16, W17, W26, W27
Pine marten	<i>Martes martes</i>	Annex V, WA	W27
Common lizard	<i>Lacerta vivipara</i>	WA	W27
Badger	<i>Meles meles</i>	WA	W26, W27
Irish stoat	<i>Mustela erminea subsp. hibernica</i>	WA	W16, W27
Eurasian pygmy shrew	<i>Sorex minutus</i>	WA	W17
West European hedgehog	<i>Erinaceus europaeus</i>	WA	W16, W17, W27
Red deer	<i>Cervus elaphus</i>	WA	W17
Sika deer	<i>Cervus nippon</i>	WA	W16, W17, W26, W27

Common Name	Scientific Name	Status	Hectad
Common pipistrelle	<i>Pipistrellus pipistrellus</i>	Annex IV, WA	W26
Brown long-eared bat	<i>Plecotus auratus</i>	Annex IV, WA	W27
Lesser horseshoe bat	<i>Rhinolophus hipposideros</i>	Annex II, IV, WA	W16, W26, W27
Killarney fern	<i>Trichomanes speciosum</i>	Annex II, IV, FPO	W16
Lesser centaury	<i>Centaurium pulchellum</i>	FPO	W16
Small cudweed	<i>Logfia minima</i>	FPO	W17
Heath cudweed	<i>Gnaphalium sylvaticum</i>	FPO	W17
Bog Orchid	<i>Hammarbya paludosa</i>	FPO	W26
Mudwort	<i>Limosella aquatica</i>	FPO	W26
Annual knawel	<i>Scleranthus annuus</i>	FPO	W26
Pale dog-violet	<i>Viola lactea</i>	FPO	W16, W26
Hooked Plait-moss	<i>Hypnum uncinatum</i>	Red Data List (Near Threatened)	W16
Renideer moss	<i>Cladonia portentosa</i>	Annex V	W16, W26
<i>Cladonia ciliata</i> var. <i>tenuis</i>	<i>Cladonia ciliate</i> var. <i>tenuis</i>	Annex V	W16, W26
<i>Plagiochilla heterophylla</i>	Western featherwort	FPO	W16
<i>Asplenium obovatum</i> subsp. <i>lanceolatum</i>	<i>Asplenium obovatum</i> subsp. <i>lanceolatum</i>	FPO	W16

Annex II, Annex IV, Annex V - Of EU Habitats Directive, WA - Irish Wildlife Acts (1976-2017), Red Data List (Curtis and McGough 1988),

6.5.5

Freshwater Pearl Mussel (*Margaritifera margaritifera*)

The NPWS *Margaritifera* Sensitive Area map (Version 8, 2017) was consulted during the desk study. The development is located within 3 separate *Margaritifera* Sensitive Areas (catchments which are sensitive for Freshwater pearl mussel).

The majority of the Cleanrath wind farm development site including the turbine delivery route and grid connection route is located within the Lee-Toon *Margaritifera* Sensitive Area. The southern section of the site lies within the Lee Upper *Margaritifera* Sensitive Area and the northernmost section of the site (including the turbine delivery route) extends into the Lee-Sullane *Margaritifera* Sensitive Area. All three of these *Margaritifera* Sensitive Areas are categorized as catchments with extant populations. However, they are not catchments with SAC populations listed in SI. 296 of 2009.

The rare and protected species records supplied by NPWS⁸ include recent (2015-2016) records for freshwater pearl mussel from the hectads overlapping the development, see Figure 6-5, confidential⁹ Appendix 6-7 of the EIAR. There are records for freshwater pearl mussel from the Toon river, almost

⁸ Following a data request to the NPWS Scientific Data Unit

⁹ Following standard best practice, the location of breeding or resting places of protected species should be provided as a confidential appendix for review by the competent authority and not made available to the public in order to avoid potential for persecution.

5km downstream of the Main Study Area from 2005. There are also records from the Sullane river downstream of the development from 2015 (NPWS records) and from the River Lee downstream of Lough Allua from 2015. The NPWS site synopsis for the Lough Allua pNHA states that a small population of freshwater pearl mussels occurs in the braided river channel east of Inchigeelagh.

No specific information is available about the occurrence of the Freshwater Pearl Mussel in the immediate vicinity of the main study area. However, the EPA reported that it “still lives in part of the upper reaches” of the Toon River (Clabby et al., 2003). It is also reported to occur in the Toon River adjacent to the Irish Wildlife Trust’s Port Bán reserve, which is around 2 km downstream from the main study area (www.iwt.ie/what-wedo/reserves).

6.5.6

National Biodiversity Data Centre (NBDC) Records

The National Biodiversity Data centre database was accessed on 02/04/2020 and the following information was obtained. Table 6-7 lists the protected faunal species (excluding birds which are dealt with in Chapter 7 of this EIAR) recorded within the hectads which pertains to the current study area (W16, W17, W26 and W27). The database was also searched for records of Third Schedule non-native invasive species within the hectad. Table 6-7 lists the non-native invasive species recorded within the hectad.

Table 6-7 NBDC records for protected fauna records (excl. birds).

Common Name	Scientific Name	Status	Hectad
Common frog	<i>Rana temporaria</i>	HD Annex V, WA	W16, W17, W27
Smooth newt	<i>Lissotriton vulgaris</i>	WA	W26, W27
Freshwater pearl mussel	<i>Margaritifera margaritifera</i>	HD Annex II, WA	W16, W26, W27
Kerry slug	<i>Geomalacus maculosus</i>	HD Annex II, IV, WA	W16, W17, W26, W27
Common lizard	<i>Zootoca vivipara</i>	WA	W27
Daubenton’s bat	<i>Myotis daubentonii</i>	HD Annex IV, WA	W16, W17, W27
Lesser noctule	<i>Nyctalus leisleri</i>	HD Annex IV, WA	W16, W17, W26, W27
Common pipistrelle	<i>Pipistrelle (Pipistrellus sensu lato)</i>	HD Annex IV, WA	W16, W17, W26, W27
Soprano pipistrelle	<i>Pipistrellus pygmaeus</i>	HD Annex IV, WA	W16, W17, W26, W27
Nathusius’s pipistrelle	<i>Pipistrellus nathusii</i>	HD Annex IV, WA	W17
Brown long-eared bat	<i>Plecotus auritus</i>	HD Annex IV, WA	W17, W26, W27
Natterer’s bat	<i>Myotis nattereri</i>	Annex IV, WA	W27
Lesser horseshoe bat	<i>Rhinolophus hipposideros</i>	HD Annex II, IV, WA	W16, W17, W26, W27
Otter	<i>Lutra</i>	HD Annex II, IV, WA	W16, W17, W26, W27
Pine marten	<i>Martes martes</i>	HD Annex V, WA	W27
Badger	<i>Meles meles</i>	WA	W16, W17, W26, W27

Common Name	Scientific Name	Status	Hectad
Eurasian pygmy shrew	<i>Sorex minutus</i>	WA	W16, W17, W26
Sika deer	<i>Cervus nippon</i>	WA	W16, W17, W26, W27
Red deer	<i>Cervus nippon</i>	WA	W17, W27
Red squirrel	<i>Sciurus vulgaris</i>	WA	W16, W17, W26, W27
Irish hare	<i>Lepus timidus</i>	WA	W17
Hedgehog	<i>Erinaceus europaeus</i>	WA	W17, W26, W27
Marsh fritillary	<i>Euphydryas aurinia</i>	HD Annex II	W17
Western featherwort	<i>Plagiochila atlantica</i>	FPO	W16
Large white moss	<i>Leucobryum glaucum</i>	HD Annex IV	W16, W17
Fir clubmoss	<i>Huperzia selago</i>	HD Annex V	W17

Annex II, Annex IV, Annex V - Of EU Habitats Directive, WA - Irish Wildlife Acts (1976-2017).

6.5.6.1 Invasive species records

The NBDC database also contains records of invasive species identified within the relevant hectad. Records of 'high impact' invasive species for hectads W16, W17, W26 and W27 are provided in Table 6-8.

Table 6-8 NBDC records for Invasive species.

Common Name	Scientific Name	Hectad
Japanese knotweed	<i>Fallopia japonica</i>	W16, W17
Himalayan knotweed	<i>Persicaria wallichii</i>	W16, W17, W26, W27
Giant knotweed	<i>Fallopia sachalinensis</i>	W27
Rhododendron	<i>Rhododendron ponticum</i>	W16, W17
Himalayan balsam	<i>Impatiens glandulifera</i>	W16, W26, W27
New Zealand pygmyweed	<i>Crassula helmsii</i>	W16
Nuttall's Waterweed	<i>Elodea nuttalli</i>	W17
Canada waterweed	<i>Elodea canadensis</i>	W26
American mink	<i>Mustela vison</i>	W26, W27
Brown rat	<i>Rattus norvegicus</i>	W27
Roach	<i>Rutilus rutilus</i>	W16

6.5.6.2 Bat Records

The National Bat Database of Ireland was consulted for records of bat activity and roosts within the development site and surrounding area. A data request for bat records within a 10km radius of the development site (IG Ref: W20520 69583) was submitted to Bat Conservation Ireland and search results received on 21/04/2020). Details of the search results are provided in Table 6-9 below. The search yielded 27 no. records for roosts within a 10km radius of the development. A number transect (n=5) and ad-hoc observations (n=3) have also been recorded from within 10km of the project. Eight of Ireland's nine resident bat species were recorded within 10 km of the development including common and soprano pipistrelle, brown long-eared bat, Leisler's bat, Daubenton's bat, Natterer's bat, whiskered bat and lesser horseshoe bat as well as several records of unidentified bats.

Table 6-9 Bat records from within 10km of the development site

Type	Grid Ref	Results	Designation
Roost	W1567	<i>Pipistrellus</i> spp.	Annex IV
	W3074	<i>Plecotus auritus</i>	Annex IV
	W2873	<i>Myotis nattereri</i> ; <i>Nyctalus leisleri</i> ; <i>Pipistrellus</i> spp.	Annex IV
	W2366	<i>Myotis daubentonii</i> ; <i>Plecotus auritus</i>	Annex IV
	W2579	<i>Pipistrellus</i> spp.	Annex IV
	W2677	<i>Plecotus auritus</i>	Annex IV
	W2976	<i>Plecotus auritus</i>	Annex IV
	W2865	<i>Pipistrellus</i> spp.	Annex IV
	W2876	<i>Plecotus auritus</i>	Annex IV
	W2477	<i>Plecotus auritus</i>	Annex IV
	W2074	<i>Pipistrellus</i> spp.	Annex IV
	W2575	<i>Pipistrellus pipistrellus</i>	Annex IV
	W1165	<i>Pipistrellus</i> spp.	Annex IV
	W2176	<i>Pipistrellus</i> spp.	Annex IV
	W1175	<i>Pipistrellus</i> spp.	Annex IV
	W2369	<i>Plecotus auritus</i> ; <i>Rhinolophus hipposideros</i>	Annex II, Annex IV
	W1874	<i>Pipistrellus</i> spp. <i>Plecotus auritus</i>	Annex IV
	W2876	<i>Plecotus auritus</i>	Annex IV
	W2875	<i>Plecotus auritus</i>	Annex IV
	W3072	<i>Nyctalus leisleri</i> ; <i>Plecotus auritus</i>	Annex IV
	W2976	<i>Plecotus auritus</i>	Annex IV
	W2776	<i>Plecotus auritus</i>	Annex IV
	W3074	<i>Plecotus auritus</i>	Annex IV
	W2975	<i>Pipistrellus</i> spp.	Annex IV
	W3069	<i>Rhinolophus hipposideros</i>	Annex II, Annex IV
	W2369	<i>Rhinolophus hipposideros</i>	Annex II, Annex IV
	W1976	<i>Plecotus auritus</i>	Annex IV
Transects	W2963673766	<i>Myotis daubentonii</i> ; Unidentified bat	Annex IV
	W2955867786	<i>Myotis daubentonii</i> ; <i>Nyctalus leisleri</i> ; Unidentified bat	Annex IV
	W3033872856	<i>Myotis daubentonii</i> ; Unidentified bat	Annex IV
	W3033872856	<i>Myotis daubentonii</i> ; Unidentified bat	Annex IV
	W3045972955	<i>Myotis daubentonii</i>	Annex IV
Ad-Hoc	W1900076000	<i>Myotis mystacinus/brandtii</i> ; <i>Nyctalus leisleri</i> ; <i>Pipistrellus pipistrellus</i> ; <i>Pipistrellus pygmaeus</i> ; <i>Plecotus auritus</i> ; <i>Rhinolophus hipposideros</i>	Annex II, Annex IV
	W2000077000	<i>Myotis daubentonii</i> ; <i>Myotis mystacinus/brandtii</i> ; <i>Myotis nattereri</i> ; <i>Nyctalus leisleri</i> ; <i>Pipistrellus pipistrellus</i> ; <i>Pipistrellus pygmaeus</i> ; <i>Plecotus auritus</i> ; <i>Rhinolophus hipposideros</i>	Annex II, Annex IV
	W2010077800	<i>Myotis daubentonii</i> ; <i>Myotis mystacinus/brandtii</i> ; <i>Myotis nattereri</i> ; <i>Nyctalus leisleri</i> ; <i>Pipistrellus pipistrellus</i> ; <i>Pipistrellus pygmaeus</i> ; <i>Plecotus auritus</i>	Annex IV

6.5.7

Baseline Hydrology

Regionally, the wind farm development site and the majority of the grid connection route is located in the Lee, Cork Harbour and Youghal Bay surface water catchment. The westernmost extent of the grid

connection route is located in the Roughy catchment. A regional hydrology map is shown in Figure 9-1, Chapter 9 'Water' of this EIA.

On a more local scale, the majority of the site is located in the Lee (Cork) sub-catchment (Lee[Cork]_SC_020). The Toon River is located to the north of the development site and flows in a south-easterly direction. The site access track crosses the Toon River. A number of smaller watercourses originate within the development site, including the Doire an Aonaigh, Cluain Tí Cairtigh and Claonráth Thuaidh, all of which flow north into the Toon River. The Ré na Ndoirí and Lack rivers flow in a southerly direction from the outside the northern boundary of the site into the Toon River along the site's northern boundary. The Silvergrove river originates within the site and flows in an easterly direction through the site towards the Toon River to the east. The Gearagh cSAC and pSPA are located >9km downstream of the site on the Toon River and the Toon enters the River Lee approximately 11km downstream of the site before flows into Cork Harbour.

The westernmost section of the site and the start (easternmost end) of the Grid Connection Route are located in the Lee[Cork]_SC_010 sub-catchment. The Graigue River originates close to the southern boundary of the Main Study Area and flows in a southerly direction before discharging to Lough Allua approximately 2.9km from the site. A local hydrology map is shown in Figure 9-2, Chapter 9 of this EIA.

The northernmost section of the site is located in the Sullane_SC_010 sub-catchment. The Cloch Eighneach originates approximately 430m from the northernmost section of the site and discharges to the Sullane Beg approximately 1.2km downstream. The Sullane Beg discharges to the Sullane river which eventually discharges to the River Lee.

6.5.7.1 EPA Water Quality Data

The EPA web-mapper (<https://gis.epa.ie/EPAMaps/>) was consulted on the 02/04/2020 to provide data regarding the water quality and status of waterbodies that are located within and downstream of the site of the development.

The wind farm development site is situated within the WFD catchment 19: Lee, Cork Harbour and Youghal Bay catchment.

The WFD River Waterbody Status 2013 - 2018 for the watercourses which flow through and around the site have been assessed in Table 6-10.

Table 6-10 EPA Water Quality Status and Risk Scores for Watercourses within and Adjacent to the Development Site

Name	Location	Status	Not at Risk
Toon River	Flows in a south-easterly direction through the northern section of the site	Good	Not at Risk
Lack	Flows in a south-easterly direction through the northern section of the site	Good	Not at Risk
Cluain Tí Cairtigh	Flows north into the Toon River	Good	Not at Risk
Doire An Aonaigh	Flows north into the Toon River	Good	Not at Risk
Ré na nDoirí	Flows south into the Toon River	Good	Not at Risk
Claonráth Thuaidh	Flows south into Toon River	Good	Not at Risk
Silvergrove	Flows east adjacent to the southern section of the site	Good	Not at Risk
Graigue	Flows south adjacent to the southern section of the site	Good	Not at Risk

Name	Location	Status	Not at Risk
Cloch Eidlneach	Flows in a north easterly direction close to the northernmost section of the site	Good	Not at Risk

The Biotic Index of Water Quality (BIWQ) was developed in Ireland by the Environmental Protection Agency (EPA). Q-values are assigned using a combination of habitat characteristics and structure of the macro-invertebrate community within the waterbody. Individual macro-invertebrate families are classified according to their sensitivity to organic pollution and the Q-value is assessed based primarily on their relative abundance within a sample.

Table 6-11 illustrates the respective Q-value status results from monitoring stations located along rivers which flow through the site (as is the case with the Toon River) or along rivers which are fed directly by watercourses which flow through or around the site (in the case of the Sullane River, for example).

Table 6-11 Q-value Results from Monitoring Stations on Rivers which Drain the Site

Name	Location	Status	Risk
Toon - Br NE of Cleanrath North	E122449, N70396	4 (Good)	2005
Toon - Second Br u/s Lee R confl	E126067, N69249	4-5 (High)	2017
Sullane - Sullane Br	E126046, N74088.	4-5 (High)	2019

6.5.8

Inland Fisheries Ireland (IFI)

The Inland Fisheries Ireland (IFI) online database was reviewed for records of fish species of conservation concern. Whilst data was unavailable for the Toon River or areas downstream in the Lee catchment, The Cloch Eidlneach stream located to the east (>700m) of the northern section of the site flows into the Sullane River. The Sullane River (upstream of its confluence with the Cloch Eidlneach Stream) was surveyed in 2014 for Water Framework Directive (WFD) fish stock assessments. The Sullane was found to support brown trout, salmon, minnow, stone loach and three-spined stickleback. It was given a species richness grade of 5.

6.5.9

Marsh Fritillary (*Euphydryas aurinia*)

The closest NBDC records for the Annex II butterfly species marsh fritillary are located in the hectad (W17). The species was recorded from a site approximately 5 km to the north-west of the development site in 2015 (Butterflies of Ireland dataset, held by the National Biodiversity Data Centre, www.biodiversityireland.ie, 20/06/2015).

6.5.10

Conclusions of the Desk Study

The desk study revealed that the site of the development is located within an area that is dominated by upland peatland and forestry habitats. There is one site designated for nature conservation located within the development footprint, i.e. Sillahertane Bog NHA. This is located along a small linear section of the western end of the grid connection route and the grid connection is located within an existing track.

Surface water connectivity was identified between the development and The Gearagh cSAC and The Gearagh pSPA. Impacts on these designated sites are fully considered under the European designation within the NIS. The Gearagh pNHA and Lough Allua pNHA are also both located hydrologically downstream of the development and impacts on these sites are also considered in this assessment.

The desk study identified that a variety of protected faunal species are known to occur within the general area, including bats, marsh fritillary, otter, freshwater pearl mussel, badger and red squirrel. The mammal

species recorded during the desk study informed the survey methodologies undertaken during the site visits.

The desk study also provided useful information to inform the ecological surveys undertaken on site as well as the identification of pathways for potential impact on sensitive ecological receptors.

6.6 Field Study Results

6.6.1 Habitats Present on the Site and Surrounding Area

General habitat surveys of the development site and grid connection route were undertaken in 2010, 2011 and 2015 by Dixon.Brosnan Environmental Consultants and MKO ecologists. Further habitat surveys were undertaken during the construction of the wind farm between 2018 and 2019. Surveys were also undertaken following construction in May 2020. These were undertaken to verify, ground truth and update, where necessary, the findings of the previous surveys. They also provide up to date information with regard to the current condition of the habitats on the site following construction of the wind farm.

Habitats within the study area were classified according to the guidelines set out in '*A Guide to Habitats in Ireland*' (Fositt, 2000), as described above in Section 6.4.3.1.

6.6.1.1 Habitats within the Wind Farm Site

The wind farm site (excluding the grid connection route) is located in an area that is dominated by upland coniferous forestry and a mosaic of exposed siliceous rock and degraded peatland habitats. The northern section of the wind farm site consists predominantly of conifer plantation (WD4) with a range of other associated habitats located within the plantation. The southern half of the wind farm site consists predominantly of a mosaic of peatland habitats including Wet Heath (HH3), Exposed siliceous rock (ER1), Dry Heath (HH1) and small areas of Upland blanket bog (PB2), where deeper peat occurs between bands of rock. In addition, a number of small areas of conifer plantation (WD4) and agricultural grassland occur in this area. The following text provides a description of the habitats on the site prior to the construction of the wind farm as described in surveys that were undertaken from 2015 and throughout the pre-commencement and construction phase up to 2019. This is followed by a description of the habitats surrounding the constructed wind farm and a verification and ground truthing of the 2015 habitat surveys. A habitat map of the site, with the infrastructure footprint overlain, is provided in Figure 6-6.

The habitats recorded within the development site during the May 2020 surveys are described below. Detailed botanical data from relevés recorded in peatland habitats during the 2020 surveys are provided in Appendix 6-1 of this EIAR.

The habitats within the study area include several habitat mosaics where the habitat patterns were too complex to map the individual habitats separately. The peatland mosaics comprised mainly Wet Heath (HH3), Exposed Siliceous Rock (ER1), Upland Blanket Bog (PB2) and Acid Flush (PF2) (Within these mosaics wet heath was the dominant habitat, while exposed siliceous rock while widespread, occupied only a small portion of the overall area. Dry Siliceous Heath (HH1) was only found occasionally within the mosaic and was associated with the Exposed Siliceous Rock (ER1). Other peatland habitats including Cutover Bog (PB4) and small areas of Lowland Blanket Bog (PB3). The Conifer Plantation is mapped as a single habitat but in reality, included several ancillary habitats such as small areas of Mixed Broadleaved Woodland (WD1), Immature Woodland (WS2), Scrub (WS1), and Dry Meadows & Grassy Verges (GS2) that form a small component of the overall conifer plantation habitat and have been mapped and evaluated as a matrix. The habitats recorded within the Habitat Survey Area during the site visits are described in the sections below.

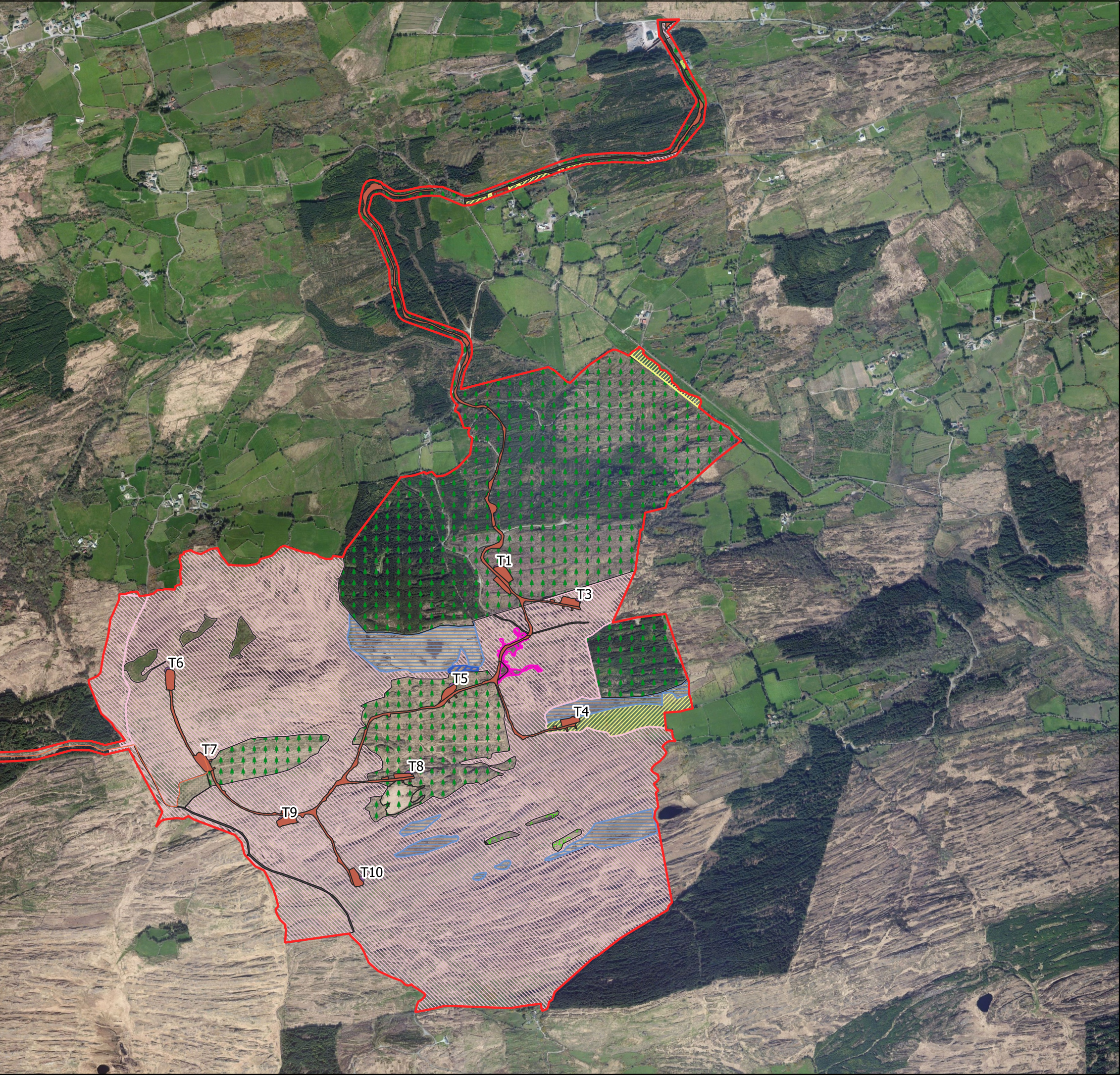
6.6.1.1.1 Peatland Habitats

Heath and peatland habitats cover approximately 63% of the development site. These habitats mainly occur in mosaics, heath (mainly HH3) on rock outcrops (ER1) and the steeper slopes, acid flush (PF2) on moderate/gentle slopes with drainage features, and blanket bog (PB) habitats on gentle slopes and

Map Legend

Habitat Legend

- Buildings and artificial surfaces (BL3)
- Improved agricultural grassland (GA1)
- Amenity grassland (improved) (GA2)
- Dry-humid acid grassland (GS3)
- Wet grassland (GS4)
- Wet Heath (HH3), Dry Heath (HH1), Exposed siliceous rock (ER1), Upland Blanket Bog (PB2) and Acid Flush (PF2) mosaic
- Lowland blanket bog (PB3)
- Cutover bog (PB4)
- Conifer plantation (WD4)
- Oak-birch-holly woodland (WN1)
- Bog woodland (WN7)
- Scrub (WS1)
- Site boundary



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Drawing Title

Habitat Map

Project Title

Cleanrath Wind Farm

Drawn By

DMN

Checked By

PR

Project No.

191223a

Drawing No.

Figure 6-6

Scale

1:16000

Date

21.07.2020



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level ground. Unvegetated areas within the rock outcrops correspond to the exposed siliceous rock (ER1) habitat. Figure 6-6 maps these peatland habitats as a mosaic. Larger areas of blanket bog occur in flatter hollows around the site and have been mapped in Figure 6-6 as discrete areas outside the peatland mosaic. These peatland habitats are all degraded to some extent by drainage, grazing, burning and/or fragmentation.

Wet Heath (HH3)

Wet heath is widespread within the development site and is particularly prominent in the southern and western sections. In many areas, the habitat is heavily grazed by sheep, as well as cattle and horses. As a result, the cover of dwarf shrubs is often very low, and well below the 25% threshold defined for this habitat by Fossitt (2007), however Perrin et al. (2014) states that “there is no minimum threshold for dwarf shrub cover” for wet heath. Purple moor-grass is abundant in this habitat, with frequent deergrass (*Trichophorum germanicum*) and occasional black bog-rush (*Schoenus nigricans*) and Sphagnum mosses. Common cottongrass (*Eriophorum angustifolium*) and hare's-tail cottongrass (*Eriophorum vaginatum*) occur in some of the wettest areas. The main dwarf shrub species are cross-leaved heath and heather (*Calluna vulgaris*) which are frequent throughout all areas of this habitat. In drier areas, and around rock outcrops, bell heather and western gorse are also often frequent. Other typical species present include carnation sedge (*Carex panicea*), common bent, green-ribbed sedge (*Carex binervis*), heath milkwort (*Polygala serpyfolia*), sheep's-fescue (*Festuca ovina*), tormentil (*Potentilla erecta*), velvet bent (*Agrostis canina*) and wavy hair-grass (*Deschampsia flexuosa*). The drier wet heath with western gorse corresponds to the *Molinia caerulea* - *Ulex galli* wet heath (HH7) community of Perrin et al. (2014). Other wet heath communities defined by Perrin et al. (2014) that may be present include the *Trichophorum germanicum* - *Cladonia* spp. - *Racomitrium lanuginosum* wet heath (WH2), the *Calluna vulgaris* - *Molinia caerulea* - *Sphagnum capillifolium* wet/damp heath (WH3), and the *Trichophorum germanicum* - *Eriophorum angustifolium* wet heath (WH4). All wet heath communities are described by Perrin et al. (2014) as corresponding to the Annex I habitat *North Atlantic wet heaths with Erica tetralix* (4010).



Plate 6-1 Example of degraded (over grazed) wet heath south of T7

Blanket Bog

Blanket bog is widespread within the development site, see Plate 6-2, but mainly occurs in small patches on level, or very gently sloping, ground, in intimate mixes with wet heath and acid flush habitat. The largest area of bog habitat occurs to the north of T5 and is a relatively intact example of active upland blanket bog on deep peat, although its margins have been affected by peat cutting, see Plate 6-3. Another sizeable area of bog habitat was recorded on the western side of Cleanrath Lough. One area of that is likely to have been bog habitat in the past is located to the south of T8 has been planted with Alder. All the blanket bog habitat examined in the vicinity of the wind farm infrastructure shows evidence of past peat cutting (sometimes probably very old). However, where the blanket bog has high *Sphagnum* cover and/or relatively intact hydrology, it has been classified as the appropriate Fossitt-type (PB2 or PB3).

The altitudinal division between upland blanket bog (PB2) and lowland blanket bog (PB3) in Fossitt (2000) is the 150 m contour, but this is only an approximate guide. All the bog habitat within the study area occurs above the 150 m contour. However, most of the bog habitat examined did not show clear characteristics of either habitat. The majority of the bog habitat surveyed has been classified as upland blanket bog, due to the altitude, and the lack of clear indicators of lowland blanket bog, but the classification is somewhat arbitrary. The upland blanket bog (PB2) occurs extensively, but mainly in small patches in the southern part of the main study area, with several small patches within the study area. These generally occur in narrow (20-40 m wide) strips on relatively shallow peat in plateaus between the rocky ridges, and often grade into acid flush. This habitat also occurs in a mosaic with wet heath around T3. *Sphagnum* mosses (*Sphagnum capillifolium* and *Sphagnum papillosum*) are frequent or abundant, while Purple Moor-grass is no more than frequent (in contrast to the wet heath and acid flush habitats, where it is often dominant or abundant). Other typical species include Bog Asphodel, Common Cottongrass (*Eriophorum angustifolium*), Deergrass (*Trichophorum sp.*), Hare's-tail Cottongrass (*Eriophorum vaginatum*), Crossleaved Heath, Heather and Lousewort (*Pedicularis sylvatica*). The lowest-lying bog habitat, in the eastern section of the main study area, was classified as lowland blanket bog (PB3). The best-developed example occurs just to the north of T4. This occurs on level ground, with some development of hummock and pool topography. It has abundant Common Cottongrass, *Sphagnum* mosses (*Sphagnum auriculatum*, *Sphagnum capillifolium*, *Sphagnum papillosum* and *Sphagnum palustre*) with frequent Bog Asphodel, Cross-leaved Heath, Deergrass, Heather, Purple Moor-grass and Cladonia lichens, and occasional Black Bog-rush and Carnation Sedge. Old peat cuttings along the southern edge of the bog hold wet pools with *Sphagnum* mosses and White Beak-sedge, and the latter also occurs in patches in wet areas on the surface of the bog. Similar bog habitat occurs to the south of T4. To the west of T4, an extensive area of bog/flush habitat occurs on gently sloping ground, with several small watercourses running through it. Purple Moor-grass is more abundant in this habitat and Black Bog-rush and Bog myrtle are frequent throughout while Bottle Sedge and Sharp-flowered Rush occur in the more flushed areas. *Sphagnum* is only locally abundant, with species indicating flushed conditions (*Sphagnum inundatum* and *Sphagnum palustre*), and Deergrass is absent. Areas of bog where the effects of peat cutting are still strongly influencing the vegetation have been mapped as cutover bog. These include areas of recently cut bog with bare peat around the edges of the large bog to the north of T5, and areas of old cutover bog with dry banks of Purple Moor-grass and Heather to the north of T4. The areas of active blanket bog correspond to the blanket bogs (* if active bog) (7130) priority Annex I habitat. No examples of the depressions on peat substrates of the Rhynchosporion (7150) Annex I habitat (which occurs as small areas within blanket bog habitats) was found, but the habitat may occur within the lowland blanket bog to the north of T4. This area is outside the construction footprint.



Plate 6-2 Example of Upland blanket bog (PB2) to the north of T5



Plate 6-3 Example of turf cutting at the margins of Upland blanket bog (PB2) to the north of T2

Acid Flush (PF2)

Acid flush habitats are widespread within the study area and are particularly prominent in the southern and south-eastern sides of the site. They occur where seepages, or small streams, flow down gentle or

moderate slopes, and often occur in intimate mosaics with bog habitats. The species composition of the acid flush habitats examined within the habitat survey area was generally similar to the bog habitats, but they were usually characterised by the presence of at least frequent sharp-flowered rush (*Juncus acutiflorus*) and occasional soft-rush (*Juncus effusus*) while purple moor-grass was usually abundant, see Plate 6-4. Other species associated with acid flush habitat included bottle sedge (*Carex rostrata*), common sedge (*Carex nigra*), star sedge (*Carex echinata*) and devil's-bit scabious (*Succisa pratensis*). In the more upland sections of the site, Black bog-rush was typically associated with this habitat, rather than the upland blanket bog habitats. Sphagnum mosses (*Sphagnum inundatum* and *Sphagnum palustre*) were frequent in some of the acid flushes. One area of acid flush, which crosses the access track to T4 and at the site of T4, was characterised by the presence of common reed (*Phragmites australis*). Another area was recorded around T9 and T10. Acid flush habitats do not correspond to any Annex I habitat types.



Plate 6-4 - Example of acid flush PF2 occurring between T9 and T10

Dry heath (HH1)

Dry heath was scarce overall within the main study area. It was recorded in the habitat survey area only on rocky outcrops in the eastern part of the site. This dry heath habitat represents a drier variant of the *Molinia caerulea*-*Ulex galli* wet heath (WH7), which is widespread elsewhere in the main study area. Dry heath habitat was dominated by bell heather (*Erica cinerea*) and western gorse (*Ulex galli*), with some common bent (*Agrostis capillaris*) and gorse (*Ulex europaeus*). Purple Moor-grass (*Molinia caerulea*) was frequent but much less abundant than in wet heath habitat, and cross-leaved heath (*Erica tetralix*) was only occasional. While cross-leaved heath and purple moor-grass are generally typical of wet heath (HH3), this habitat was classified as HH1, due to the low cover of these species compared to the dry heath elements, and the general absence of other wet heath elements. This habitat corresponds to the *Ulex galli* - *Erica cinerea* dry heath (DH1) community of Perrin et al. (2014), and also corresponds to the Annex I habitat *European dry heath* (4030).



Plate 6-5 - Example of Dry heath (HH1) occurring to the north of T10.

Exposed Siliceous Rock (ER1)

Areas of unvegetated rock outcrop are widely distributed throughout most of the open areas of the main study area, occurring in a mosaic with the wet heath, bog and acid flush habitats, see Plate 6-6 Vegetated ledges and crevices within these areas generally held elements of the surrounding wet heath vegetation. Some steep, north-facing outcrops held drier vegetation elements such as bilberry (*Vaccinium myrtillus*), blackberry (*Rubus fruticosus*), black spleenwort (*Asplenium adiantum-nigrum*), bracken (*Pteridium aquilinum*), great wood-rush (*Luzula sylvatica*) and hard-fern (*Blechnum spicant*). Fir Clubmoss (*Hypersia selago*) was also recorded from this habitat.



Plate 6-6 Example of Exposed siliceous rock (ER1) to the north of T10

6.6.1.1.2 Forestry Plantation Habitats

Extensive areas of forestry plantations occupy almost all of the northern section of the main study area, with a further three blocks distributed across the middle of the main study area. While the forestry plantation areas are dominated by conifer plantation (WD4) habitat, small areas of other habitats occur within the plantations, mainly as linear strips along forest roads and stream corridors. Figure 6-6 maps all habitats associated with the conifer plantation as a Conifer Plantation mosaic.

Conifer plantation (WD4)

Conifer plantation within the main study area is dominated by Sitka spruce (*Picea sitchensis*), with patches of Japanese larch (*Larix sp.*) and lodgepole pine (*Pinus contorta*). The conifer plantation habitat can be divided into three broad categories: pre-thicket plantations where the canopy has not closed, thicket-stage plantations with close canopy but little vertical stratification, and post-thicket plantations where the trees have grown tall enough to allow development of distinct ground layer, and (occasionally) some understorey, vegetation. The pre-thicket plantations generally have widely-spaced spruce 1-2 m tall, with well-developed ground layer vegetation between. In some areas, naturally regenerated downy birch and/or grey willow are frequent. The ground layer contains a reduced version of the pre-forestation vegetation with cross-leaved heath, purple moor-grass and heather in the peaty areas, soft-rush and sharp-flowered rush in the wetter areas, and bell heather, cross-leaved heath, heather and western gorse on rocky outcrops. In the pre-thicket plantation containing T5 and T8, some of the larger rocky outcrops have been left unplanted retaining patches of wet heath vegetation in these areas, see Plate 6-7. The thicket-stage plantations have a dense closed canopy of spruce several m tall with very little ground vegetation. However, these areas often include patches of poorly-developed forestry that retain the pre-thicket vegetation. The post-thicket plantations have a closed canopy of spruce with a ground layer dominated by bryophytes. Occasional woodland vascular plants occur, particularly close to the edges and in areas that have been thinned, including broad buckler-fern, hay-scented buckler-fern, scaly male-fern and wood-sorrel.



Plate 6-7 Example of plantation forestry (WD4) around T8 with larger rocky outcrops left unplanted. These areas retain patches of wet heath vegetation.

Small areas of broad-leaved plantation occur amongst the coniferous plantations within the habitat survey area. These include small planted sub-compartments of pre-thicket downy birch and beech, which have

been classified as immature woodland (WS2). In addition, linear strips of mature alder and downy birch occur along some of the forestry roads. These mainly appear to be planted, although it is possible that some have developed by natural regeneration. However, as they generally lack well-developed woodland structure or ground flora, they have been classified as modified broad-leaved woodland (WD1). One area within the plantation has been felled several years ago, but not replanted. This now supports an area of open grassy vegetation dominated by common bent, which currently supports dry humid-acid grassland (GS3), which is developing into scrub (WS1) habitat.

Habitats also occurring within the overall Conifer Plantation complex

Other sections of forestry roads have wide unplanted margins. In some areas these have developed into scrub (WS1) habitat, which is often dominated by grey willow. In other, more recently cleared areas, they contain a complex mixture of habitats including elements of dry humid-acid and wet grassland (GS3 and GS4), dry and wet heath (HH1 and HH3), and scrub (WS1). These sections of have been classified as open verge habitat.

6.6.1.1.3 Watercourses

The access road to the site crosses the Toon River in the northern section of the development site (on the turbine delivery route). The river is classified as eroding/upland river (FW2) habitat. The river was 3-4 m in width, with a gravel/cobble substrate. Several other watercourses, which are tributaries of the Toon River flow through the forestry plantation in the northern section of the site. These are generally very small streams with eroding/upland river (FW2) habitat with steep gradients and usually heavily shaded and lacking significant in-channel vegetation. The forestry plantations also have numerous drainage ditches, with some of these functioning as seasonal streams. A number of watercourses flow through the bog habitats in the eastern section of the main study area, ultimately feeding into Cleanrath Lough. Close to the development footprint, the watercourses are artificially created, very narrow and flow through deeply cut, or straightened channels. The steeper sections have gravelly substrates, while level sections have deep silt/peat substrates with extensive growth of Bog Pondweed (*Potamogeton polygonifolius*). The south-western section of the main study area has a number of small watercourses, often associated with areas of acid flush habitat (PF2; see above), see Plate 6-8. Within the habitat survey area, these are mainly artificial Drainage Ditches (FW4) that have been excavated to improve drainage. These watercourses usually have very steep gradients and generally lack distinct vegetation communities (although many wetland plant species occur in the associated flush habitat; see above). Many are seasonal watercourses with no flow during dry periods.



Plate 6-8 Example of small watercourse (FW2), associated with acid flush habitat to the south of T9

6.6.1.1.4 Grassland

Small areas of grassland habitat occur around the edges of the bog/heath habitat mosaic throughout the study area. On the western side of the study area, an area of improved agricultural grassland (GA1) occurs close to T7, while on the eastern side of the main study area, a low ridge of improved agricultural grassland extends into the bog habitat around T4. The open land adjacent to the forestry plantation at the northern side of the main study area is also mainly occupied by improved agricultural grassland. Other areas of grassland in the study area, but outside the development footprint have been assessed and include areas of dry humid-acid grassland (GS3) occurring in an intimate mosaic with wet heath. Such areas have not been subject to detailed mapping as no wind farm infrastructure was developed in this area and there is no potential for them to be affected.

6.6.1.1.5 Bog Woodland

Small patches of semi-natural woodland habitat occur in the heath/peatland/exposed rock matrix on the eastern side of the development site. A section of patchy woodland occurs along the access road between T5 and T3 where scrub has developed into woodland following the historic cutting and draining of the bog in the area. This has a patchy canopy of Downy Birch and Grey Willow, with areas of Gorse scrub. It is not well-differentiated from the surrounding wet heath and acid flush habitats, and lacks a well-developed woodland ground flora, but it has been classified as bog woodland (WN7). This bog woodland habitat does not correspond to the bog woodland (91D0) Annex I habitat because it lacks the required ground flora (25% Sphagnum as per 'Results of a Monitoring Survey of Bog Woodland' (NPWS, 2013). Detailed botanical surveys of this area were undertaken in May 2020 and are provided in Appendix 6-1. The results of these surveys conclusively demonstrate that this woodland/scrub area does not conform to any Annex I habitat.



Plate 6-9. Example of semi-natural woodland habitat of Downy Birch and Grey Willow occurring between T5 and T3

6.6.1.1.6 Wet Willow Alder Ash Woodland

Linear strips of riparian-influenced habitat often occur along the streams that flow through the forestry plantation. The best developed riparian habitat occurs along the Toon River in the north of the site. However, the development footprint is narrow at this location, with a single watercourse crossing occurring over the Toon River. During habitat surveys of the site, small sections of wet willow-alder-ash woodland (WN6), were found to occur in 10-20 m wide strips along the northern bank. The canopy in this habitat is formed by 4-5 m tall Grey Willows, while some Ash have been planted. There is a diverse ground layer with a good representation of wet woodland species such as Hemlock Water dropwort, Marsh-bedstraw, Marsh Ragwort, Meadowsweet, Opposite-leaved golden saxifrage and tufted hair-grass, as well as more general woodland flora such as Broad Buckler-fern, False-brome, Foxglove, Great Wood-rush, Hard-fern, Herb Robert, Primrose, Wood-sorrel and Yellow Pimpernel. These wet willow-alder-ash woodland habitats have potential to correspond to the alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, *Alnion incanae*, *Salicion albae*) (91E0) Annex I habitat. These habitats have been entirely avoided in the design of the development as all works in the vicinity of this habitat are restricted to existing tracks.

6.6.1.2 Description of the habitats associated with the Built Infrastructure

Following construction of the wind farm development, the study area was reassessed in May 2020. The following subsections provide a description of the habitats occurring adjacent to the 'as built' habitats on site. Detailed botanical survey data is provided in Appendix 6-1 of this EIAR. In addition to the habitats occurring adjacent to the 'as built' development footprint, the main infrastructure elements are also described below.

6.6.1.2.1 Description of the 'as built' infrastructure

The constructed development footprint comprises mainly of Buildings and artificial surfaces (BL3) as the turbine hardstands, foundations, access roads and blade set down areas comprise of recently constructed infrastructure.

In some areas, the lands surrounding the constructed development have been temporarily disturbed and are in the early stages of post-construction restoration. These areas are classified as Recolonising Bare Ground (ED3) or where they are more bare Spoil and Bare Ground (ED2). In some areas, the disturbed ground is recolonising with typical heathland species such as tormentil, deergrass, purple moor grass and sweet vernal grass. In other areas it is still bare or, in the wetter areas, becoming colonised with rushy vegetation. Bare rock habitats have been created within the temporary disturbance area in order to recreate the habitat mosaic that surrounds the development. Plate 6-10 shows a typical area of temporarily disturbed habitat surrounding the built wind farm infrastructure. This shows the surrounding undisturbed habitat along with the reinstated and recolonising area. It also shows the inclusion of bare rock habitat in the restoration design.

Each Turbine location is described below. Turbines are numbered T1, T3, T4, T5, T6, T7, T8, T9 & T10.



Plate 6-10 Example of reinstatement of roadside verges along the site access track infrastructure classified as Buildings and artificial surfaces (BL3).



Plate 6-11 Example of Recolonising bare ground (ED3), right, and Buildings and artificial surfaces (BL3) left.

6.6.1.2.2 Turbine 1

Turbine no. 1 is located within second rotation plantation forestry (WD4) dominated by Sitka spruce (*Picea sitchensis*). As the forestry is planted on peatland, the vegetation beneath the trees is dominated by purple moor-grass (*Molinia caerulea*) with some Ling (*Calluna vulgaris*). This is shown in Plate 6-12.



Plate 6-12 Example of second rotation forestry (WD4) occurring to the west of Turbine no. 1

6.6.1.2.3 Turbine 3

Turbine 3 occurs within a mosaic of peatland habitats comprising mainly of Wet heath (HH3), with some areas of Exposed siliceous rock (ER1) occurring to the east and south and lowland blanket bog (PB2) occurring to the west. The lands immediately adjacent to the north comprise of Conifer plantation (WD4) dominated by Sitka spruce. This is shown in Plate 6-13.



Plate 6-13 Example of Wet heath (HH3) occurring to the east of T3.

6.6.1.2.4 Turbine 4

Turbine no. 4 is located within a strip of Improved agricultural grassland (GA1) that extends into peatland habitats. This is shown in Plate 6-14. An area of Lowland blanket bog (PB2) occurs to the north but is avoided by the footprint of the development. The surrounding lands to the west and south comprise of a mosaic of wet heath (HH3), Dry heath (HH1), Exposed siliceous rock (ER1) and Acid flush (PF2).



Plate 6-14 Example of improved agricultural grassland (GA1) grading into lowland blanket bog (PB2) to the north of T4

6.6.1.2.5 Turbine 5

Turbine no. 5 is located within plantation forestry (WD4) dominated by Sitka spruce (*Picea sitchensis*). As the forestry is planted on peatland, the vegetation beneath the trees is dominated by purple moor-grass (*Molinia caerulea*) with some Ling (*Calluna vulgaris*). In wetter areas, *Polytrichum commune* occurs between hummocks of purple moor-grass. This is shown in Plate 6-15.



Plate 6-15 Example of plantation forestry (WD4) in which T5 is located.

6.6.1.2.6 Turbine 6

Turbine no. 6 is located within an area of degraded Wet heath (HH3) habitat. The area is extensively grazed by sheep resulting in a low sward height in places as well as, increased occurrence of purple moor grass and other grass species and stunted heathers. Where grazing has been more intensive further to the south, nearer the local road, this habitat grades into a mosaic with Dry-humid acid grassland (GS3) The elevated lands to the north of the turbine comprise a mosaic of Wet heath, dry siliceous heath (HH1) and Exposed siliceous rock (ER1). This is shown in Plate 6-16.



Plate 6-16 Example of degraded Wet heath (HH3) habitat occurring to the south of Turbine no. 6.

6.6.1.2.7 Turbine 7

Turbine no. 7 is located within an area of degraded Wet heath (HH3) habitat. The area has been subject to burning, with the majority of the established gorse now showing signs of regeneration, post burning. In addition, the area is extensively grazed by sheep resulting in a low sward height in places. Purple moor-grass is becoming more abundant due to burning and sheep grazing and the heather species comprised largely of young plants. This is shown in Plate 6-17.



Plate 6-17 Example of degraded Wet heath (HH3) habitat occurring around Turbine no. 7.

6.6.1.2.8 Turbine 8

Turbine 8 is predominantly located within plantation forestry (WD4). Some Wet heath (HH3) occurs on rocky outcrop features where forestry has not been planted. This is shown in Plate 6-18.



Plate 6-18 Example of plantation forestry (WD4) in which T8 is located, including areas of Wet heath (HH3) occurring in an intimate mosaic on rocky outcrop features.

6.6.1.2.9 Turbine 9

A mosaic of peatland and acid grassland habitats occur in the area adjacent to T9. Blanket bog (PB2) occurs to the south of the turbine infrastructure with an intimate mosaic of acid flush (GS3) and Exposed siliceous rock (ER1). The area to the north of the infrastructure is located at a higher elevation as the gradient increases. This area consists of a mosaic of Wet heath (HH3) and Exposed siliceous rock (ER1). This is shown in Plate 6-19.



Plate 6-19 Blanket bog (PB2) occurring to the south of T9 with a mosaic of acid flush occurring further to the south and some Exposed siliceous rock (ER1).

6.6.1.2.10 Turbine 10

T10 occurs primarily within a mosaic of Dry siliceous heath (HH1) and Exposed siliceous rock (ER1). Stunted gorse is a common component of the vegetation where dry heath occurs on shallow peat on siliceous rock. Some areas of Wet heath (HH3) occur in the wider area where deeper peat occurs between bands of siliceous rock. This is shown in Plate 6-20



Plate 6-20 Example of Dry siliceous heath (HH1) and Exposed siliceous rock (ER1) occurring to the north of T10.

6.6.1.3 Habitats along the Grid Connection Route

The grid connection cable route comprises electricity cabling (33kV) from Turbine no. 7 within cable ducting along the permitted Operational Access/Inspection Road (PI Ref. 18/04458) southwest of Turbine no. 7 and on to the local public road until it turns onto the access track of the constructed Derragh Wind Farm development and connects to the constructed 38kV electricity substation, which is located in a forestry plantation approximately 3km west of the Cleanrath wind farm development in the townland of Rathgaskig (Plate 6-21). The grid connection is approximately c15km in length. The cabling loops back out of the Derragh Wind Farm Substation (38kV) and runs mainly within the public road corridor on to the 110kV Coomataggart substation located in the townland of Grousemount, Co. Kerry. The final 1.5km of the cable route within Co. Cork and the 2km of the cabling in Co. Kerry is located on existing private access tracks. The first section runs from the south western boundary of the wind farm site on an unbound road through a large conifer plantation (WD4), much of which has been recently clearfelled (Plate 6-22) The next section continues on public roads, which are surrounded by coniferous forestry and open agricultural land mainly occupied by improved agricultural grassland (GA1) with heath (HH) habitat on rock outcrops, and a larger area of wet heath (HH3) on the ridge south of the forestry plantation at Rathgaskig. A short section of the road is surrounded by a strip of birch-dominated oak-birch holly woodland (WN1). The roadside boundaries along this section of the route are mainly earth banks (BL2), and lack well-developed hedgerows/treelines, although there are occasional small Ash trees and conifers. In the next section, the road in which the cable is laid is surrounded by another large conifer plantation to the west of Rathgaskig.

The grid connection route then follows a series of local roads through a largely improved agricultural landscape before reaching an upland landscape at Lackabaun. The road margins comprise largely of Dry meadows and grassy verges (GS2) and Dry-humid acid grassland (GS3).

The grid connection route then follows a steep upland track from the termination of the public road to the boundary with Co. Cork and continuing until it reaches the infrastructure associated with the Grousemount Wind Farm and associated Coomatagart Substation. This track is surrounded by Acid Grassland, Bog and Heath habitats. This section of the route passes through edge of the Sillahertane Bog NHA at the Kerry border but is confined to the existing track with no encroachment onto the adjacent bog and heath habitats. The habitats along the grid connection route are provided in plates 6-23 – 6-26.

The entire grid connection is located within the curtilage of existing roads and tracks with no encroachment onto adjacent habitats. During the walkover surveys undertaken in May 2020, no signs of habitat loss or degradation were identified, with all signs of any disturbance at all located within the footprint of the existing roads.

The grid connection route crosses a number of streams between the wind farm site and the sub-station. These are in the Lee Catchment. There were no instream works undertaken as part of the construction of the grid connection and during surveys undertaken in May 2020, no evidence of any water pollution in the watercourses that were crossed was identified.



Plate 6-21. Constructed Derragh Substation - located within forestry plantation.



Plate 6-22. Example of unbound forestry (WD4) access track along the grid connection route outside the south of the site (Cal's road).



Plate 6-23. Cable laid within the road carriageway



Plate 6-24 Cable attached to side of bridge along cable route



Plate 6-25 Upgrade of mountain track at Lackabaun to facilitate cable connection



Plate 6-26. Location of grid connection in local track at edge of Sillahertane Bog NHA.

6.6.1.4 Protected Flora

No botanical species listed under the Flora (protection) Order (1999, as amended 2015), listed in the EU Habitats Directive (92/43/EEC), or listed in the Irish Red Data Books were recorded within the Main Study Area or along the Grid Connection Route. Species recorded are common in the Irish landscape. No rare and protected plant species recorded in the desk study, including those obtained from NPWS data request were recorded within the study area.

6.6.1.5 Invasive Species

During field surveys, a search for Invasive Alien Species (IAS) listed under the Third Schedule of the European Communities Regulations 2011 (S.I. 477 of 2015) was conducted. Three stands of Himalayan knotweed (*Persicaria wallichii*) and ten stands of Rhododendron (*Rhododendron ponticum*) were recorded during invasive species surveys undertaken by MKO and Fehily Timoney and Company. An Invasive Species Management Plan was prepared for the development and is included as Appendix 6-2 of the EIAR. The locations of Rhododendron recorded during the 2018 pre-construction surveys are displayed in Table 6-12 below and shown in Figures 2-1-2-3 of the *Invasive Species Management Plan*, Appendix 6-2 of the EIAR.

Table 6-12 Invasive species recorded during the 2018 survey

Species	Location	Date	Comment
Rhododendron	W 12528, 69944	13 th , 14 th , 15 th November 2018 (MKO)	Growing along Bunsheelin River bank
Rhododendron	W 11596, 70074	13 th , 14 th , 15 th November 2018 (MKO)	Growing along Bunsheelin River bank
Rhododendron	W 11606, 70066	13 th , 14 th , 15 th November 2018 (MKO)	Growing along Bunsheelin Riverbank
Rhododendron	W 11690, 70104	13 th , 14 th , 15 th November 2018 (MKO)	Growing along Bunsheelin River bank
Rhododendron	W 11710, 70109	13 th , 14 th , 15 th November 2018 (MKO)	Growing along Bunsheelin River bank
Rhododendron	W11740, 70119	13 th , 14 th , 15 th November 2018 (MKO)	Growing along Bunsheelin River bank
Rhododendron	W11750, 70133	13 th , 14 th , 15 th November 2018 (MKO)	Growing along Bunsheelin River bank
Himalayan knotweed	E120699, N071675	10 th January 2019 (MKO)	Growing in road verge at junction adjacent to stream
Himalayan knotweed	E121805, N071955	10 th January 2019 (MKO)	Growing adjacent to lay-by and along roadside

Species	Location	Date	Comment
Himalayan knotweed	E121731, N072078	10 th January 2019 (MKO)	Growing near lay-by at junction with new access road
Rhododendron	E121680, N71987	10 th January 2019 (MKO)	Plant growing adjacent to a length of road at the eastern side of the site
Rhododendron	E116935.4430, N70073.9486	Fehily, Timoney & Company	Near point where access track leading to T5 will leave existing forestry track
Rhododendron	E115744.8498, N70842.5926 to E115740.2866, N70851.0c501	Fehily, Timoney & Company	2m wide mature Rhododendron along property boundary of derelict house at wind farm entrance

6.6.2 Fauna

The ecological surveys were designed to detect the presence, or likely presence, of a range of protected species, including birds, bats, otter and badger. Potential suitable habitats were investigated for signs of animal presence. The following subsections provide a breakdown of the species recorded within the development site during the site visit and assessment.

6.6.2.1 Bats

Full details of the results of the bat surveys carried out for the Cleanrath wind farm are provided in the standalone *Bat Report*, see Appendix 6-4 of the EIAR. The below paragraphs provide a summary of the findings of the bat surveys undertaken to date.

6.6.2.1.1 Summary of 2015 survey results

Five bat species were recorded in the main study area during these surveys: Common Pipistrelle, soprano pipistrelle, Leisler's bat, brown long-eared bat and unidentified *Myotis* species. A single recording from a likely lesser horseshoe bat was also recorded (from the static detector location 1), in mature conifer plantation within the north of the study area on the 8th May 2015.

The results of the car and walked surveys show that activity was Low, with a maximum of 0-7.28 bat passes/km. A total of 30.91 km of transects were walked and 18.4 km driven over the survey period and a total of 38 bat contacts were made. This is equivalent to 0.77 bat passes/km travelled. These values are typical for upland exposed habitats. Static bat detector data recorded low activity levels. This is fully described in the standalone *Bat Report*, see Appendix 6-4 of the EIAR.

The surveys undertaken at the site in 2015 found that the site of the wind farm did not support high quality roosting habitats with few trees of high potential to support roosting bats. No evidence of bat roosting activity was recorded. Overall, the numbers of bats recorded within and around the Cleanrath site appear to be typical of upland conifer plantations with low levels of activity. The site appears to provide suitable feeding grounds for a variety of bat species; however, no suitable roosting trees or structures were found within the study area.

6.6.2.1.2 2020 bat surveys

Despite the finding of low levels of bat activity recorded during the 2015 surveys, dedicated bat surveys commenced at the constructed Cleanrath wind farm site in 2020 and are ongoing. These surveys have recorded bat activity during the period that the wind farm was operational and are continuing to monitor the wind farm whilst it is in sleep mode. The results of these surveys are provided in Appendix 6-4. Dedicated walked transects of the built infrastructure, using handheld bat detectors, are undertaken along the development footprint. These are being undertaken along with the use of ground-level static detectors, which have been deployed at each of the 9 turbines.

Roost Surveys

Following the search for roosts in 2020, no structures containing suitable bat roost features were identified within the site boundary. Trees present within the site are commercial coniferous species with Negligible - Low roosting potential.

Trees present on site comprise a mixture of mature and immature commercial coniferous species. Overall trees within the site did not provide optimal habitat for roosting bats and were assessed as having Negligible - Low roosting potential. Trees may have an increased or decreased probability of hosting roosting bats in certain circumstances i.e. Having large broadleaf trees with cavities or other damage such as rot or loose bark increased probability whereas, Conifer plantations and young trees with little - no damage have a decreased probability of hosting bats (Kelleher and Marnell, 2006).

Manual Transects

Bat activity was recorded during spring and summer surveys. As with the 2015 surveys, bat activity was low, with just 31 bat passes in total recorded across the survey area.

A total of 31 bat passes were recorded. In general, Common pipistrelle (n=29) was recorded most frequently. Smaller instances of Leisler's bat (n=1) and Myotis sp. (n=1), were also recorded. However, species composition and activity levels varied significantly between surveys. Transect survey results were calculated as bat passes per km surveyed (to account for differences in survey effort).

Ground Level Static Surveys

In total, 5,164 bat passes were recorded across spring and summer deployments. In general, Common pipistrelle (n=4197), Leisler's bat (n= 494) and Soprano pipistrelle (n=296) occurred most frequently, while instances of *Myotis* sp. (n=97), Brown long-eared bat (n=67), Nathusius' pipistrelle (n=8) and Lesser Horseshoe bat (n=5) were significantly less. Figure 4-2 presents relative species composition across all ground-level static detector surveys. This is a low level of activity in comparison to other sites surveyed.

Common pipistrelle was predominant across all detectors during the spring and summer seasons, particularly at detector 10 in the summer, where Leisler's bat activity was significantly higher than all other species (Figure 4-4). The only exception is D15 in summer, where Leisler's bat activity is slightly more abundant than Common pipistrelle.

Following the precautionary principle, bat activity levels were objectively assessed against a reference dataset using Ecobat. Common pipistrelle, Soprano pipistrelle and Leisler's bat had at least **Moderate** median bat activity during spring. Common pipistrelle median bat activity reduced to **Moderate** in summer from **Moderate to high** in the spring. Leisler's bat reduced to **Low to Moderate** in summer and Soprano pipistrelle to **Low**. Median bat activity during spring was **Low** for all other species.

Activity peaks were found to be high for Common pipistrelle throughout both seasons. Soprano pipistrelle and Leisler's bats were found to be **Moderate to high** during peak activity times in spring and summer.

Nathusius' pipistrelle was found to have moderate activity during peak activity times in spring but was not recorded during the summer season. *Myotis* sp. was **Moderate** at peak activity for spring and summer, whereas Brown long-eared bat was **Low** in spring and **Moderate to High** in summer. Lesser Horseshoe was **Low** at peak activity in both seasons.

It is noted that the results of the Ecobat assessment are highly precautionary and levels of activity recorded on the site during both manual transect and fixed point detector surveys were very low (as would be expected in upland peatland and forestry habitats).

Corpse search monitoring

Corpse searching surveys were conducted between January and July 2020. This is undertaken using both hand searching and a trained search dog to detect any potential bat fatalities. To date (27.07.2020), only one Leislers bat corpse has been found on site on the 11/06/20 at turbine 8.

6.6.2.2 Non-volant mammals

Mammal species recorded from the development site include red squirrel, pine marten, red fox, Irish hare and sika deer. Other protected mammal species that are likely to occur within the main study area include hedgehog, pygmy shrew, otter, badger and Irish stoat

Badger

No evidence of badger activity and no badger setts were recorded within the development area or along the grid connection route during the dedicated badger surveys undertaken. The majority of the main study area is on very peaty soils, with rocky outcrops, which generally do not provide significant habitat for badger setts. No signs of this species were recorded during the pre-commencement surveys undertaken in November 2018, see Appendix 6-3 of this EIAR.

Otter

No otter (*Lutra lutra*) breeding or resting sites (holts) and no potential tree roots, riverbank excavations or rock formations with the potential to support an otter holt were recorded within the development site or along the grid connection route during the dedicated otter surveys. Many of the watercourses within the survey area comprise of field drains or narrow upland streams and are too small to provide significant otter habitat. No signs of otter were recorded during dedicated kick samples undertaken both within and downstream of the site undertaken in May 2020. However, evidence of otter usage (slides and spraints) was recorded during surveys undertaken in 2018 at a number of locations. The results are presented in Table 6-13 and Table 6-14 below and in Figure 3-1 of the *Pre-Commencement Surveys Report* in Appendix 6-3 of this EIAR.

Table 6-13 Otter survey results - wind farm site

Location on Site	Grid Reference	Comment
Bridge over the River Toon	W20739, 70999	Spraint on bridge
East of Derrineaning Hill (within wind farm site and not associated with a significant watercourse)	W20998, 69552	Spraint on rock

Table 6-14 Otter survey results - watercourse crossings along grid connection route

Watercourse Number	Grid Reference	Comment
44	W 14603, 68593	Spraint on rock on the bank of the Cathair Na Cáithe River

35	W 12597, 69861	Otter slide; recorded on the banks of the Bunsheelin Rive
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Otter are likely to utilise other small watercourses within the study area and along the grid connection route for foraging and commuting.

Other mammals

Red squirrel was recorded close to the eastern section of the development site during surveys undertaken in December 2015 and red squirrel feeding signs were recorded in mature spruce plantation along the north-western access route. Red Squirrel are likely to occur within mature Sitka spruce plantation in the main study area.

A pine marten was observed on the road to the south of T8 on 21st March 2015. This species may be established in the conifer plantation habitat within the main study area. Pine marten scat was also observed on a forestry track within the north of the site in November 2018.

Irish hare was observed in the main study area during surveys undertaken in October 2010, December 2015 and March 2019 and it is likely to be widespread in open habitats within the development site.

Given the size and variety of habitats in the study area, other mammals such as pygmy shrew (*Sorex minutus*), hedgehog (*Erinaceus europaeus*) and stoat (*Mustela erminea*) are also likely to be present, at least on occasion.

6.6.2.2.2 Reptiles and Amphibians

Common frog (*Rana temporaria*) is likely to be widespread throughout the study area in wet grassland and peatland habitats as well as forestry drains. The species was confirmed breeding in wet habitats within the study area during both 2015 and 2020 surveys. Common lizard (*Zootoca vivipara*) and smooth newt (*Lissotriton vulgaris*), while not recorded during the site visits, are likely to occur within the study area in peatland and heath areas and pools within forestry areas respectively. However, the development did not result in a significant loss of suitable habitat for reptiles and amphibians. It is considered that suitable habitat is extremely widespread in the study area and beyond. No likely significant effects on these species as a result of the development are anticipated and therefore further survey/ assessment was not deemed necessary.

6.6.2.2.3 Marsh fritillary

The desk study identified records for marsh fritillary in the wider area. During the habitat surveys undertaken in December 2015, the larval food plant for marsh fritillary, devil's-bit scabious was recorded, and areas supporting the plant species were assessed for their potential suitability for marsh fritillary. During the surveys undertaken in 2018, 2019 and 2020, devils bit scabious was only recorded in the vicinity of the wind farm infrastructure from areas of acid flush habitat to the west of T4 and around T9. In both areas, the plant was locally frequent in places but never abundant. The habitats were dominated by tall uniform tall swards of rushy, flush vegetation that did not provide high quality habitat for Marsh Fritillary.

A dedicated survey of the two areas where devils bit scabious was recorded in the vicinity of the wind farm infrastructure was undertaken on the 25th September 2019. No significant marsh fritillary habitat was recorded and no larval webs were recorded. In addition, no adult marsh fritillary butterfly were recorded during any other surveys undertaken at the site.

6.6.2.2.4 Kerry Slug

Details of all Kerry slug surveys and associated results are provided in Appendix 6-6 to this EIAR. The following paragraphs provide a summary of the survey findings, including both pre-construction surveys and translocation surveys.

The site is located within the core distribution range of the Kerry slug (*Geomalacus maculosus*) in Ireland (Reich *et al.* 2012) and is situated within a larger landscape which contains significant suitable habitat for the species. As such, a Kerry slug survey was carried out on 25th August and 6th September 2011. A total of 18 Kerry Slugs were recorded from 14 of the 35 transects searched. Two Kerry Slugs were observed during the habitat surveys in December 2015, on a boulder adjacent to acid flush habitat close to T9.

Kerry slug pre-construction surveys were undertaken between November and December 2018 to inform an application for a derogation licence and to inform future survey effort. These initial surveys recorded thirteen Kerry slugs within the development footprint.

Following the issue of a derogation licence from the NPWS, for the translocations of Kerry slug from within the development footprint, additional surveys were undertaken in advance of construction between January and March 2019¹⁰. In total, 142 Kerry slugs were translocated from within the development footprint in advance of the works. The location of all Kerry slug translocation records, and subsequent release locations, is provided in Figure 3.1, Appendix 6-6 of this EIAR. Kerry slugs found on trees within the plantation forestry were translocated to similar trees in nearby suitable habitat. Kerry slugs recorded in areas of rocky outcrop/wet heath habitat were translocated to similar habitat away from the development footprint. This was undertaken as the species has differing colour/pigmentation due to the variations in the levels of exposure to sunlight/ UV radiation associated with forestry cover (O'Hanlon *et al.*, 2017¹¹).

Kerry slug were not recorded along the cable route during either the surveys undertaken in 2016 or in the pre-commencement invasive species and Kerry slug survey that was undertaken on the 10th September 2018.

6.6.2.2.5 **Watercourse Survey Results**

The small streams that flow off the site of the development, and downstream watercourses, were subject to biological evaluation and assessment through kick sampling. Full details of the results of these surveys are provided in Appendix 6-5. A map of the kick sample locations is provided in Figure 6-2.

The survey included a general habitat assessment and biological water quality assessment at every watercourse where flowing water was present within or downstream of the wind farm site and grid connection route following construction and operation of the wind farm. In none of the 11 survey stations was there any evidence to indicate that there had been any impact on water quality or any other aspect of the watercourse as a result of the construction or the operation of the wind farm and grid connection.

6.6.2.2.6 **Freshwater Pearl Mussel**

The streams within the wind farm site were assessed for their potential to support freshwater pearl mussel habitat. There were few watercourses within the wind farm site and most were small man made drains with no suitable habitat for freshwater pearl mussel. However, the Toon River and one of its tributaries (See sample stations 9 & 10 – Appendix 6-5) was identified as having potentially suitable habitat for the species at two locations where the access track to the wind farm was located, see Figure 6-2. In addition, potentially suitable habitat for the species was also recorded at two of the watercourses along the grid connection route. No freshwater pearl mussel were recorded at these locations and no evidence of the construction or operation of the wind farm having resulted in any effects on these or any of the watercourses within the wind farm site or along the grid connection route.

6.6.2.3 **Importance of Ecological Receptors**

Table 6-15 lists all identified receptors and assigns them an ecological importance in accordance with the Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA, 2009). This table

¹⁰ Under a derogation licence issued by the NPWS - 'DER-KERRY SLUG-94-Cleanrath Wind farm'

¹¹ O'Hanlon, Aidan & Feeney, Kristina & Dockery, Peter & Gormally, Michael. (2017). Quantifying phenotype-environment matching in the protected Kerry spotted slug (*Mollusca: Gastropoda*) using digital photography: Exposure to UV radiation determines cryptic colour morphs. *Frontiers in Zoology*. 14. 10.1186/s12983-017-0218-9.

also provides the rationale for this determination and identifies the habitats that are Key Ecological Receptors (KERs).

Table 6-15 Importance of Ecological Receptors

Habitat and Geographic Importance	KER Y/N	Rationale
European Sites (SACs and SPAs) International importance	Y	<p>The following European Sites are identified in the AA Screening as being within the Likely Zone of Impact and are assessed fully in the NIS that accompanies this application:</p> <ul style="list-style-type: none"> > The Gearagh cSAC. > The Gearagh pSPA <p>They are both located downstream of the site of the development and sites are identified as KERs as a potential pathway for indirect effects via surface water pollution was identified.</p>
Nationally Designated Sites (NHA/pNHA) National importance	Y	<p>Nationally Designated Sites</p> <p>The following Nationally designated site is traversed by the Grid Connection Route and has therefore been identified as being within the Likely Zone of Impact and included as a KER:</p> <ul style="list-style-type: none"> > Sillahertane Bog NHA <p>The following site is located hydrologically downstream of the development. This site is assigned as a KER as a potential pathway for indirect effects via surface water pollution was identified and it is also included as a KER.</p> <ul style="list-style-type: none"> > Lough Allua pNHA <p>The Gearagh pNHA is also located downstream of the site but is also designated as a cSAC and is included as a KER.</p>
Peatland mosaic: Wet Heath County Importance	Y	<p>The habitat is widespread within the peatland habitat mosaic on the site. However, it is mainly degraded through drainage, grazing and burning and has a low cover of positive indicator species (Perrin et al. 2014) and ericoids in many areas. Wet heath has been assigned County importance as it contains areas of the following Annex I habitat in a degraded state:</p> <ul style="list-style-type: none"> > <i>North Atlantic wet heaths with Erica tetralix [4010]</i>
Peatland mosaic: Dry Heath County Importance	Y	<p>Dry heath habitat has been evaluated as being of County Importance as it occurs as very small and fragmented areas within the peatland mosaic on the development site. Dry heath corresponds to the following Annex I habitat in a degraded and fragmented state:</p> <ul style="list-style-type: none"> > <i>European Dry heaths (4030)</i>

Habitat and Geographic Importance	KER Y/N	Rationale
Peatland mosaic: Blanket Bog County Importance	Y	Areas of blanket bog within the development site are generally small in size within the overall peatland complex. Larger areas of this habitat have been avoided in the design of the development and are unaffected. In addition, many examples of this habitat within the site are degraded and show evidence of past peat cutting. However, the habitat has been assigned County importance as it corresponds to the following Annex I habitat: ➤ <i>Blanket bogs (* if active)</i>
Peatland Mosaic: Poor fen and flush Local importance (higher value)	Y	This habitat does not conform to any Annex I habitat type. It has been assigned Local importance (higher value) on the basis that it consists of semi-natural habitats with a high biodiversity value in the local area.
Peatland Mosaic: Exposed siliceous rock Local importance (higher value)	Y	This habitat has been assigned Local importance (higher value) as it is a habitat of high biodiversity value within the overall peatland complex on the site of the development
Peatland Mosaic: Cutover Bog. Local Importance (higher value)	Y	This habitat has been assigned Local importance (higher value) as it is a habitat of high biodiversity value within the overall peatland complex on the site of the development
Oak-birch-holly woodland County importance	N	This habitat has been assigned County importance as it contains areas that may correspond to the Annex I habitat but are very small and fragmented: <i>Old sessile oak woods with Ilex and Blechnum in the British Isles (91A0)</i> However, any areas of this habitat within the study area lie outside of the construction footprint and were not impacted directly or indirectly by the development and have no potential to be affected into the future. Therefore the habitat is not included as a KER.
Non-Annex I Bog Woodland Local importance (higher value).	Y	Bog woodland within the study area has been assigned Local importance (higher value) . This is on the basis that areas consist of semi-natural habitats with a high biodiversity value in the local area but do not correspond to habitats that are listed on Annex I of the EU Habitats Directive.
Wet willow-alder-ash woodland	N	This habitat has been assigned County importance as it contains areas that may correspond to the Annex I habitat <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i>) (91E0). As the habitat occurs outside the development footprint and was not directly or indirectly impacted by the development and has

Habitat and Geographic Importance	KER Y/N	Rationale
		no potential to be affected into the future, it has not been included as a KER.
<p>Eroding Upland Rivers (FW1) (Toon river and other watercourses)</p> <p>Local Importance (Higher Value)</p>	Y	<p>The Toon River, is located downstream of the wind farm site and over which, the site access route passes, provides downstream connectivity with the Gearagh cSAC and pSPA. In addition, this watercourse includes areas that correspond to the Annex I habitat '<i>water courses of plain to montane levels with the Ranunculus fluitantis and Callitriche-Batrachion vegetation (3260)</i>'. These were recorded downstream of the wind farm site.</p> <p>Similarly, the grid connection route crosses a number of watercourses that ultimately discharge to the Gearagh cSAC and pSPA.</p> <p>In addition, a small section at the end of the grid connection discharges to the Roughty River catchment and a small section at the end of the site access route discharges to the Sullane catchment, both of which have the potential to support sensitive aquatic habitats and species downstream of the development.</p> <p>Although many of the smaller watercourses on the wind farm site are small in size and heavily modified, and no instream works were undertaken, they are conduits to waterbodies with a high biodiversity value in the local context.</p> <p>Similarly, the larger watercourses along the site access route and grid connection route also provide a conduit for effects on downstream sensitive habitats and species.</p> <p>These watercourses are therefore assigned Local importance (higher value).</p> <p>No instream works were undertaken on any upland eroding rivers during the construction and operation of the development. However, there is potential for indirect effects on this habitat in the form of pollution in various forms to occur. Therefore Eroding upland rivers (FW1) within the development are included as a KER.</p>
Habitats of Local Importance (Lower Value)	N	The following habitats that were recorded throughout the study area were highly modified from their natural state and were of low ecological significance or biodiversity value: Conifer Plantation (WD4), Wet Grassland (GS4), Recolonising Bare Ground (ED3), Spoil and Bare Ground (ED2), Scrub (WS1), Buildings and Artificial Surfaces (BL3), Dry humid-acid grassland (GS3).
Badger	N	No badger setts were identified within the development footprint or study area and no signs of badger activity were recorded. No evidence of a regularly occurring population of significance was recorded on the site during the surveys undertaken. There was no loss of resting or breeding places associated with the development. Therefore, badger has not been included as a KER.
<p>Otter</p> <p>Local Importance (Higher Value)</p>	Y	<p>No otter resting or breeding places were identified within the study area. There was no loss of resting or breeding places associated with the development.</p> <p>Whilst no otter resting or breeding places were identified, otter activity was recorded on the site of the development and it is likely that there is a regularly occurring population of local</p>

Habitat and Geographic Importance	KER Y/N	Rationale
		importance in watercourses downstream of the development site. Therefore, the species is assigned Local importance (higher value) . The construction of the development had the potential to result in indirect effects on the receptor (as a result of deterioration in habitat or disturbance during construction). The operation similarly, has the potential to result in water pollution and otter is therefore included as a KER for further assessment.
Bat species Local Importance (Higher Value)	Y	The populations of bats recorded on the site represent a regularly occurring population of species that are listed on Annex IV of the EU Habitats Directive and are therefore assigned Local importance (higher value) . The potential for direct and indirect effects on the receptor can not be excluded. Therefore, bats are included as a KER for further assessment.
Freshwater pearl mussel National importance	Y	Freshwater pearl mussel is known to occur in the Toon River and River Lee downstream of the development. The species has been assigned National importance as it is listed on Annex II of the Habitats Directive and may represent a resident or regularly occurring population assessed to be importance at the national level. According to NRA (2009) it is suggested that, in general, 1% of the national population of such species qualifies as an internationally important population. A potential pathway for indirect effects on this species via surface water pollution was identified. Freshwater pearl mussel has therefore been included as a KER.
Aquatic Fauna Local Importance (Higher Value)	Y	Whilst the majority of the streams on the wind farm site are drainage ditches or very small man made drains with peaty substrates, the access route to the site crosses the Toon River and a tributary of the same river. In addition, the rivers and streams that are located downstream of the wind farm site and along the grid connection route provide high quality habitat for a range of aquatic species including Atlantic salmon, brown trout, lamprey species
Kerry slug Local Importance (higher value)	Y	Kerry slug has therefore been assessed as an ecological receptor of Local Importance (higher value) . This assessment was made on the basis of resident or locally occurring populations of Annex II/ IV species under the EU Habitats Directive, and species protected under the Wildlife Act.
Reptiles and amphibians Local importance (higher value)	N	Reptiles and amphibians were assigned Local importance (higher value) as they are likely to represent regularly occurring populations important at the local level. The site of the development did provide some habitat for these species but it was not considered significant in the context of the overall abundance of the habitat in the wider area. Although there has been some loss of these habitats as a result of the works, the loss does not represent a significant loss of suitable habitat for reptiles and amphibians. It is considered that suitable habitat is extremely widespread in the study area and beyond. No likely significant effects on these species are

Habitat and Geographic Importance	KER Y/N	Rationale
		anticipated and therefore these species are not included as KERs.
Marsh fritillary	N	This species was not recorded on the site of the development and habitat conditions were overall not suitable for marsh fritillary comprising predominantly uniform tall swards. Therefore the species is not included as a KER.
Additional protected fauna	N	The site surveys did not identify any other protected faunal species with the potential to be significantly affected by the development at the population level

6.7 Ecological Impact Assessment

6.7.1 Do Nothing Impact

A do-nothing option to developing the Cleanrath wind farm development would have been to leave the site as it was prior to construction, with no changes made to the land-use practices of low-intensity agriculture, turf cutting and commercial forestry. This option would have no positive impact with regards to the production of renewable energy and the opportunity to offset of greenhouse gas emissions would be lost. On the basis of the positive environmental effects arising from the Cleanrath wind farm development, the do-nothing scenario was not the chosen option.

The Cleanrath wind farm development has been constructed, has been operational and is now in Sleep Mode with the site essentially in a shut-down mode with no export of electricity pending the outcome of the Substitute Consent process. In the event that Substitute Consent is obtained, the intention is to recommence and continue the full operation of the Cleanrath wind farm development until the end of 25 years from the formal commissioning of the turbines in July 2020 and implement the decommissioning plan for the Cleanrath wind farm development at the end of the operational period.

The do-nothing scenario also includes for the continuation of low intensity agriculture, peat cutting and forestry in the surrounding area.

In the event that Substitute Consent is not granted and full operation of the development is not recommenced, it will remain in Sleep Mode which is, in effect, the “do nothing” option insofar as it represents the current situation as at the date of the application for Substitute Consent. . There is the possibility that the decommissioning plan may need to be implemented early, should Substitute Consent not be granted. These scenarios are assessed in this chapter.

6.7.2 Impacts during Construction

Effects on the key ecological receptors (KERs) as defined in the preceding sections, during the construction phase of the development are fully considered in Section 6.7.2 of the rEIAR and summarised in this section of this EIAR.

In the absence of mitigation, the potential for significant effects to have occurred on the following identified KERs was identified:

6.7.2.1 Impacts on Peatland Habitats

Peatland habitat mosaic – a loss of 4.13 ha was identified along with disturbance surrounding the development footprint. This was mitigated through the development of a Habitat Restoration and Enhancement Plan, which ensures that the constructed wind farm will not result in any net loss of peatland habitats.

6.7.2.2 Impacts on Watercourses (including Aquatic Fauna)

Upland eroding rivers and sensitive aquatic faunal species – the potential for significant indirect effects in the form of deterioration of water quality resulting from pollution was identified. This was mitigated through the implementation of good construction environmental practice as set out in the CEMP and in the various chapters of the rEIA. The post construction surveys that were undertaken did not record any evidence of water pollution in any downstream watercourse and there is no potential for any significant residual effect to have occurred.

6.7.2.3 Impacts on otter

Otter – significant effects on otter in the form of habitat loss, disturbance and displacement were discounted in the assessment. However, the potential for significant indirect effects in the form of deterioration of water quality resulting from pollution was identified. This was mitigated through the implementation of good construction environmental practice as set out in the CEMP and in the various chapters of the rEIA. The post construction surveys that were undertaken did not record any evidence of water pollution in any downstream watercourse and there is no potential for any significant residual effect to have occurred.

6.7.2.4 Impact on Kerry Slug

Kerry Slug – potentially significant effects at the local level were identified in the form of disturbance and mortality. Mitigation was employed during construction to relocate slugs in advance of habitat disturbance and to recreate habitat for the species following construction. These works were undertaken under licence from the NPWS (DER/KERRY SLUG 2018-88). No significant residual impact was identified.

6.7.2.5 Conclusion

The potential for significant effects during construction, short-term operation and sleep mode operation on other KERs such as bats and bog woodland was assessed in the rEIA. However, no potential for significant effects was identified even in the absence of mitigation.

Following the implementation of mitigation, no significant residual effects on biodiversity were identified.

6.7.3 Impacts During Operation

This section of the impact assessment considers the effects that may occur during the operational period of the Cleanrath wind farm development (including the continued Sleep Mode operation and any full operation).

6.7.3.1 Impacts on Habitats during Operation

There was and will be no additional loss of any habitats associated with the operational phase of the development. There is no potential for significant effects on the peatland matrix or on the non-Annex I bog woodland to occur during the operational phase of the wind farm. Whilst these habitats were considered KERs during construction, they were not identified as KERs during any operational period.

Potential for effects on watercourses and sensitive aquatic fauna was identified and these habitats (and species) were identified as a KER during the operational phase of the wind farm.

6.7.3.1.1 **Assessment of Potential Effects on Upland Eroding Rivers (and downstream watercourses) and Sensitive Aquatic Faunal Species during Operation**

Table 6-16 Impact on upland eroding rivers, streams and Sensitive Aquatic Species during operation

Description of Effect	<p>The increased amount of hard standing associated with the wind farm infrastructure has the potential to result in faster run off of water from the site to the surrounding watercourses. This may have the indirect effect of causing erosion, which could lead to deterioration of surface water and supporting habitat quality. Additionally, there is the potential for the faster run off of any pollutants that may be associated with vehicular usage on the site.</p> <p>In addition, the felling of forestry will be undertaken to facilitate the habitat management Plan and this activity could result in the run off of pollutants from the site in the same manner as it could have during construction.</p> <p>However, following comprehensive surveys of the site and of the surrounding watercourses (as described in Appendix 6-5), no evidence of any such effect having occurred since the wind farm was constructed was recorded.</p> <p>These effects on water quality are fully described in Chapter 9 'Water' of this EIAR and are described here in relation specifically to ecology.</p> <p>Note: Whilst this impact assessment is in the habitats section, it also assesses the impact of the development on aquatic species including salmonids, lamprey, freshwater pearl mussel, European eel, aquatic invertebrates, otter and other aquatic species. The development has had no direct impact on the aquatic habitat of these species and there is no potential for disturbance. The only pathway for effect to have occurred is as a result of water pollution and this is discussed in this section in relation to habitats and species.</p>
Characterisation of unmitigated effect	<p>The potential impact on water quality during the operational phase of the development has been assessed as a permanent negative effect in the absence of mitigation. The magnitude of this impact is imperceptible as all major infrastructure is located over 50 metres from any significant watercourse (those mapped by the EPA) and the hard standing of the development is minimal when compared to the overall size of the site. No evidence of any such effect was recorded during post operational surveys in May 2020.</p>
Assessment of Significance prior to mitigation	<p>Significant effects on water quality have not been identified during the operation of the wind farm.</p>
Mitigation	<p>The mitigation measures that are fully described in Section 9.6 of Chapter 9: 'Water' and in the Operation and Environmental Management Plan have been employed during the brief period of operation and during the period of sleep mode and the same measures will be employed during any future operation. The Habitat Restoration Plan that is provided in Appendix 6-8 provides details of additional measures that will be implemented to protect water quality during the operation of the wind farm and the felling associated with the habitat restoration should it be granted permission.</p>
Residual Effect following Mitigation	<p>Following the implementation of the mitigation measures outlined above, no potential for significant effect has been identified at any geographic scale as a result of the operation of the wind farm.</p>
Potential for Cumulative Effect	<p>The operation of the Cleanrath wind farm development has not resulted, and will not result in any significant effect on watercourses or sensitive aquatic fauna. It therefore cannot contribute to any cumulative effect in this regard.</p>

6.7.3.2 **Impacts on Fauna During Operation**

The operation of the development will not result in any additional habitat loss or deterioration, nor will it result in any significant increase in anthropogenic activity on the site. The potential for impacts on aquatic

fauna including otter is described above. Otter are not identified as a separate KER during the operational phase as the only potential effect is from water pollution, and that is assessed in relation to all other aquatic habitats and species (there is no potential for significant disturbance to occur). There is no potential for loss or disturbance of Kerry slug or its habitat. The only faunal KER (with the exception of the aquatic fauna that was assessed above) was bats and these species are assessed below.

6.7.3.2.1 *Assessment of Impacts on Bats During Operation*

The impact on bat species during the operational phase is assessed in Table 6-17 below.

Table 6-17 Assessment Impacts on bats during operational phase

Description of Effect	<p>There is no potential for loss or fragmentation of foraging or roosting habitat for bat species to occur during the operation of the wind farm.</p> <p>The bat survey report that is provided in Appendix 6-4, found bat species composition and abundance to be typical of the geographic location and exposed upland and coniferous forestry dominated nature of the site.</p> <p>Despite the low levels of bat activity recorded at the site, there is potential for direct mortality and collision to occur or to have occurred and following the precautionary principle, the operational and sleep mode phases were monitored for bat activity and collisions. Details of these surveys are provided in Appendix 6-4. No evidence of any bat mortality during operation of the wind farm was recorded (though a single Leisler's Bat was recorded during a period when the wind farm was operating in Sleep Mode). This monitoring is ongoing during the current Sleep Mode phase of the development.</p>
Characterisation of unmitigated effect	<p>In the absence of mitigation, the risk of mortality during the short period that the wind farm was operational for species at high risk of collision, i.e. Leisler's and pipistrelle spp. is assessed as a Short term imperceptible negative effect given that the wind farm was operational during a period of low bat activity. Based on the results of the 2015 and 2020 bat surveys, there is potential for a long term slight impact on bats during any operational phase of the wind farm into the future.</p> <p>No negative effects as a result of mortality are expected for any other bat species which are considered to be at low risk of collision.</p>
Assessment of Significance prior to mitigation	<p>In the absence of mitigation, the risk of mortality for species at high risk of collision, i.e. soprano and common pipistrelle was not predicted to be a significant effect.</p>
Mitigation	<p>Following the precautionary principle and in accordance with the SNH (2019) guidelines, any future operation of the wind farm will be the subject of ongoing monitoring as described in Appendix 6-4. If, following monitoring, there is any uncertainty as to the impacts on bat species, mitigation will be implemented. The mitigation that could potentially be applied is described below in Section 6.11.3.</p>
Residual Effect following Mitigation	<p>No significant effects are likely to have occurred as a result of the operation of the wind farm and if, following monitoring of any future operation, mitigation is required, it will be employed to ensure that there are no significant effects on bat species.</p>
Potential for Cumulative Effect	<p>The development including the turbine delivery route and grid connection has not resulted and will not result in any significant effect with regard to bat species. It therefore cannot contribute to any cumulative effect in this regard.</p>

6.7.4 Impacts During Decommissioning

As described in Chapter 4 of this EIAR, the turbines are designed for a period of operation of 25 years at which point, they would either be replaced or decommissioned and removed. Should early removal be required, the same procedures would be followed as if decommissioning were to occur at the end of the lifespan of the turbines/development.

Decommissioning is fully described in Chapter 4 but would involve primarily the removal of the above ground elements of the turbines, with the foundations left in-situ and covered with soil (thus avoiding large scale excavations). The existing site roads would be used during decommissioning. The redundant Grid Connection cables will be pulled from their trenches without the requirement for significant excavation.

Whilst the works required to decommission the wind farm will be considerably smaller in scale than those required for construction, they will be similar in nature (though without large scale excavation or use of concrete. The impacts on biodiversity will also be similar in nature to those experienced during construction but on a far lesser scale and magnitude.

A suite of measures is in place to avoid any significant effects on biodiversity. These measures are set out throughout the EIAR and in the OEMP (Appendix 4-3) they are also set out in a dedicated Decommissioning Plan, which is provided as Appendix 4-9 to this EIAR and will be carried out in accordance with Scottish Natural Heritage report (*SNH Research and Guidance on Restoration and Decommissioning of Onshore Wind Farms (SNH, 2013)*). All prescribed measures will be employed in full during any works associated with the decommissioning of the Cleanrath wind farm development at any stage. The decommissioning phase of the development will be overseen and supervised by an ECoW to ensure that the prescribed measures are fully and correctly implemented. It can be concluded that following the implementation of preventative mitigation, there is no potential for the decommissioning of the wind farm to result in significant effects on biodiversity.

6.8 Invasive Species

As described in Section 6.6.1.5, two invasive plant species were recorded at the site of the development during the surveys that were undertaken prior to the construction of the wind farm – Himalayan Knotweed and Rhododendron. An invasive species management plan was prepared and is included as Appendix 6-2. This plan was implemented in full during the construction of the development and the management of these stands of Himalayan Knotweed and Rhododendron was supervised by the Environmental Clerk of Works (ECoW). All necessary measures to prevent the spread of these invasive species were employed and there was no potential for any significant effect to occur or have occurred in relation to the spread of these or any other invasive species.

6.9 Assessment of any Biodiversity or Ecological Gains

A Habitat Management Plan has been prepared for the development and is provided in Appendix 6-8. An area of 4.13 ha of forestry will be the subject of bog restoration on the site. This will be undertaken in accordance with the published guidelines and best practice such as the guidelines arising from the EU – LIFE/Coillte ‘Irish Blanket Bog Restoration Project’ (2002-2007), Scottish Natural Heritage (SNH)’s guidance note Planning for development: What to consider and include in Habitat Management Plans (Version 2, January 2014).

In addition, the wind farm site will be managed for the enhancement of the peatland habitats thereon through the prevention of burning, turf cutting, fertilisation and vehicular access along with the active removal of conifer trees that encroach onto the peatlands.

The area of peatland habitat that will be actively managed and restored will be larger than that which is lost to facilitate the development.

6.10 Impacts on Designated Sites

6.10.1 Impacts on European Sites

The EPA draft Guidance 2017 states:

“a biodiversity section of an EIAR, should not repeat the detailed assessment of potential effects on European sites contained in a Natura Impact Statement” but should “incorporate their key findings as available and appropriate”.

This section provides a summary of the key assessment findings with regard to Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).

The Article 6(3) Appropriate Assessment Screening report identified the potential for the development to have resulted in significant effects on the following European Sites:

- The Gearagh cSAC
- The Gearagh pSPA
- Mullaghanish to Musheramore Mountains SPA

The potential for impact on European sites has been fully assessed in the Natura Impact Statement (NIS) that has been prepared in support of the current application.

The NIS concludes as follows:

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 to occur 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 operation and decommissioning of the Cleanrath wind farm development will not adversely affect the integrity of any European sites.

Therefore, it can be objectively concluded beyond reasonable scientific doubt that the operation and decommissioning of the Cleanrath wind farm development (including all its elements: the turbine delivery route, the Derragh Substation and the grid connection route), individually or in combination with other plans or projects, will not adversely affect the integrity of any European Site.

6.10.2 Impacts on Nationally Designated Sites

Impacts on nationally designated sites including NHAs and pNHAs are considered in this section of the report.

The following Nationally designated sites have been identified as being within the likely zone of impact of the development:

- Sillahertane Bog NHA (01882)
- The Gearagh pNHA (000108)
- Lough Allua pNHA (001065)

6.10.2.1 Sillahertane Bog NHA

A section at the western end of the grid connection route passes through this designated site. However, it is located entirely within an existing track with no encroachment onto the peatlands within the NHA. The works were supervised by an ECoW and it is confirmed that all mitigation to prevent any significant effects on the surrounding peatlands within the NHA was implemented and no such effects occurred. Plate 6-27 shows the grid connection route through the NHA.



Plate 6-27. Grid Connection as it passes through Sillahertane Bog NHA

There is no potential for effects to occur during any operational or decommissioning phase of the Cleanrath wind farm development.

6.10.2.2 The Gearagh pNHA

This designated site is located 7.4 km (9.4km surface water distance) from the wind farm site and further from the grid connection route. The only identified pathway for impact on this designated site was via surface water in the Toon and Lee Rivers.

A suite of measures were in place to prevent any significant effect on surface water during the construction and operation of the wind farm and the works were supervised by an ECoW to ensure that all the measures were implemented and that no effects on watercourses occurred. In addition, water

quality and river habitat assessments were undertaken in May 2020 and no evidence of any pollution of the watercourses that flow into The Gearagh pNHA was recorded. There has been no significant effect on The Gearagh pNHA as a result of the construction of the wind farm and its operation. The measures that are in place to prevent water pollution during any future operation will be in place and are listed in the OEMP that accompanies this EIAR. Following the implementation of this mitigation, there is no potential for effects to occur during any operational or decommissioning phases of the Cleanrath wind farm development.

6.10.2.3 Lough Allua pNHA (001065)

This designated site is located at closest 1.6km from the grid connection and further from the wind farm site. The only identified pathway for impact on this designated site was via surface water in the Graigue River and other unnamed streams to the south west of the wind farm site.

A suite of measures were in place to prevent any significant effect on surface water during the construction and operation of the wind farm and the works were supervised by an ECoW to ensure that all the measures were implemented and that no effects on watercourses occurred. In addition, water quality and river habitat assessments were undertaken in May 2020 and no evidence of any pollution of the watercourses that flow into Lough Allua pNHA was recorded. There has been no significant effect on Lough Allua pNHA as a result of the construction of the wind farm and its operation. The measures that are in place to prevent water pollution during any future operation will be in place and are listed in the OEMP that accompanies this EIAR. Following the implementation of this mitigation, there is no potential for effects to occur during any operational or decommissioning phases of the Cleanrath wind farm development.

6.11 Summary of Mitigation Measures

6.11.1 Summary of Water Protection Measures

The full suite of measures that are in place to protect water quality are provided in Chapter 9 of this EIAR. The development has been designed so that all large-scale infrastructure such as turbines, site compound and borrow pit are located over 50 metres from any significant watercourses and so that water crossings that occur on access tracks etc. were minimised and where possible, use existing bridges. The OEMP, Appendix 4-3, describes the measures in place for the protection of water quality.

6.11.2 Summary of Peatland Mitigation

- Removal of brash from felled areas off-site.
- Drain blocking will be undertaken on a local scale in the immediate surroundings of felled plantation by installing dams at drainage ditches (largely remnant semi-functioning conifer forest drains) to maintain, enhance and restore the favorable baseline hydrological and ecological conditions at each site location. Drains can be dammed using peat dams.
- No additional drainage to be installed in proximity to these habitat areas during the lifetime of the development.
- The use of off road vehicles on the site will be restricted to the existing tracks.
- No application of chemical and organic fertilisers or herbicides and pesticides will be undertaken within the development footprint.

In addition, the plan also sets out measures that will enhance the existing peatlands that surround the wind farm development. These are listed below:

- Burning and dumping will not be permitted in all lands under the control of the wind farm.
- Application of artificial fertilisers within rehabilitation or enhancement areas will be prohibited in all lands under the control of the wind farm.

- The planting of forestry will not be permitted. There is currently forestry activity in the vicinity of the development and conifer seedlings are encroaching on the site on an annual basis during the lifetime of the wind farm development.
- Seedlings of coniferous or other trees or any invasive plants will be removed from this area on an annual basis during the lifetime of the wind farm development.
- Scrub species including Gorse (*Ulex europaeus*) and Bramble (*Rubus fruticosus* agg.) will be removed on an annual basis during the lifetime of the wind farm development.
- The rehabilitation area will be monitored to assess the success of the rehabilitation plan.
- Where possible, drains will be blocked to restore the natural hydrology of the blanket bog in the area.

6.11.3 Summary of Bat Mitigation

6.11.3.1.1 Buffers

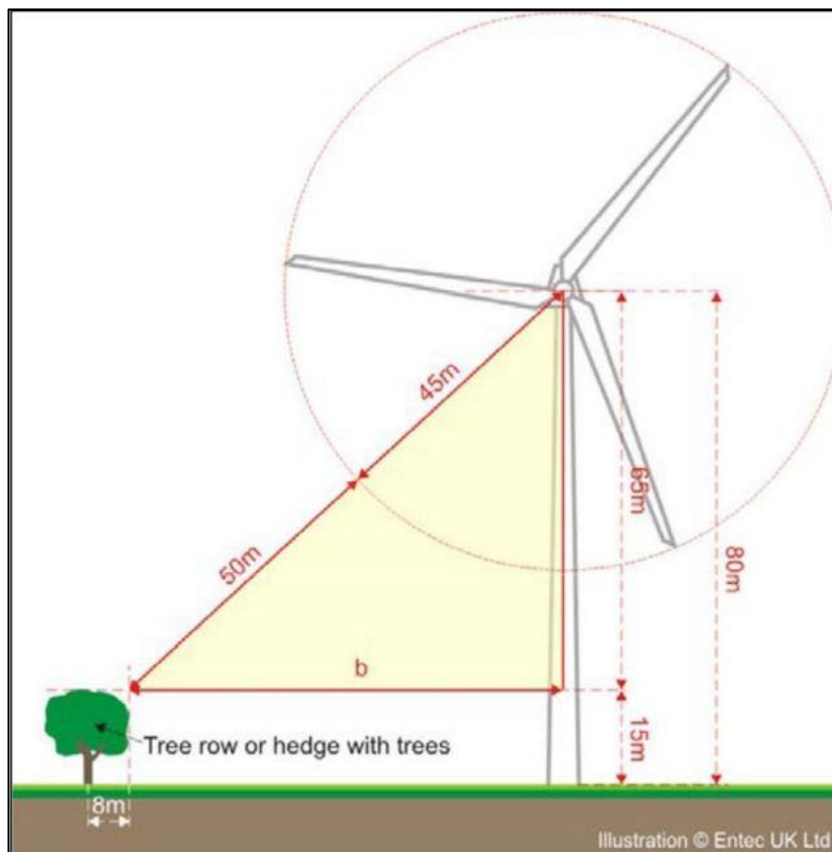
Buffers of 50 metres have been created around all turbines. Where necessary forestry has been felled in these areas to create these buffers. A 50m buffer between turbine blade tip and nearest woodland is recommended by Natural England (2014) for low risk situations i.e. not near any significant roosting or swarming sites. When measured at fixed intervals up to 50m away from treelines, bat activity was shown to decline (Verboom & Spoelstra 1999; Downs & Racey 2006).

“Forest clearing will observe a minimum buffer distance of 50m as a basic standard mitigation measure for all bat species, including all key-holed sites” (SNH, 2019). These vegetation-free areas will be maintained during the operational life of the development. In practice, the 50m buffer should be applied universally, irrespective of whether curtailment is also considered necessary. Some higher risk species, notably Leisler’s bats frequently fly high in open areas and this form of mitigation is unlikely to be effective.

To minimise the risk, such as collisions and barotrauma, to bat populations it is recommended to maintain a minimum buffer of 50m between turbine blade and habitat feature (treeline, hedges). This means the edge of the rotor-swept area needs to be at least 50m from the nearest part of the habitat feature. Measuring 50m for the base of the turbine to the habitat feature is inadequate as tall tree canopies may put bat populations at risk. 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 meters)
See example below, b = 69.3



6.11.3.1.2 **Post Construction Monitoring & Assessment of Adaptive Mitigation Requirement**

As per SNH Guidance at least 3 years of post-construction monitoring is required to assess the effects of construction related habitat modification on bat activity. For example, it may be that the construction of wind turbines significantly reduces bat activity at the site relative to that recorded pre-construction and to a level at which there is no longer potential for significant effects on bats (SNH 2019).

Current and ongoing bat monitoring being conducted on site, in the absence of operating turbines, will be utilised in conjunction with the 2015 bat survey findings. This will be used to assess bat activity patterns and to inform the design of any advanced site-specific mitigation requirements, including curtailment, to ensure that there are no significant residual effects on bat species.

Operational Year 1

Static monitoring at turbine bases shall take place at each turbine during the bat activity season (between April and October). Full spectrum recording detectors shall be utilised for the same duration as during pre-application surveys and at the same density (SNH, 2019).

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 (°C)
- Precipitation (mm/hr)

Carcass searches, to monitor and record bat fatalities, shall be conducted at each turbine. 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. The methodology used to conduct and assess carcass searches is provided in Appendix 6-4.

At the end of Year 1, and if a curtailment requirement is identified (i.e. significant bat fatalities encountered), a curtailment programme shall be devised around key activity periods and weather parameters.

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. The most basic and least sophisticated form of curtailment “blanket” curtailment -involves feathering the blades between dusk and dawn over the entire bat active period (April to October). A more sophisticated and efficient solution is to focus on certain times and dates, corresponding with those periods when the highest level of bat activity is expected to occur. Further savings can be achieved by programming the SCADA operating system to only pause/feather the blades below a specified wind speed and above a specified temperature within specified time periods.

In order to minimise down time, the threshold values at which turbines are feathered should be site specific and informed by bat activity peaks at that location, but as an indication, they are likely to be in the range of wind speeds between 5.0 and 6.5m/s and at temperatures above approximately 10 or 11°C measured at the nacelle. Significant savings can be achieved by so-called “smart” curtailment over the other less sophisticated alternatives.

The effectiveness of curtailment needs to be monitored in order to determine (a) whether it is working effectively (i.e. the level of bat mortality is incidental), 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.

Operational Years 2 & 3

Where a curtailment requirement is identified, 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/years.

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- curtailment during different periods of bat activity.

At the end of each year, the efficacy of the curtailment programme shall be reviewed, and any identified efficiencies incorporated into the curtailment programme.

6.12 Cumulative Impact Assessment

The development was considered in combination with other plans and projects in the area that could result in cumulative impacts on the Key Ecological Receptors (KERs) identified as set out in Table 6-15, including European Sites and Nationally designated sites. This included a review of online Planning Registers and served to identify past, present and future plans and projects, their activities and their predicted environmental effects. The projects considered are listed in Chapter 2: ‘Background’ of the Development.

6.12.1 Assessment of Plans

The review focused on policies and objectives that relate to biodiversity, Nationally designated sites and European Sites. Policies and objectives relating to the conservation of peatlands, sustainable land use were also reviewed, particularly where the policies relate to the preservation of surface water quality. An overview of the search results with regard to plans is provided in Table 6-18.

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

- Cork County Development Plan 2014-2020
- Kerry County Development Plan 2015-2021
- River Basin Management Plan for Ireland 2018-2021

Table 6-18 Review of Plans and Policies

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
Cork County Development Plan 2014-2020 and all relevant environmental documents and assessments associated with that plan	<p><u>Natural Heritage Policies</u></p> <p><u>HE-2-3</u></p> <p>Retain areas of local biodiversity value, ecological corridors and habitats that are features of the County's ecological network, and to protect these from inappropriate development. This includes rivers, lakes, streams and ponds, peatland and other wetland habitats, woodlands, hedgerows, tree lines, veteran trees, natural and semi-natural grasslands as well as coastal and marine habitats. It particularly includes habitats of special conservation significance in Cork as listed in Volume 2 Chapter 3 Nature Conservation Areas of the plan.</p> <p><u>HE-2-4</u></p> <p>Ensure that an appropriate level of assessment is completed in relation to wetland habitats subject to proposals which would involve drainage or reclamation. This includes lakes and ponds, watercourses, springs and swamps, marshes, heath, peatlands, some woodlands as well as some coastal and marine habitats.</p> <p><u>HE-2-4</u></p> <p>Control the spread of invasive plant and animal species within the county.</p> <p><u>GI-10-1</u></p> <p>(A) Protect and improve the County's water resources and ensure that development permitted meets the requirements of the relevant River Basin Management Plan and does not contravene the objectives of the EU Water Framework Directive.</p> <p><u>GI-10-2</u></p> <p>Protect and improve the status and quality of all surface waters throughout the County, including transitional and coastal waters</p> <p><u>NATURA 2000 Sites: Policies & Objective</u></p>	The development plan was comprehensively reviewed, with particular reference to Policies and Objectives that relate to the Natura 2000 network and other natural heritage interests. There is no potential for cumulative impacts to occur or have occurred when considered in conjunction with the Cleanrath wind farm development.

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
	<p><u>HE-2-1</u></p> <p>Provide protection to all natural heritage sites designated or proposed for designation under National and European legislation and International Agreements, and to maintain or develop linkages between these. This includes Special Areas of Conservation, Special Protection Areas, Natural Heritage Areas, Statutory Nature Reserves, Refuges for Fauna and Ramsar Sites.</p> <p><u>HE-2-2</u></p> <p>Provide protection to species listed in the Flora Protection Order 1990, on Annexes of the Habitats and Birds Directives, and to animal species protected under the Wildlife Acts in accordance with relevant legal requirements.</p>	
Kerry County Development Plan 2015-2021 and all relevant environmental documents and assessments associated with that plan	<p><u>NE-2</u> Ensure that the requirements of relevant national and EU legislation, including the Habitats Directive (92/43/EEC), the EU (Birds) Directive (79/409/EEC), the Environmental Impact Assessment Directive (85/337/EEC), the Water Framework Directive (2000/60/EC), and the Flood Directive (2007/60/EC), are met by the Council in undertaking its functions.</p> <p><u>NE-11</u> Ensure that all projects likely to have a significant effect on a Natura 2000 / European site will be subject to Habitats Directive Assessment prior to approval.</p> <p><u>NE-12</u> Ensure that no projects which will be reasonably likely to give rise to significant adverse direct, indirect or secondary impacts on the integrity of any Natura 2000 sites having regard to their conservation objectives, shall be permitted on the basis of this Plan (either individually or in combination with other plans or projects) unless imperative reasons of overriding public interest can be established and there are no feasible alternative solutions.</p> <p><u>NE-13</u> Maintain the nature conservation value and integrity of all Natural Heritage Areas (NHAs), proposed Natural Heritage Areas (pNHAs), Nature Reserves and Killarney National Park. This shall include any other sites that may be designated at national level during the lifetime of the plan in co-operation with relevant state agencies</p> <p><u>NE-14</u> Protect species of plants listed in the Flora Protection Order (S.I. No. 94 of 1999) and their habitats, species and the habitats of species that require strict protection under the Habitats Regulations (S.I. No. 94 of</p>	<p>The Development plan was comprehensively reviewed, with particular reference to Policies and Objectives that relate to the Natura 2000 network and biodiversity. There is no potential for cumulative impacts to occur or have occurred when considered in conjunction with the Cleanrath wind farm development.</p> <p>Detailed ecological surveys have been undertaken within the study area to provide robust scientific data on which the findings of this report rely.</p> <p>The Cleanrath Wind Farm Development has been designed in order to avoid any potential for direct or indirect impact on</p>

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
	<p>1997, 233 of 1998 and 378 of 2005) and animal and bird species and their habitats protected under the Wildlife Acts 1976-2000.</p> <p><u>NE-15</u> Achieve water quality targets by implementing the River Basin Management Plans (and associated programmes of measures) and to ensure that development undertaken or permitted by local authorities; other public agencies or private operators, shall not contravene the objectives of the Water Framework Directive, the European Communities Environmental Objectives (Surface Waters) Regulations 2009 SI 272 of 2009 and the European Communities Environmental Objectives (Groundwaters) Regulations 2010, SI 9 of 2010.</p> <p><u>NE-16</u> (a) Promote the protection of Protected Areas as outlined in Annex (IV) of the Water Framework Directive and the application of relevant Government Guidance in this area. Implement Sub-basin (b) Management Plans in accordance with the Fresh Water Pearl Mussel Regulations (SI 296 of 2009).</p> <p><u>NE-19</u> Ensure that planning applications are assessed with regard to the Groundwater Protection Scheme and the likely impacts the development may have on groundwater quality. Development considered inappropriate by the Council will be prohibited in the vicinity of important aquifers. Cumulative impacts shall also be taken into consideration.</p> <p><u>NE-22</u> Protect rivers, streams and other watercourses including those outside Protected Areas and maintain them where possible in an open state capable of providing suitable habitat for fauna and flora and to work with other agencies, as appropriate, to prevent the spread of invasive species in or along the county's aquatic habitats by implementing biosecurity measures, where appropriate.</p>	downstream European or nationally Designated Sites or other sensitive aquatic or ecological receptors to occur or have occurred.
River Basin Management Plan for Ireland 2018 - 2021 ¹² and all relevant environmental documents and assessments associated with that plan	The River Basin Management Plan for Ireland 2018-2021 sets out the actions that Ireland will take to improve water quality and achieve 'good' ecological status in water bodies (rivers, lakes, estuaries and coastal waters) by 2027. The RBMP has been prepared under the Water Framework Directive (WFD).	The Cleanrath wind farm development has been designed in order to avoid any potential for direct or indirect impact on downstream waterbodies, EU or Nationally Designated Sites to occur or have occurred.

¹² Department of Housing, Planning and Local Government (2018), River Basin Management Plan for Ireland 2018-2021 [Online], Available at: https://www.housing.gov.ie/sites/default/files/publications/files/rbmp_report_english_web_version_final_0.pdf, Accessed 03/06/2020.

6.12.2 Projects in the Vicinity of the Cleanrath wind farm development

The potential for the Cleanrath wind farm development to contribute to a cumulative impact on Biodiversity including National and European Sites was considered. The online planning systems for Cork and Kerry County Councils were consulted on the 07/08/2020.

As described in Section 2.4 of the EIAR, relevant projects have been assessed in-combination with the wind farm development and include recent developments within the zone of influence of all identified KERs. The projects assessed specifically include all other wind energy applications within the wider area along with all other developments for which details are available on the planning registers of Cork and Kerry County Councils. The full list of projects considered has not been repeated here to reduce the duplication of information within this report. However, they have been fully considered in the assessment with further detail provided Chapter 2. In addition, Section 6.12.4 concludes on their potential for impact on biodiversity.

The majority of planning applications in the immediate vicinity of the Cleanrath wind farm development are related to the provision and/or alteration of one-off housing and agricultural developments. Where relevant, these applications have been considered in the design of the project and are considered within the relevant sections of this EIAR.

6.12.2.1 Wind Farm Development within 10km of the Cleanrath wind farm site

Clydaghroe / Creedon (Ref: 04/3152)

Location: Clydaghroe, Clonkeen, Co. Kerry. Approx. 10km from Cleanrath wind farm.

The potential for the Cleanrath wind farm development to result or have resulted in cumulative or in combination effects on biodiversity when assessed alongside Clydaghroe wind farm was considered. The planning file was reviewed on the Kerry County Council Planning Register.

Given that there is no potential for the Cleanrath wind farm to result or have resulted in significant effects on biodiversity when considered on its own, there is no potential for it to contribute or have contributed to any adverse effect, when considered cumulatively or in- combination with any other development, including the Clydaghroe/Creedon Wind Farm.

Midas, (Ref: 01/3571)

Location: Coolknoohil, Co. Kerry. Approx. 10km from Cleanrath wind farm.

The potential for the Cleanrath wind farm development to result or have resulted in cumulative or in combination effects on biodiversity when assessed alongside Midas wind farm was considered. The planning file was reviewed on the Kerry County Council Planning Register.

Given that there is no potential for the Cleanrath wind farm to result or have resulted in significant effects on biodiversity when considered on its own, there is no potential for it to contribute or have contributed to any adverse effect, when considered cumulatively or in- combination with any other development, including the Midas Wind Farm.

Shehy More (Ref: 13/551)

Location: Cloghboola, Gortnacarriga, Tooreenalour, Garryantorna, Shehy More, Dunmanway, Co. Cork. Approx. 6km from Cleanrath wind farm.

The potential for the Cleanrath wind farm development to result or have resulted in adverse cumulative or in combination effects on biodiversity when assessed alongside Shehy More wind farm was considered. The planning file was reviewed on the Cork County Council Planning Register.

Given that there is no potential for the Cleanrath wind farm to result or have resulted in significant effects on biodiversity when considered on its own, there is no potential for it to contribute or have contributed to any adverse effect, when considered cumulatively or in- combination with any other development, including the Shehy More Wind Farm.

Carrigierk (Ref: 15/730)

Location: Carrigangan, Co. Cork. Approx. 8km from Cleanrath wind farm.

The potential for the Cleanrath wind farm development to result or have resulted in adverse cumulative or in combination effects on biodiversity when assessed alongside Carrigierk wind farm was considered. The planning file was reviewed on the Cork County Council Planning Register.

Given that there is no potential for the Cleanrath wind farm to result or have resulted in significant effects on biodiversity when considered on its own, there is no potential for it to contribute or have contributed to any adverse effect, when considered cumulatively or in- combination with any other development, including the Carrigierk Wind Farm.

Knocknamork (Ref: 19/4972)

Location: Slievareagh and Coomnaclohy, Ballyvourney, Co. Cork. Approx. 10km from Cleanrath wind farm.

The potential for the Cleanrath wind farm development to result or have resulted in adverse cumulative or in combination effects when assessed alongside Knocknamork wind farm was considered. The planning file was reviewed on the Cork County Council Planning Register.

Given that there is no potential for the Cleanrath wind farm to result or have resulted in significant effects on biodiversity when considered on its own, there is no potential for it to contribute or have contributed to any adverse effect, when considered cumulatively or in- combination with any other development, including the Knocknamork Wind Farm.

Derragh Wind Farm & Grousemount / Coomatagart Sub Station

Location: Adjacent to Cleanrath wind farm.

The Cleanrath wind farm development includes an entirely underground 33/38 kV cable running predominantly within the public road corridor from the wind farm to the 110 kV Coomatagart substation located in the townland of Grousemount, Co. Kerry. It also includes the Derragh Substation (Pl. Ref. 17/5126). Potential cumulative effects arising from the Cleanrath wind farm development have been comprehensively assessed with regard to Derragh Wind Farm (ABP PL04.245082) and Coomatagart 110 kV substation (Pl Ref. 15/262).

The potential for the Cleanrath wind farm development to result or have resulted in adverse cumulative or in combination effects when assessed alongside Derragh wind farm was considered. The planning files were reviewed on the Cork and Kerry County Council Planning Registers. In addition, the previous An Bord Pleanála decision on the Cleanrath wind farm development was reviewed.

Following a review of the available online documentation, the decision by ABP states that it can be concluded *‘beyond reasonable scientific doubt, that the proposed development (including the proposed grid connection), either individually or in combination with other plans and projects, would not adversely affect the integrity of these European sites, in view of those sites’ conservation objectives, or of any other European sites’*. It was further *‘concluded that the proposed development, subject to compliance with*

the mitigation measures proposed, and subject to compliance with the conditions set out .. (in the planning permission conditions), would not be likely to have significant effects on the environment'.

Given that there is no potential for the Cleanrath wind farm development to result or have resulted in significant effects on biodiversity when considered on its own, there is no potential for it to contribute or have contributed to any adverse effect, when considered cumulatively or in- combination with any other development, including the Derragh Wind Farm & Grousemount wind farm / Coomatagart Sub Station .

In the review of the other projects that was undertaken, no connection between the sites, 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 subject wind farm.

Taking into consideration the reported residual effects from other plans and projects in the area and the identified or predicted effects with the Cleanrath wind farm development, there is no potential for significant cumulative effects on biodiversity to occur or have occurred.

6.12.3 Conclusion of Cumulative Assessment

The residual construction, operational and decommissioning impacts of the Cleanrath wind farm development are considered cumulatively with other plans and projects as described in Sections 6.12.1 & 6.12.2. Particular focus has been placed on those plans and projects that are in closest proximity to the Cleanrath wind farm development and those that could be potentially affected via downstream surface water.

Following the detailed surveys undertaken and impact assessment provided in Section 6.7, it is concluded that there have been and will not be significant residual effects on biodiversity, associated with the wind farm project and therefore it has not and will not contribute to any cumulative effect when considered in combination with other plans and projects. The other wind farms in the area were considered (among other projects) but the Cleanrath wind farm development has been deliberately designed to minimise the effects on biodiversity and by minimising the development footprint. The project also includes a Peatland Restoration Plan, which further minimises/offsets any potential for individual or cumulative negative effects on biodiversity to occur or have occurred.

No significant effects as a result of the development in relation to disturbance, displacement or mortality of faunal species has been identified. Therefore, there is no potential for the Cleanrath wind farm development to contribute or have contributed to any cumulative effect in this regard.

The Cleanrath wind farm development has not and will not result in any significant residual effects on biodiversity and has not contributed and will not contribute to any cumulative effect when considered in combination with other plans and projects. In the review of the projects and plans that was undertaken, no connection that could potentially result or have resulted 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 Cleanrath wind farm development identified.

Conclusion

Following consideration of the residual effects (post-mitigation) it is noted that the operation and decommissioning of the Cleanrath wind farm development on its own, or in combination with any other development, will not result in any significant effects on any of the identified KERs.

Potential impacts on water quality and the habitats of sensitive aquatic fauna will be avoided through the sympathetic design of the development and adherence to a robust Operation and Environmental Management Plan during any future operation. The identified potential effects on both European and Nationally designated sites will be avoided through good construction practice and the adherence to the mitigation measures that are in place to avoid water pollution. Post construction surveys of watercourses have found no evidence of the construction or operation of the Cleanrath wind farm having any effect on water quality in the surrounding watercourses and no such impact will occur during operation or decommissioning.

The Cleanrath wind farm development will be operated and decommissioned in strict accordance with the design, best practice and mitigation that is described within this EIAR and as such, significant residual effects on biodiversity will not occur at any geographical scale on any of the identified KERs.