Derryadd Wind Farm

Natura Impact Statement

January 2019

TOBIN CONSULTING ENGINEERS

TOBIN
Patrick J. Tobin & Co. Ltd.

Natura Impact Statement

PROJECT: **Derryadd Wind Farm**

CLIENT: **Bord na Móna Powergen Ltd.**

COMPANY: **TOBIN Consulting Engineers**
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DOCUMENT AMENDMENT RECORD

Client: **Bord na Móna Powergen Ltd.**

Project: **Derryadd Wind Farm**

Title: **Natura Impact Statement**

PROJECT NUMBER: 10325				DOCUMENT REF: 10325_NIS_D.06			
Revision	**Description & Rationale**	**Originated**	**Date**	**Checked**	**Date**	**Authorised**	**Date**
D01	NIS	PC	14/06/17	ST	14/06/17	DG	14/06/17
D02	NIS	PC	21/06/18	EO'M	21/06/18		
D03	NIS	PC	03/08/18				
D04	NIS	PC	11/09/18	EO'M	11/09/18		
D05	NIS	PC	08/10/18				
D06	NIS	LK	10/01/19				
TOBIN Consulting Engineers							

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1 INTRODUCTION

The proposed Derryadd Wind Farm (herein after referred to as the proposed development) is located approximately 3 kilometres (km) east of Lanesborough, Co. Longford, 4km west of Killashee, Co. Longford and 8km to the north of Newtowncashel Co. Longford. The wind farm is located on the Mountdillon group of peat extraction bogs in Co. Longford (Figure 1).

Planning Permission is being sought from An Bord Pleanala (ABP) for the installation of 24 No. wind turbines with a nominal capacity of 4 megawatts (MW) per turbine or approximately 96 MW total installed capacity. The turbines will have a blade tip height of a maximum of 185 metres (m) above the top of the foundation and will be accessible from internal access routes within the Bord na Móna site.

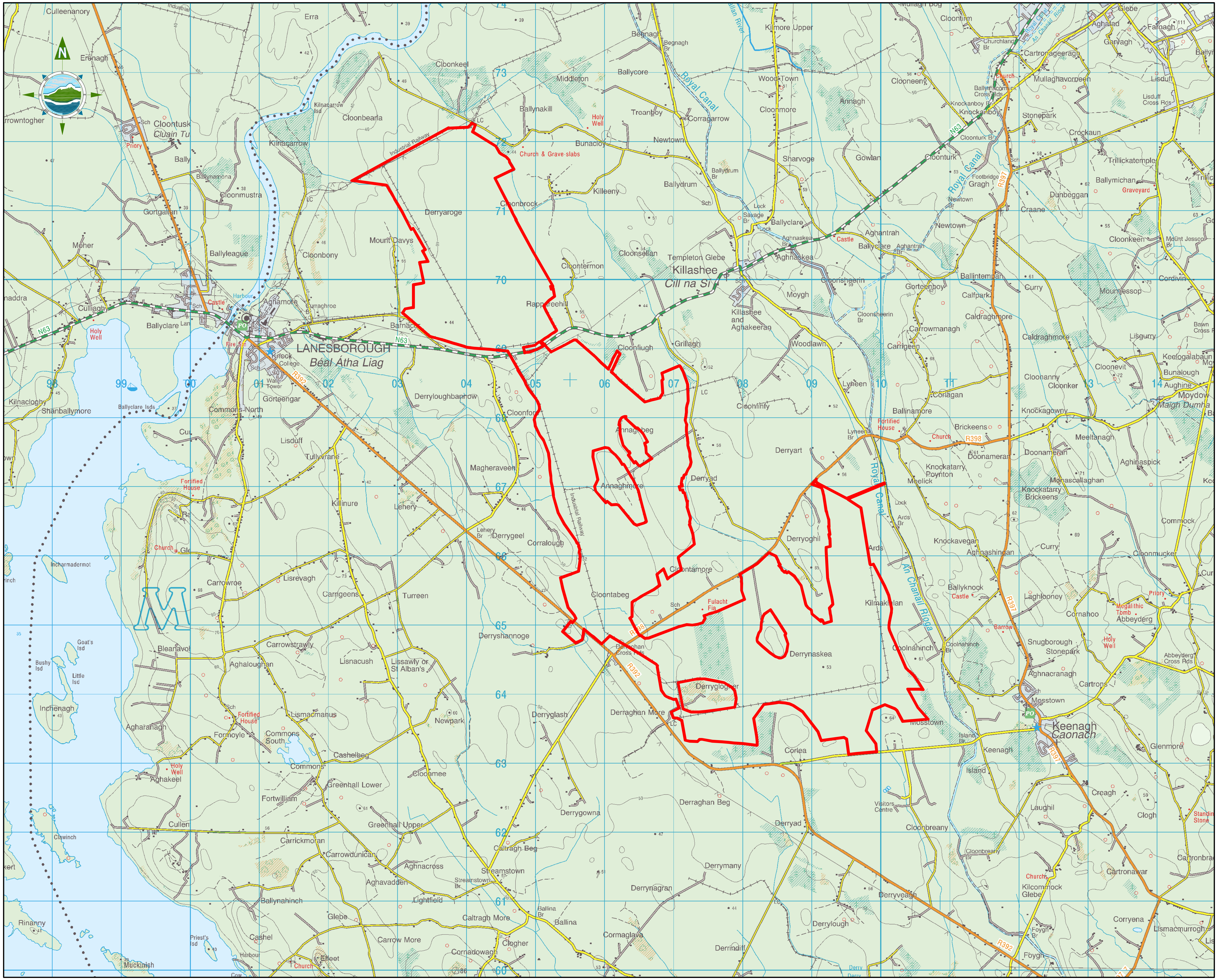
The proposed development is not directly connected with or necessary for the management of any European site and hence the requirements of Article 6(3) of the Habitats Directive and Part XAB of the Planning and Development Act 2000, as amended, in respect of Appropriate Assessment (AA) are engaged.

An Appropriate Assessment Screening Report was prepared (see Appendix B), on behalf of Bord Na Móna Powergen Ltd, providing information to enable the competent authority to perform its statutory function to undertake screening for AA in respect of the proposed development. The findings of the report where that an Appropriate Assessment is required as it cannot be excluded on the basis of objective information that the proposed development, individually or in combination with other plans or projects will have a significant effect on a European site. Following an examination, analysis and evaluation of the relevant information, including in particular, the nature of the proposed development, its potential relationship with European sites, in view of best scientific knowledge, on the basis of objective information and in light of the conservation objectives of the relevant European sites, it was the professional conclusion of the authors of the Appropriate Assessment Screening Report that it was not possible to rule out the possibility of significant effects on four European sites, namely;

- Lough Ree SPA,
- Lough Ree SAC,
- Ballykenny-Fisherstown Bog SPA, and
- River Shannon Callows SAC.

Thus, TOBIN Consulting Engineers (TOBIN) prepared this Natura Impact Statement (NIS) in accordance with the provisions of the above stated legislation, providing information to enable the competent authority to perform its statutory function to undertake AA in respect of the proposed development. This NIS includes an examination and analysis of the best available scientific knowledge and data in the field to identify and assess the implications of the proposed development for any European sites in view of the conservation objectives of those sites. It considers whether there are ex-situ implications for any European sites, for example from impacts which occur via upstream pathways

at a remote but connected location, or from impacts on populations of ex-situ species located outside of European sites, or from impacts on ex-situ supporting habitats. It considers whether the proposed development, by itself and in-combination with other plans or projects, would adversely affect the integrity of any European sites. In reaching a conclusion in this regard consideration has been given to any mitigation measures necessary to avoid or reduce any potential adverse effects.



Legend

Planning Application Boundary

0 250 500 1,000 1,500 2,000

Metres

A	Jan. 2019	Final Issue	MN	LK
Issue	Date	Description	By	Chkd.

Client:

BORD NA MÓNA
Naturally Driven

Project:

DERRYADD WIND FARM

Title:

SITE LOCATION MAP

Scale @ A3: 1:50,000

Prepared by: M. Nolan
Checked: L. Kennedy
Date: January 2019

Project Director: D. Grehan

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Issue: A

Figure 1

1.1 BACKGROUND

Bord na Móna was established by the Irish government in 1946 to strengthen the security of energy supply and stimulate the economy of the Midlands. The harvesting of peat from the industrial peatlands is reducing. As many individual bogs and areas within individual bogs have ceased peat harvesting and are now cutaway, the company is planning for a new and beneficial use for these lands.

One of the main uses of these cutaways is the development of onshore wind farms, accompanied in some areas with natural recolonisation and the creation of biodiversity and amenity uses. The use of cutaway bog land to develop wind farms will ensure that this land continues to produce energy, in a clean, low carbon form.

Arising from this identified new use a number of wind farm projects have been developed and/or are under development. The latest proposed development is the Derryadd Wind Farm in Co. Longford. The extent of the proposed development is outlined in Figure 1.

1.2 LEGISLATIVE CONTEXT

The European Communities (EC) Habitats Directive 92/43/EEC or "the Habitats Directive" and the Council Directive 2009/147/EC (as amended) on the conservation of wild birds or "the Birds Directive" have been transposed into Irish law by EC (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011 as amended; hereafter referred to as the Birds and Habitats Regulations). The Birds Directive seeks to protect birds of special importance by the designation of Special Protection Areas (SPAs). The Habitats Directive does the same for habitats and other species groups with Special Areas of Conservation (SACs).

The requirement for an AA is outlined in Article 6(3) and further expanded upon in Article 6(4) of the Habitats Directive. Article 6(3) of the Habitats Directive requires that:-

> "*Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public*."

This provision is transposed into Irish law by Part XAB of the Planning and Development Acts, 2000-2017. Section 177U(4) of the said Acts provides for screening for Appropriate Assessment as follows:

> *"The competent authority shall determine that an appropriate assessment of [...] a proposed development [...] is required if it cannot be excluded, on the basis of objective information, that the [...] proposed development, individually or in combination with other plans or projects, will have a significant effect on a European site."*

Section 177U(5) provides as follows:

> *"The competent authority shall determine that an appropriate assessment of a […] proposed development, […], is not required if it can be excluded, on the basis of objective information, that the […] proposed development, individually or in combination with other plans or projects, will have a significant effect on a European site."*

Article 6(4) of the Habitats Directive requires that:

> *"If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted."*

Where the site concerned hosts a priority natural habitat type and/or a priority species, the only considerations which may be raised are those relating to human health or public safety, to beneficial consequences of primary importance for the environment or, further to an opinion from the Commission, to other imperative reasons of overriding public interest.

Appropriate Assessment should be based on best scientific knowledge. This report informs the second stage in the process to be undertaken by the competent authority.

1.3 GUIDANCE AND APPROACH

This report has been carried out using the following guidance:

- Appropriate Assessment under Article 6 of the Habitats Directive: Guidance for Planning Authorities. Circular NPW 1/10 & PSSP 2/10;
- Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities (Department of Environment, Heritage and Local Government 2010 revision);
- Managing Natura 2000 Sites: The Provisions of Article 6 of the Habitat's Directive 92/43/EEC (European Commission 2000 and updated draft April 2015);
- Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites: Methodological Guidance on the Provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC (European Commission Environment Directorate-General 2001); and

- Guidance Document on Article 6(4) of the Habitats Directive 92/43/EEC. Clarification of the Concepts of Alternative Solutions, Imperative Reasons of Overriding Public Interest, Compensatory Measures, Overall Coherence. Opinion of the European Commission (European Commission January 2007, updated 2012).

The potential for effects on nature conservation interests was assessed, taking into consideration the habitats and species that are likely to be affected by the proposed development. This approach included consideration (as appropriate) of the following guidance documents:

- Scottish Natural Heritage (SNH) (2000). Wind Farms and Birds: Calculating a Theoretical Collision Risk Assuming no Avoidance Action;
- SNH (2006). Assessing Significance of Impacts from Onshore Wind Farms on Birds Outwith Designated Areas;
- SNH (2009). Monitoring the Impact of Onshore Wind Farms on Birds;
- SNH (2010). Avoidance Rates Information and Guidance Note: Use of Avoidance Rates in the SNH Wind Farm Collision Risk Model;
- SNH (2012). Assessing the Cumulative Impact of Onshore Wind Energy Developments;
- SNH (2014). Recommended Bird Survey Methods to Inform Impact Assessment of Onshore Wind Farms;
- SNH (2016). Assessing Connectivity with Special Protection Areas (SPAs);
- Fossitt (2000). A Guide to Habitats in Ireland. The Heritage Council;
- Environmental Protection Agency (EPA) (2002). Guidelines on the information to be contained in Environmental Impact Statements;
- EPA (2017). Guidelines on the information to be contained in Environmental Impact Assessment Reports. Draft, August 2017;
- Chartered Institute of Ecology and Environmental Management (CIEEM) (2016). Guidelines for Ecological Impact Assessment in the UK and Ireland;
- National Roads Authority (NRA) (2005). Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes;
- NRA (2006a). Guidelines for Assessment of Ecological Impacts of National Road Schemes (Revision 1, National Roads Authority);
- NRA (2006b). Guidelines for the Treatment of Otters prior to the Construction of National Roads Schemes. National Roads Authority, Dublin;
- NRA (2009a). Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes;
- NRA (2009b). Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes;
- NRA (2009c). Guidelines for Assessment of Ecological Impacts of National Road Schemes. (Revision 2, National Roads Authority);

- Smith *et al.* (2011). Best Practice Guidance for Habitat Survey and Mapping in Ireland;
- NRA (2010). Guidelines on the Management of Noxious Weeds and Non-Native Plan Species on National Roads;
- Murray A. (2003). Draft Methodology for a National Hedgerow Survey. Unpublished document for Network for Nature;
- Longford County Development Plan 2015 – 2021; and
- Bord na Móna (2016). Biodiversity Action Plan 2016-2021.

In addition, a detailed online review of published scientific literature was conducted. This included a detailed review of the National Parks and Wildlife Service (NPWS) website including mapping and available reports for relevant European sites and, in particular, sensitive qualifying interests described and their conservation objectives. The Environmental Protection Agency (EPA) Envision Map-viewer (www.epa.ie) and available reports were also reviewed.

1.4 APPROPRIATE ASSESSMENT METHODOLOGY

There are potentially four stages in the AA process; derived from the "*Assessment of Plans and Projects Significantly affecting Natura 2000 sites: Methodological Guidance on the Provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC*". The result of each stage determines whether a further stage in the process is required.

Stage One: Screening – This process identifies the likely significant effects upon a European site from a proposed project or plan. Its purpose is to determine whether a plan or project, which is not directly connected to or necessary for the management of the site, individually or in-combination with other plans or projects is likely to have a significant effect upon the European site, in view of its conservation objectives and best scientific knowledge. An AA is required if it cannot be excluded, on the basis of objective information, that the proposed development, individually or in-combination with other plans or projects, will have a significant effect on a European site. It is not appropriate, at this screening stage, to take account of the measures intended to avoid or reduce harmful effects of a plan or project on European sites (as per clarification provided by the Court of Justice of the European Union [CJEU] in Case 323-17 People Over Wind and Peter Sweetman v Coillte). It is this stage that is the focus of this report.

Stage Two: Appropriate Assessment – In this stage, consideration is given to ascertain whether the plan or project would adversely affect the integrity of a European site(s), either alone or in-combination with other plans or projects, with respect to the European site's structure and function and its conservation objectives. This stage of the assessment is carried out by the consenting authority and is informed by a Natura Impact Statement (NIS). A NIS is required where there is uncertainty as to whether or not an adverse effect arises, uncertainty of the effect itself, or a potential effect has been defined which requires further procedures/mitigation to remove uncertainty of a defined impact (i.e.

significant effects cannot be excluded). Where there are adverse effects, an assessment of the potential mitigation to ameliorate those effects is required. If the assessment results in a negative conclusion, i.e. adverse effects on the integrity of a site cannot be excluded (by design or mitigation) or there is uncertainty as to whether an adverse impact arises, then the process must consider alternatives (Stage 3) or proceed to Stage 4.

Stage Three: Assessment of Alternative Solutions – Where adverse effects on a European site are identified at the end of Stage Two despite the application of mitigation, this third stage examines alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of the European site.

Stage Four: Assessment Where Adverse Impacts Remain – The fourth and final stage applies where the project can only proceed for Imperative Reasons of Overriding Public Interest (IROPI), despite the plan or project resulting in adverse effects on a European site(s). This stage provides for an assessment of compensation measures to maintain or enhance the overall coherence of the Natura 2000 network.

This report details Stage Two, preparation of a NIS to assist An Bord Pleanála (ABP) in carrying out its Appropriate Assessment for the proposed development. Definitions of conservation status, integrity and significance used in this assessment are defined in accordance with "*Managing Natura 2000 Sites: The Provisions of Article 6 of the Habitat's Directive 92/43/EEC*" (EC, 2000), as follows:

- "*The conservation status of a natural habitat is defined as the sum of the influences acting on a natural habitat and its typical species that may affect its long-term natural distribution, structure and functions as well as the long-term survival of its typical species";*
- *"The conservation status of a species is defined as the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its population";*
- *"The integrity of a European Site is defined as the coherence of the site's ecological structure and function, across its whole area, or the habitats, complex of habitats and/or populations of species for which the site is or will be classified"; and*
- *Significant effect should be determined in relation to the specific features and environmental conditions of the protected site concerned by the plan or project, taking particular account of the site's conservation objectives.*"

2 DESCRIPTION OF THE PROPOSED DEVELOPMENT

Bord na Móna Powergen Limited intends to apply for a ten-year planning permission from An Bord Pleanála for the installation of 24 No. wind turbines with a nominal capacity of 4 MW per turbine or approximately 96 MW total installed capacity. The turbines will have a blade tip height of a maximum of

185 m above the top of the foundation and will be accessible from internal access routes within the Bord na Móna site.

The overall site area is 1,908 hectares (ha). The site is approximately 12km long in the northwest/southwest direction and is approximately 4km wide in an east/west direction. The site lies between the towns and villages of Lanesborough, Derraghan, Keenagh and Killashee while the main urban centre in the region, Longford Town, is 9km to the northeast from its nearest point. Derryaroge Bog to the north is adjacent to the River Shannon and Lough Bannow Bog is immediately to the west of the Royal Canal which runs in a north south direction.

The land use/activities on the site are a mixture of active peat extraction, peat extraction works (administration offices, machinery maintenance and storage, stores, canteen), bare cutaway peat, re-vegetation of bare peat, and two existing wind monitoring masts on Derryaroge Bog and Lough Bannow Bog. These works as well as the transportation of peat/ash by rail form part of the Bord na Móna Mountdillon peat production facility in Co. Longford.

At a local scale, the proposed development is situated between the Ballynakill River to the east and the Lough Bannow River to the west. All rivers in this area ultimately discharge to the River Shannon. The proposed development is located within an operating peat extraction site. An extensive network of existing drainage channels are present throughout the peatland which is currently operated under IPC licence P0504-01 Mountdillon bog group. Lough Ree is located downstream of the proposed development.

The surrounding landscape is a mixture of forestry, agricultural land and cutaway peatland. The landscape is predominately flat (refer to Figure 1 for Site Location Map).

The proposed development will consist of:

- 24 no. wind turbines with an overall blade tip height of up to 185m and all associated hard-standing areas;
- 5 no. borrow pits;
- 3 No. permanent Anemometry Masts up to a height of 120m;
- Provision of new internal site access roads (permanent and temporary), passing bays, amenity cycleways, car parking and associated drainage;
- 1 no. 110kV electrical substation, including battery storage, which will be constructed at one of two proposed locations on site: either Option A in Cloonfore townland or Option B in Derraghan More townland. The electrical substation will have 2 no. control buildings, associated electrical plant and equipment, battery storage containers and a wastewater holding tank;
- 5 no. temporary construction compounds, in the townlands of Cloonfore, Cloontabeg, Derraghan More, and Rappareehill (2 no.);

- All associated underground electrical and communications cabling connecting the wind turbines to the proposed substation at either Option A in Cloonfore or Option B in Derraghan More;
- All works associated with the connection of the proposed wind farm to the national electricity grid, which will be either to the existing Lanesborough/Richmond 110 kV line via overhead line (Option A) or to the existing Lanesborough/Mullingar 110 kV line via an underground or overhead line (Option B);
- Removal of existing meteorological masts;
- New access junctions, improvements and temporary modifications to existing public road infrastructure to facilitate delivery of abnormal loads and construction access, including locations on the N6, N61, N63, R392, R398, L11554, L1136 roads, access onto the local road in the townland of Cloonkeel, access onto the local road in the townland of Mount Davys and amenity access from the Royal Canal Tow Path (off the L5239);
- All related site works and ancillary development; and
- A 10-year planning permission and 30-year operational life from the date of commissioning of the entire wind farm.

Turbines will be transported to the site within the carriageway of existing roads along a specific haul route thereby avoiding potential significant adverse effects on any European site.

3 STUDY AREA AND ZONE OF INFLUENCE

As mentioned, the proposed development includes 24 No. wind turbines on a peat extraction bog site approximately 12km long and 4km wide. The study area comprised the proposed development site and the wider surrounding hinterland.

The Zone of Influence (ZoI) is the area within which the proposed development could affect the receiving environment such that it could potentially have significant effects on the qualifying interest habitats or qualifying interest/ special conservation interest species of a European site, or on the achievement of their conservation objectives (as defined in CIEEM, 2016).

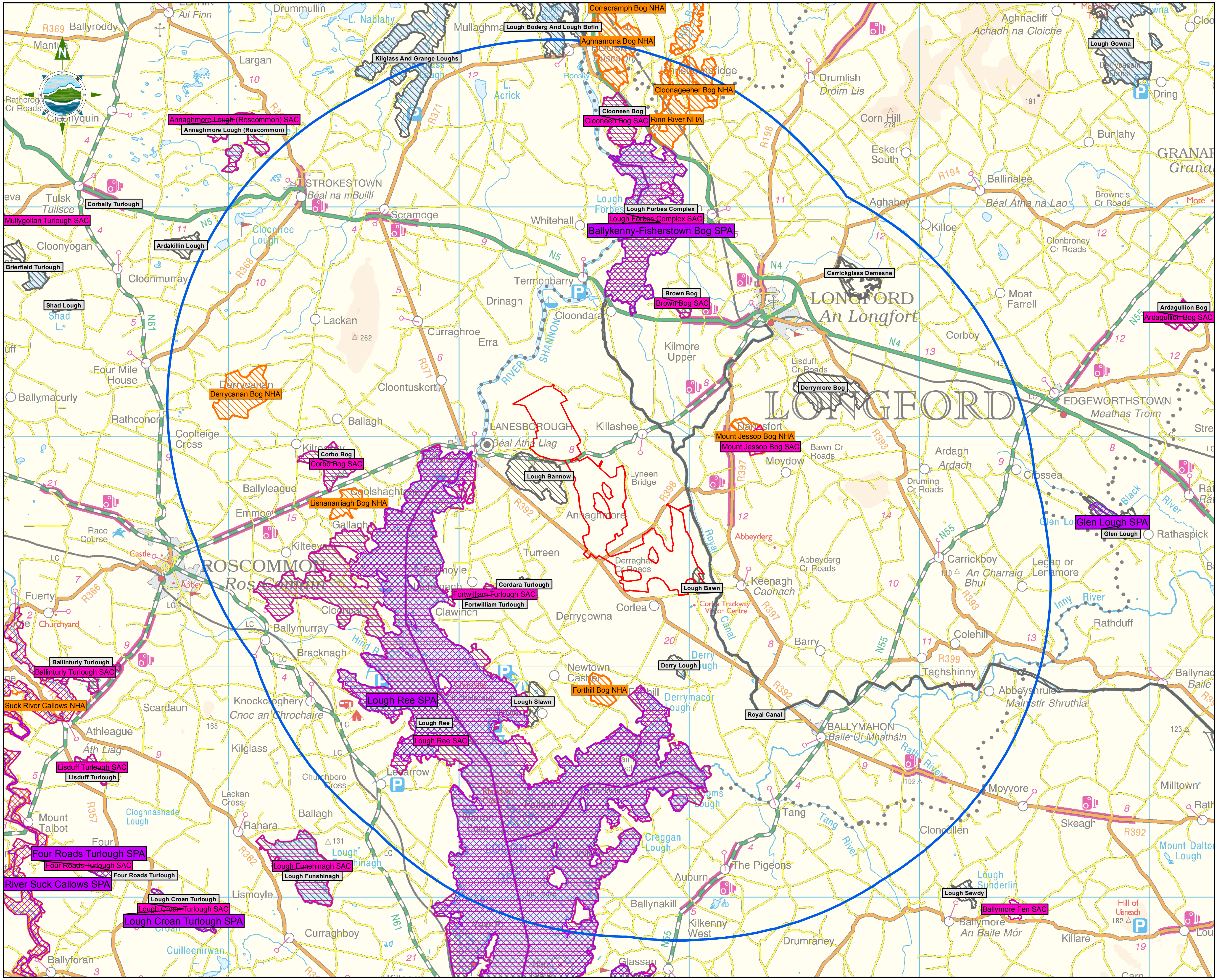
The mechanism for defining the ZoI is summarised as follows:

- The nature, size and location of the proposed development were considered;
- The sensitivities of the relevant ecological receptors were considered; and
- The potential impact sources and pathways were identified.

The ZoI was determined by considering all of the above, in order to determine which European sites are within the ZoI of the proposed development, and therefore potentially at risk of significant effects from the proposed development.

In determining the ZoI of the proposed development consideration was also given to whether distant European sites fall within the ZoI of the proposed development for ex situ impacts on qualifying interest/ special conservation interest species, considering the species' foraging range, home range and connections between sites they use (e.g. for birds connections between breeding, roosting and feeding sites). To this end, the ZoI extends outside of the proposed development footprint to include ecological receptors connected to the project though overlap / intersection, proximity and connectivity through features such as watercourses.

The ZoI was first assessed in a desk study review of ecological information that was pertinent to the proposed development, focusing on a 15km buffer around the proposed development. It was found, the proposed development is not located within sites designated for nature conservation but supports potential connectivity with eleven European sites (see Figure 2 and AA Screening Report in EIAR Appendix B). Seven of these sites were found to have no intact source-receptor-pathway, thus potential significant adverse effects were excluded. The remaining four sites were identified to have a potential source-pathway-receptor connectivity to the proposed development; Lough Ree SPA, Lough Ree SAC, Ballykenny-Fishertown Bog SPA and River Shannon Callows SAC.



Legend

- Planning Application Boundary
- 15Km Buffer Zone
- Special Protection Area (SPA)
- Special Area of Conservation (SAC)
- Natural Heritage Areas (NHA)
- Proposed Natural Heritage Area (pNHA)

0 1 2 4 6
Kilometres

Issue	Date	Description	By	Chkd.
A	Jan. 2019	Final Issue	FH	LK

Client: BORD NA MÓNA Naturally Driven

Project: DERRYADD WIND FARM

Title: SITE LOCATION AND DESIGNATED SITES

Scale @ A3: 1:150,000

Prepared by: F. Healy | Checked: L. Kennedy | Date: January 2019

Project Director: D. Grehan

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Figure 2 | Issue: A

4 CONSULTATION

Consultation with key state agencies and environmental Non-Governmental Organisations (NGO's) was undertaken between September 2016 and April 2018 to inform the Environmental Impact Assessment Report (EIAR) and AA. Responses relating to the Biodiversity chapter of the EIAR and AA process specifically are presented in Chapter 6 of the EIAR whereas all project consultation is detailed in Chapter 1 of the EIAR. Consultees were informed of updates to the site layout, as the layout changed. Consultation letters were sent (September 2016, April/ May 2017 and April 2018) to the following key parties, relevant to this assessment:

- An Bord Pleanála;
- Longford County Council;
- National Parks and Wildlife Service;
- BirdWatch Ireland;
- Irish Raptor Group Study Group;
- Inland Fisheries Ireland;
- Bat Conservation Ireland;
- Irish Wildlife Trust; and
- Irish Peatland Conservation Council.

5 METHODOLOGY

5.1 DESK STUDY

The ecological desk study for this NIS included the following steps:

- A review of the NPWS site synopsis reports for the relevant European sites within the ZoI of the proposed development;
- A species list for the study area (i.e. within the proposed development site and wider surrounding hinterland; see Section 3) was generated using the National Biodiversity Data Centre biodiversity maps (www.biodiversityireland.ie) in order to determine if any of the relevant qualifying interests/special conservation interest species of local European sites have been recorded in this area and the likelihood of any such species being present at the proposed development site. A species list for 10km grid square N06, N07 and N16 was also generated to determine if any rare or protected species occur in the wider Longford area;
- A review of Ordnance Survey maps and aerial photography in order to determine the broad habitats that occur within the study area and thus typical bird communities; and
- A review of relevant ecological reports and rehabilitation plans previously completed for the study area.

The following hydrology/ hydrogeology sources of information were utilised to establish the baseline hydrogeological environment:

- The Geological Survey of Ireland (GSI) groundwater records for the area were inspected, with reference to hydrology and hydrogeology;
- Office of Public Works (OPW) flood mapping;
- Catchment Flood Risk Assessment and Management (CFRAM) and Preliminary Flood Risk (PFRA) Map data;
- EPA water quality monitoring data for watercourses in the area;
- Results from the chemical analysis of water samples taken in 2015 to 2018 (Bord na Móna IPC licence data);
- EPA Water Framework Directive Monitoring Programme; and
- Information from the River Basin Management Plan for the Shannon International River Basin District (SHIRBD).

5.2 RELEVANT ONLINE RESOURCES

Bird Atlas 2007-2011

The Bird Atlas project aimed to map the distribution and abundance of wintering and breeding birds across Ireland and Britain. Surveying was conducted by a network of volunteers from November 2007 to July 2011. The data was then published in "*Bird Atlas 2007-2011: the breeding and wintering birds of Britain and Ireland*" (Balmer *et al.* 2013). A review of Bird Atlas 2007-2011 distribution maps was carried out for certain key species of conservation concern. For further details please refer to Chapter 6 of the EIAR (Biodiversity).

BirdWatch Ireland Bird Sensitivity to Wind Energy Developments

BirdWatch Ireland developed a mapping tool to give a spatial indication of where protected bird species are likely to be sensitive to wind energy developments (McGuinness *et al.* 2015). The potential impact of wind energy developments on protected birds includes loss of habitat and fragmentation, disturbance displacement, collision risk and the barrier effect (obstruction movement within the landscape).

The area in which the proposed development is located (10km grid squares N07, N06 and N16) does not have data available (unknown) for the majority of the landholding. Bird sensitivity data is available for a section of Derryadd bog. This area has been categorised as being of Low sensitivity to impacts from the wind energy industry. For further details please refer to Chapter 6 of the EIAR (Biodiversity).

5.3 SURVEY RATIONALE

The ecological surveys were designed following the consideration of the consultation responses, the findings of the desk study, a review of the key methodologies and based on qualifying interest/ special conservation interest of local European sites identified by the AA Screening Report as potentially susceptible to impacts from the proposed development. In addition, bird survey methodology was peer reviewed by Aniar Ecology (in May 2016) following the winter bird surveys carried out in 2014/2015 and

recommendations on the survey approach were made (see Appendix 6.2 of the EIAR for further details).

5.4 VIEWSHED ANALYSIS

The Scottish Natural Heritage (SNH), "*Recommended Bird Survey Methods to Inform Impact Assessment of Onshore Wind Farms*" (SNH 2014) recommends undertaking Vantage Point (VP) surveys such that the viewshed encompasses the wind farm envelope and a 500m radius beyond the outermost turbines. A viewshed analysis was undertaken (using ArcGIS 10.4.1) as per SNH (2014) (see Chapter 6 of the EIAR [Biodiversity] for details).

5.5 FIELD SURVEYS

Field surveys were undertaken by skilled and appropriately experienced ecologists between the periods October 2014 to October 2018 (please refer to Chapter 6 of the EIAR [Biodiversity] for further details). The data collected was robust and allowed TOBIN to draw accurate and coherent conclusions on the possible impacts of the proposed development on ecological receptors.

The site synopsis reports for the relevant European sites were reviewed (Appendix A), and this review informed the field surveys which focussed on areas of scientific and/ or conservation interest in the vicinity of the proposed development were investigated. Details of the survey methodology employed to survey the qualifying interests/ special conservation interest species of local European sites identified in the AA Screening Report as potentially susceptible to adverse effects as a result of the proposed development are presented in the subsequent paragraphs. Further survey details are also included in the EIAR Chapter 6 (Biodiversity) and Chapter 8 (Hydrology and Hydrogeology), and in the EIAR appendices (please refer to the Derryadd Wind Farm: Collision Risk Modelling [CRM; Appendix 6.5], and the Construction Environmental Management Plan [CEMP; Appendix 2.2]).

Surveys undertaken during the period of October 2014 to October 2018 (see Table 5-1:) included:

- A multi-disciplinary walkover survey following the methodology outlined by the NRA (2009b) was undertaken at all proposed infrastructure sites including proposed turbine locations hardstand areas, borrow pits, substation locations, temporary construction compounds and internal haul roads. This survey aimed to identify protected species (including otter) that occur within the proposed development site;
- Vantage point surveys were carried out to quantify the level of avian flight activity and its distribution over the survey area. The primary purpose of the survey is to provide data to inform the CRM, which makes predictions of mortality from collisions with turbines. Vantage points are fixed locations which are strategically positioned to provide a maximum view shed of the survey area from a minimum number of locations (Figure 3);
- Breeding and wintering bird transect surveys were carried out and covered a large and representative portion of the survey area. Where access allowed, all areas of suitable habitat

were surveyed on site and to a 500m radius from the planning/ development boundary, as per SNH (2014) (Figure 3);

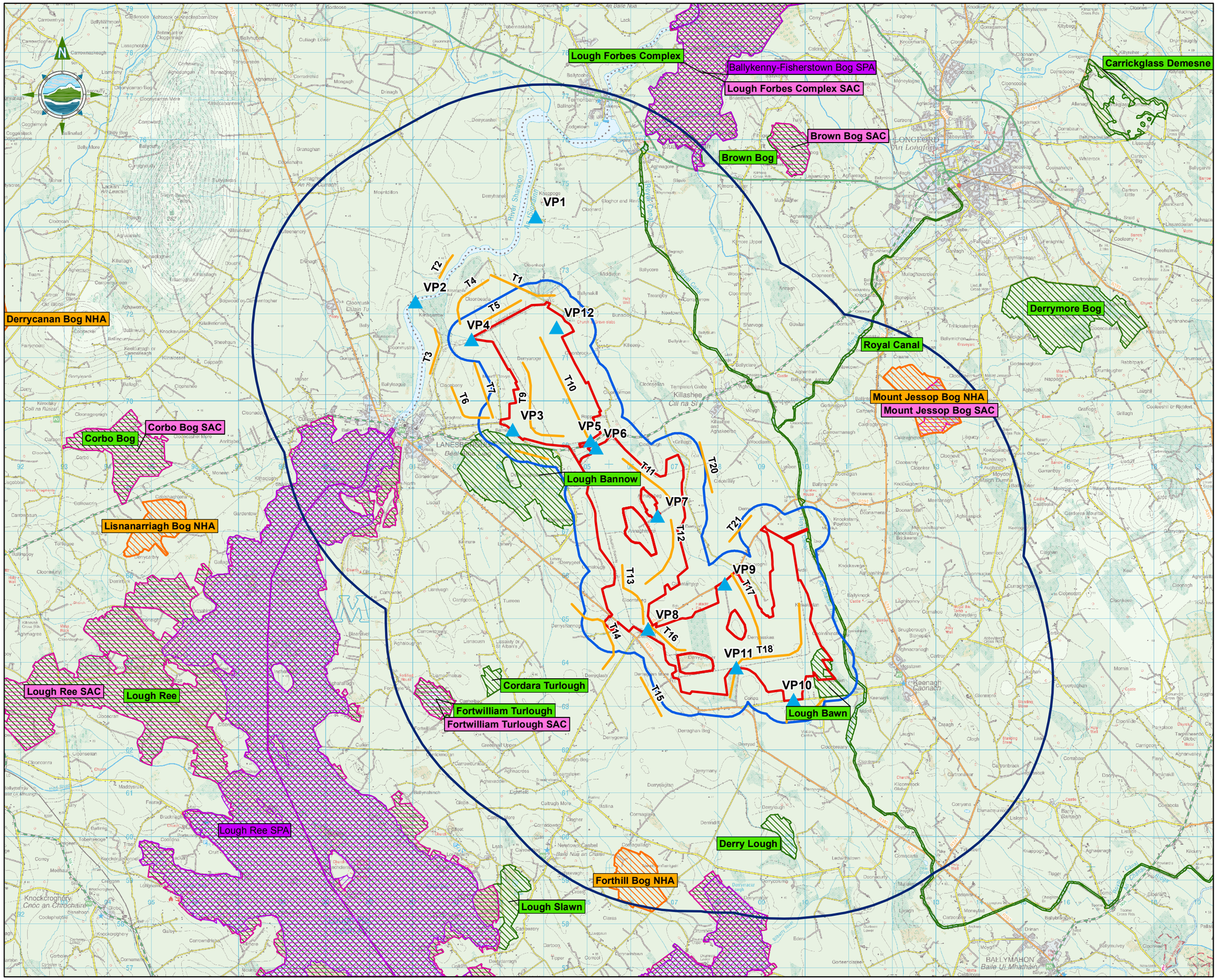
- Monthly counts (May 2016 to March 2017) and bimonthly counts (August 2017 to March 2018) of wetland water birds were conducted at wetland water bird sites during daylight hours (at dawn or before dusk) from suitable vantage points using binoculars and/ or telescope as required; and
- Hydrology field surveys included: walkover survey, peat probes, trial pits, borehole testing and water sampling.

Table 5-1: Survey Works and Periods Conducted

Survey Period	Personnel	Surveys Conducted
October 2014 – March 2015	John Murphy (Senior Ecologist/Ornithologist), Caroline Hurley (Senior Ecologist), Austin Cooney (Ornithologist), Caroline Lalor (Ecologist), Hazel Tough (Ecologist) and Caoimhin O'Neill (Ecologist) of Malachy Walsh and Partners Engineering and Environmental Consultants.	Birds: Monthly vantage point (VP) surveys[1], 6 hours per VP per month. Winter transects survey, 2 visits, one early (November) and one late (March) visit.
April – August 2015		Birds: Monthly vantage point (VP) surveys, 6 hours per VP per month. Breeding birds transect survey, 2 visits, one early (May) and one late (July) visit.
September 2015 – March 2016		Birds: Monthly vantage point (VP) surveys, 6 hours per VP per month. Winter transects survey, 2 visits, one early (November) and one late (March) visit.
April – September 2016	Jessica Quinn (Ecologist/ Ornithologist), Allison Austin (Senior Ecologist), Christopher Walsh (Ecologist), Alan Booth (Ecologist), Kevin Delahunty (Ecologist), Brian Arneill (Independent Ornithologist), Nick Duff (Independent Ornithologist) and Austin Cooney (Independent Ornithologist) of TOBIN.	Birds: Monthly vantage point (VP) surveys, 6 hours per VP per month. Breeding bird transect surveys two visits March-July. Woodcock survey two visits, both in June. Monthly I-WeBS[2] of water bodies in the hinterland of the site (April - September).
September 2016 (1 day)	Daireann McDonnell (Senior Ecologist), Laura Kennedy (Senior Ecologist), Jessica Quinn (Ecologist/ Ornithologist), and Christopher Walsh (Ecologist) of TOBIN	Ecological walkover survey, records were made of habitats encountered and any signs of protected species at proposed turbine locations.
October 2016 – March 2017	John Murphy (Senior Ecologist/Ornithologist), Caroline Hurley (Senior Ecologist), Austin Cooney (Ornithologist), Caroline Lalor (Ecologist), Hazel Tough (Ecologist) and Caoimhin O'Neill (Ecologist) of	Birds: Monthly vantage point (VP) surveys, 6 hours per VP per month. I-WeBS of water bodies in the hinterland of the site.

[1] At proposed wind farm sites vantage point surveys are typically used to evaluate the flight activity of a given location.
[2] Irish Wetland Bird Surveys.

Survey Period	Personnel	Surveys Conducted
	Malachy Walsh and Partners Engineering and Environmental Consultants.	
June, July and November 2017	John Dillon (Hydrogeologist)	A walkover survey of the site to identify hydrological features on site including inter alia; wet ground, drainage patterns and distribution, exposures and drains. Peat probes, trial pitting and borehole testing.
April 2017 (1 day)	Padraig Cregg (Senior Ecologist) of TOBIN	Following the relocation of several turbines, these new locations were surveyed for habitats encountered and any signs of protected species.
April – September 2017	John Hehir (Assistant Ornithologist), Patrick Manley (Assistant Ornithologist) and Sean Ronayne (Assistant Ornithologist) of McCarthy Keville O'Sullivan Planning and Environmental Consultants.	Birds: Monthly vantage point (VP) surveys, 6 hours per VP per month, breeding walkover survey (3 visits, April - June), breeding raptor survey (4 visits, April - July) Woodcock survey (3 visits in June) and I-WeBS of water bodies in the hinterland of the site (August and September).
October 2017 – March 2018	Alan Booth (Ecologist), Shane Cully (Ornithologist) and Kevin Delahunty (Ecologist) of TOBIN	Birds: Monthly vantage point (VP) surveys, 6 hours per VP per month. I-WeBS of water bodies in the hinterland of the site, Hen Harrier Roost Surveys, Transect surveys.
April 2018 (3 days)	Joanne Allen Hamilton (Senior Ecologist) of TOBIN	Following the relocation of several turbines and internal roads, all infrastructure locations were surveyed for habitats encountered and any signs of protected species (including Otters).
March and April 2018	John Dillon (Hydrogeologist)	Peat probes, trial pitting, borehole testing and field analysis of water samples.
May – July 2018	Padraig Cregg (Senior Ecologist) and Kevin Delahunty (Ecologist) of TOBIN	Birds: Species specific Curlew and Woodcock surveys. These surveys were undertaken in areas where these species were previously recorded, Curlew survey (4 visits) and Woodcock survey (3 visits).



Legend

- Vantage Points
- Transects
- Planning Application Area
- Site Boundary 500m Buffer
- Site Boundary 5km Buffer
- Natural Heritage Areas
- Special Protection Ares
- Special Areas of Conservation
- Proposed Natural Heritage Areas

0 0.5 1 2 3 4
Kilometres

NOTES

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Issue	Date	Description	By	Chkd.
A	Jan 19'	Final Issue	F.H	L.K

Client: Bord na Móna – Naturally Driven

Project: DERRYADD WIND FARM

Title: Study Area for Bird Surveys

Scale @ A3: 1:80,000

Prepared by:	Checked:	Date:
F.Healy	L. Kennedy	January 2019

Project Director: D. Grehan

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Figure 3

Issue: A

6 OVERVIEW OF RECEIVING ENVIRONMENT

The proposed development is located within an operating Bord na Móna peat extraction site. An extensive network of field drains, arterial drainage channels of peatland, and associated silt ponds are present throughout the site which is currently operated under IPC licence P0504-01 Mountdillon Bog group.

Following site walkovers in August 2016, January 2017, and March 2018, a number of surface water features were noted on site. A number of drainage channels were identified to be flowing through or adjacent to the proposed development site. These man-made drains assist with the drainage of peatland and reclaimed peatland areas under agricultural land and forestry use. The natural surface water drainage pattern in the environs of the proposed development site is shown in Figure 4. The streams are identified as follows:

Derryaroge Bog (Location of Turbines 1-9)

The proposed turbines T1-T9 and associated roads are located within the catchment of two streams; i) Kilnacarrow Stream (EPA ID: Stream 26_1494) is located to the north-west of the Derryaroge site and flows in a northerly direction into the River Shannon and ii) Ballynakill Stream (named locally as the Griallagh River, EPA ID: Stream 26_3574) forms a short section of the boundary but mainly runs to the east of the site in a northerly direction and joins the River Shannon to the north of the site. The catchment area for each stream was estimated using the EPA's online database (gis.epa.ie/Envision) and geographic contours available from OS maps.

Derryadd Bog (Location of Turbines 10-17)

Three streams were identified as flowing through or adjacent to the Derryadd Bog. An upper section of the Ballynakill Stream (named locally as the Griallagh River, EPA ID: (for this section) Stream 26_625a) is located to the east of turbines T10-T17. The Rappareehill Stream (EPA ID: Stream 26_3871) flows south of the Bord na Móna Mountdillion Works and then south along the western boundary of Derryadd bog before turning west and then north and joining with a number of other streams before flowing into the River Shannon. The Derrygeel Stream (EPA ID: Stream 26_593) flows across the southern section of Derryadd in a westerly direction before flowing north, joining with the Rapparreehill Stream and also the Lehery Stream (located approximately 2.7km to the west of Derryadd Bog) before flowing into the River Shannon. This collection of streams are referred to locally as the Lough Bannow Stream.

The proposed substations and overhead/underground powerlines are located in the Lough Bannow Stream catchment (Rappareehill and Derrygeel) as follows:

- Substation Option A is located to the south of the Mountdillon works. Substation Option A is within the catchment of the Rappareehill Stream, which discharges to the Lough Bannow Stream approximately 5km downgradient of the Substation Option A.

- Substation Option B is within the catchment of the Derrygeel Stream, which discharges to the Lough Bannow Stream approximately 2km downgradient of the substation. Three proposed borrow pits are identified within the Lough Bannow catchment and two located with the Ballynakill catchment.

Lough Bannow Bog (Location of Turbines 18-24)

Two streams were identified as flowing adjacent to the Lough Bannow Bog. The uppermost section of the Ballynakill Stream (named locally as the Griallagh River, EPA ID: Stream 26_625) flows in a northerly direction and runs along a section of the northern boundary of the site and is located to the north of turbines 18-24. There are two streams, both forming part of the Bilberry Stream (Bilberry [west Branch] EPA ID: Stream 26_692, and the Bilberry Stream, EPA ID: Stream: 26_3735) that are located to the south of the Lough Bannow bog. The Bilberry (west branch) Stream is south of the Irish Society for Prevention of Cruelty to Animals (ISPCA) headquarters and the Bilberry Stream is south of Lough Bawn pNHA. It was noted that there were no hydrometric stations located in the immediate environs of the proposed development site. Although hydrometric stations do exist on watercourses downstream of the proposed development, they include flows coming from a number of different tributaries (gis.epa.ie/Envision). As such, they are not representative of the actual flows occurring at the site.

Substantial areas of the proposed development and surrounding area have been artificially drained to enable industrial harvesting of peat. The carefully maintained network of drainage ditches effectively drain the proposed development site and surrounding area. No incidents of flooding on the Lough Bannow Bog were noted during the field surveys with the exception of some flooding noted in the middle of the bog during the winter bird surveys in December 2015. This was inline with the exceptional rainfall which occurred during the 2015/ 16 winter (McCarthy *et al.* 2016). Some flooded bog was also noted during the winter bird surveys in 2016/17, however this occurred south of the Lough Bannow Bog, outside the proposed development site. The proposed development site is not located in a flood prone area (Flood Zone A or B) based on the preliminary flood risk assessment (PFRA) maps, published by the OPW. Based on the information available and a site-specific risk assessment, the proposed development site is not considered a flood risk.

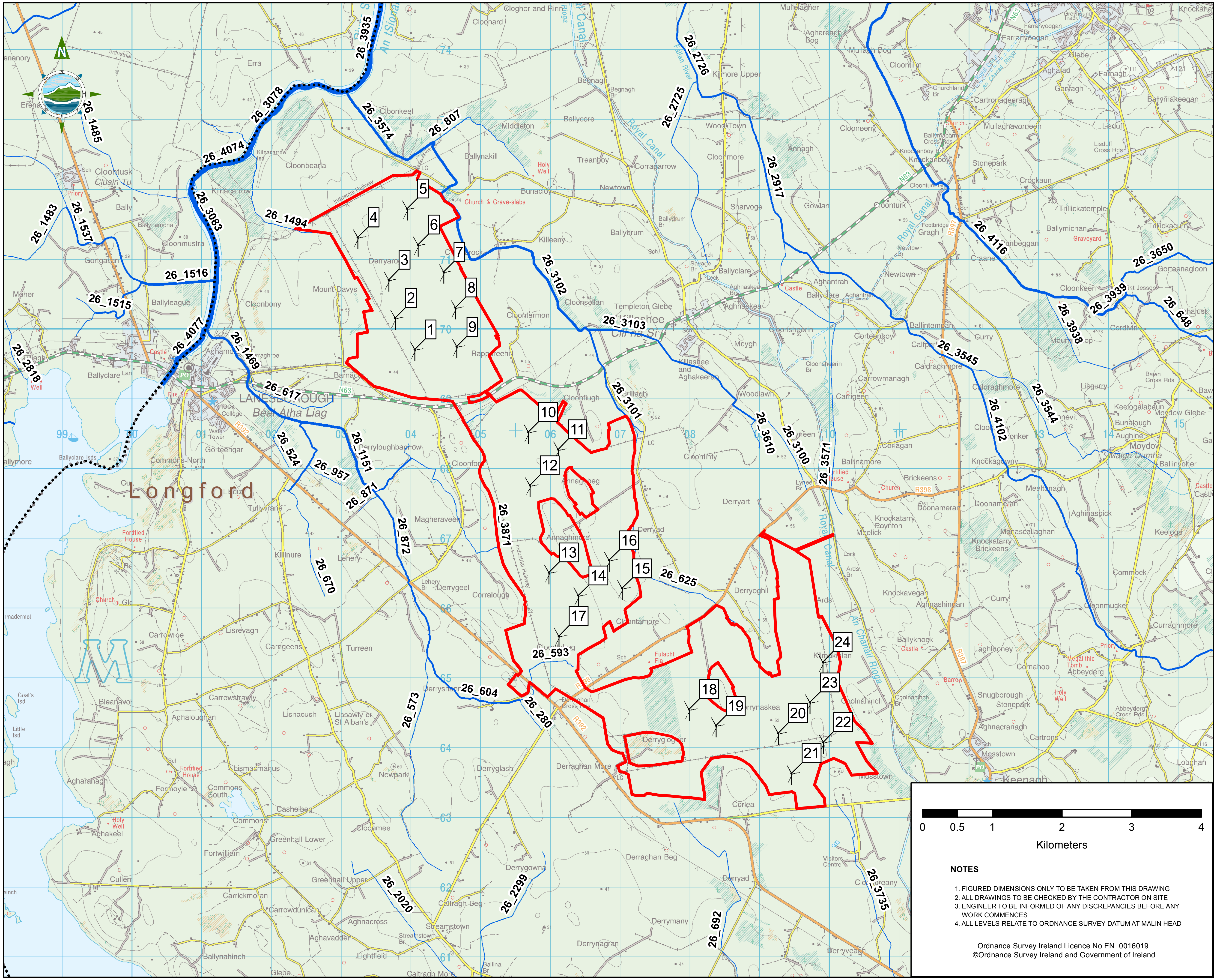
Site-Specific Surface Water Monitoring

Surface water monitoring is conducted as part of the requirements of the Mountdillon IPC Licence on a regular basis. Results for the parameters tested were within the recommended discharge limits. Water sampling was also carried out by TOBIN in 2017 and 2018 (see EIAR Chapter 8). These results provide a baseline set of data which can be used for comparative studies during the lifetime of the proposed development.

Ground Water

The EPA report that bedrock is close to the surface within 1km of the surrounding area of the proposed development site. No significant dissolution features (i.e. karst) were observed from visual appraisal of the proposed development and no karst features are recorded within the GSI Karst Database of Ireland

within a 1km radius of the proposed development site. The groundwater vulnerability throughout the proposed development site ranges from L (Low) to H (High). On a regional scale, the groundwater flow direction is generally a subdued reflection of surface water drainage. Therefore, the groundwater flow is considered to be towards the surrounding tributaries and the large rivers located to the east (Ballynakill River), and west (Lough Bannow, Rappareehill and Derrygeel streams) of the proposed development. Limited recharge to groundwater is likely to occur due to the low permeability peat, marl and till deposits on the site. For further details on the hydrology/ hydrogeology of the proposed development please refer to EIAR Chapter 8.



Legend

- Planning Application Boundary
- River
- County Boundary
- Proposed Turbine Locations

River Segment Code: 26_XXXX

0 0.5 1 2 3 4

Kilometers

NOTES

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Issue	Date	Description	By	Chkd.
A	Jan 2018	Final Issue	FH	JD

Client: BORD NA MÓNA — Naturally Driven

Project: DERRYADD WIND FARM

Title: Existing Surface Water Features and Drainage within the Site Boundary

Scale @ A3: 1:50,000

Prepared by: F.Healy | Checked: J. Dillon | Date: January 2019

Project Director: D. Grehan

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Figure 4

Issue: A

7 NATURA IMPACT ASSESSMENT

7.1 CONCLUSIONS OF APPROPRIATE ASSESSMENT SCREENING REPORT

The initial step in the assessment of potential significant effects on European sites was the determination of the number and nature of the sites within the potential ZoI of the proposed development (see Appendix B). Initially sites within a 15km buffer from the site boundary were considered to be within the potential ZoI. In addition, using the precautionary principle, sites outside of the 15km buffer zone were also taken into account and assessed where potential pathways for impact were identified. A standard source-receptor-pathway conceptual model was then used to screen the initial list to determine a preliminary list of "relevant" European sites (i.e. those which could be potentially affected). This conceptual model is a standard tool in environmental assessment. In order for an effect to occur, all three elements of this mechanism must be in place. The absence or removal of one of the elements of the mechanism means there is no likelihood for the effect to occur. In the context of the proposed development, the model comprises:

- Source (s) – e.g. sediment run-off from proposed development;
- Pathway (s) – e.g. drains and streams connecting to a European site; and
- Receptor (s) – qualifying habitats and species of European sites.

The Appropriate Assessment screening process considered potential impacts which may arise during the construction, operational and decommissioning phases of the proposed development. The conclusion of the Appropriate Assessment Screening is outlined below:

Following an examination, analysis and evaluation of the relevant information, including in particular, the nature of the proposed development, its potential relationship with European sites, in view of best scientific knowledge, on the basis of objective information and in light of the conservation objectives of the relevant European sites, it is the professional conclusion of the authors of the report that it is not possible to rule out the possibility of significant effects on four European sites, namely;

- Lough Ree SPA,
- Lough Ree SAC,
- Ballykenny-Fisherstown Bog SPA, and
- River Shannon Callows SAC.

This conclusion has been reached on the basis of the potential impact sources and pathways associated with the proposed development which may put qualifying interest species or habitats/special conservation interest species at risk.

For these reasons, it is the professional opinion of the authors of this report that the application for consent for the proposed development requires an Appropriate Assessment to be undertaken, for which

a NIS will be required to assess whether the proposed development would adversely affect the integrity of any European sites.

Table 7.1: Designated Features and Potential Significant Effects identified in the AA Screening Report

European Site, Code, and Approx. Distance from the Proposed Development	Qualifying Interest(s)(QI's) / Special Conservation Interest(s)(SCIs) (* indicates Priority Annex I Habitats)	Identification of Potential Significant Effects	Potential Significant Effect
Lough Ree SPA (004064) c. 2.5km west	• Little Grebe (*Tachybaptus ruficollis*) [A004] • Whooper Swan (*Cygnus cygnus*) [A038] • Wigeon (*Anas penelope*) [A050] • Teal (*Anas crecca*) [A052] • Mallard (*Anas platyrhynchos*) [A053] • Shoveler (*Anas clypeata*) [A056] • Tufted Duck (*Aythya fuligula*) [A061] • Common Scoter (*Melanitta nigra*) [A065] • Goldeneye (*Bucephala clangula*) [A067] • Coot (*Fulica atra*) [A125] • Golden Plover (*Pluvialis apricaria*) [A140] • Lapwing (*Vanellus vanellus*) [A142] • Common Tern (*Sterna hirundo*) [A193] • Wetland and Waterbirds [A999]	The Lough Ree SPA is designated for a number of water bird species. <u>Direct effects:</u> The potential for birds to collide with turbines is one of the main direct effects to consider in the assessment of possible effects associated with an operating wind farm. The potential for collision risk exists for the special conservation interest species of this SPA. <u>Indirect effects:</u> The habitats onsite may provide supporting habitat to the special conservation interest species of this SPA. Habitat loss may occur as a consequence of the land take from the footprint of the proposed development and through disturbance and/or displacement. A wide range of environmental factors are required to support these water bird species including high water quality and clarity, good supply of food resources and breeding sites. Potential indirect effects associated with the proposed development include; increased levels of silt and suspended solids in surface water run-off from the site during the construction stage. This could occur as a result of soil stripping, traffic, and construction works. Potential pollution risk exists from an alteration of the pH in surface water from concrete utilised onsite, alteration of soil conditions and spills/leaks. Potential exists with reference to in-combination effects due to water quality pressures in the River Shannon catchment.	Yes
Lough Ree SAC (000440) c. 2.5km west	• Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation [3150] • Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (*important orchid sites) [6210] • Degraded raised bogs still capable	The Lough Ree SAC is designated for a number of different habitat types and for Otter. At a local scale, the proposed development is located between the Ballynakill River to the east and the Lough Bannow Stream to the west. The proposed development site is situated within the River Shannon catchment and the Shannon River Basin District, upstream of the Lough Ree SAC. All watercourses in the area ultimately discharge to the River Shannon. <u>Indirect effects:</u> Potential indirect effects associated with the proposed development include; increased levels of silt and suspended solids in surface water run-off from the site during the construction stage. This could occur as a result of soil stripping, traffic, and construction works. Potential pollution risk exists from an alteration of the	Yes

European Site, Code, and Approx. Distance from the Proposed Development	Qualifying Interest(s)(QI's) / Special Conservation Interest(s)(SCIs) (* indicates Priority Annex I Habitats)	Identification of Potential Significant Effects	Potential Significant Effect
	of natural regeneration [7120] • Alkaline fens [7230] • Limestone pavements [8240] • Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0] • Bog woodland [91D0] • Otter (*Lutra lutra*) [1355]	pH in surface water from concrete utilised onsite, alteration of soil conditions and spills/leaks. Potential exists with reference to in-combination effects due to water quality pressures in the River Shannon catchment. These potential effects may impact the aquatic/water dependent qualifying interest habitats, i.e. natural eutrophic lake, degraded raised bogs, alkaline fens and bog woodland. Potential exists for the site to provide supporting habitat for Otter, which are a qualifying interest of the SAC. There is potential for habitat loss associated with the land take related to the construction of the proposed development infrastructure. Old oak woods, orchid-rich calcareous grassland, and limestone pavement are terrestrial habitats which are found fringing the Lough Ree SAC. No source-pathway-receptor link from the proposed development to these habitats was identified based on the type of development, its potential impacts and the distance between the proposed development site and this SAC. These habitats can therefore be screened out from further assessment.	
Ballykenny-Fisherstown Bog SPA (004101) c. 4.5km north	• Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A395]	The Ballykenny-Fisherstown Bog SPA is designated for Greenland White-fronted Goose. <u>Direct effects:</u> The distance separating this SPA and the proposed development site is within potential connectivity distance for this species. The Greenland White-fronted Goose has a maximum core foraging distance of 8km (SNH 2016). The potential for birds to collide with turbines is one of the main direct effects to consider in the assessment of possible effects associated with an operating wind farm. The potential for collision risk exists for the special conservation interest species of this SPA.	Yes
River Shannon Callows SAC (000216) c. 22.8km south	• Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410] • Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*) [6510] • Limestone pavements [8240] • Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0] • Otter (*Lutra lutra*) [1355]	This SAC is located approximately 22.8km downstream of the proposed development. Surface water pathways exist; however, considering: • the distance from the proposed development (22.8km), • the nature of the proposed development (discharges indirectly into Lough Ree), • the dilution capabilities of Lough Ree (which is upstream of the River Shannon Callows SAC), and • the qualifying interests of this SAC, a strong source-receptor-pathway is not considered to exist. Furthermore, in relation to the potential connectivity of both sites with regards Otter; range sizes for Otter vary widely according to the quality of the foraging habitat and other resources. The smallest territories are thought to occur at coastal sites, where territories may be as small as 2km. The longest territories occur in upland streams where an individual may have to range more than 20km to find sufficient food (Reid *et al.* 2013). In this case the source pathway receptor is weak and no adverse effects are likely. Notwithstanding the above, a significant adverse effect cannot be excluded without further consideration.	Yes

7.2 CONSERVATION OBJECTIVES

The conservation objectives for each of the potentially effected European sites are outlined in Table 7-21 below.

7.2.1 Lough Ree SPA

7.2.1.1 Special Conservation Interest Species of the Lough Ree SPA

The Lough Ree SPA is located approximately 2.5km directly west of the proposed development site. This SPA is designated for thirteen special conservation interests. The site is one of the most important wintering water bird sites in the Midlands of Ireland. The special conservation interest Annex I species of the Lough Ree SPA, and the overall conservation objectives for each, are listed in Table 7-21 below.

Table 7-21: Special Conservation Interest Species and Conservation Objectives of the Lough Ree SPA

Special Conservation Interest Species	Conservation Objectives
Little Grebe (*Tachybaptus ruficollis*) [A004]	To maintain or restore the favourable conservation condition of the bird species listed as special conservation interests for this SPA. To maintain or restore the favourable conservation condition of the wetland habitat at Lough Ree SPA as a resource for the regularly-occurring migratory waterbirds that utilise it.
Whooper Swan (*Cygnus cygnus*) [A038]	
Wigeon (*Anas penelope*) [A050]	
Teal (*Anas crecca*) [A052]	
Mallard (*Anas platyrhynchos*) [A053]	
Shoveler (*Anas clypeata*) [A056]	
Tufted Duck (*Aythya fuligula*) [A061]	
Common Scoter (*Melanitta nigra*) [A065]	
Goldeneye (*Bucephala clangula*) [A067]	
Coot (*Fulica atra*) [A125]	
Golden Plover (*Pluvialis apricaria*) [A140]	
Lapwing (*Vanellus vanellus*) [A142]	
Common Tern (*Sterna hirundo*) [A193]	

7.2.1.2 Description of Lough Ree SPA Special Conservation Interest Species Recorded in the Study Area

Whooper Swan (Annex I EU Birds Directive)

The wintering population of Whooper Swan has been increasing since 1995. An estimated 15,104 birds winter in all-Ireland (AI). This population is currently thought stable (Crowe *et al.* 2015). The birds which winter in Ireland and breed in Iceland, constitute 60% of this population. Birds arrive in September or October and remain until March or April. The birds utilise the following habitats; lakes, marshes, lagoons, sheltered inlets and feed regularly on agricultural fields.

Whooper Swans were recorded regularly during vantage point surveys. Observations were confined to the typical wintering period, from September to April. The species was noted in each month, October to March inclusive in 2014/ 15, 2015/ 16 and 2017/ 18 (and frequently in the winter of 2016/ 17). There was a combined total of 149 separate flights record at the site, as per the CRM Report in the EIAR Appendix 6.5 (CRM 2018). These flights were primarily associated with commuting. Commuting flights included birds flying from feeding grounds towards the River Shannon. Over the course of surveying, Whooper Swans were observed to utilise flooded bog opportunistically for roosting and feeding. Notable parcels of land with feeding/ roosting flocks included Derrycashel (offsite) and Derryaroge (onsite). In 2016, the largest flock feeding onsite numbered 72 birds at Derryaroge. However, site usage differed conspicuously between the first winter (2014/ 15) and second winter (2015/ 16). The more extensive flooding which occurred in the second winter attracted greater numbers of Whooper Swan more frequently to the site. Flock size ranged from 1 to 148 birds. The largest flock (148 birds) was observed feeding in the fields to the east of Derryadd (offsite), as per Ornithology Report 2015/ 16 in EIAR Appendix 6.1. On the 15th of February 2018, 100 birds were recorded feeding in an area of flooded bog at Derryaroge bog (onsite). Numbers observed onsite were below national importance estimates (150 birds constitute a flock of national importance). I-WeBS surveys of the hinterland of the proposed development site recorded Whooper Swan principally along the River Shannon and in flooded fields adjacent to the river. Flock size ranged from 1-100 birds. The fields at Bunacloy Co. Longford (approximately 1km north-east) hosted 200 birds in January 2017. The Fortwilliam Turlough located approximately 5 km to the west of the proposed development site was also notable for its 2017/ 18 wintering population of Whooper Swan (maximum site count was 88 birds).

The total flight activity recorded from vantage point surveys for Whooper Swan amounted to 48,081 seconds (CRM 2018). Much of the flight activity was recorded from vantage points that overlooked the River Shannon; however, flight lines were not restricted to specific portions of the site (see Whooper Swan Flight Line Maps in EIAR Appendix 6.1). The results of the collision risk analysis are below the threshold level of a 1% increase in annual mortality (Percival 2003) required for potentially significant effects (see CRM [2018]). The maximum counts varied between years; the peak onsite/ on adjacent lands was 63 (2014/ 15), 148 (2015/ 16), 29 (2016/ 17) and 100 (2017/ 18). The exceptional rainfall which occurred during the 2015/ 16 winter and resulting flooding (McCarthy *et al.* 2016) coincided with the highest number of Whooper Swan recorded in the study area. Overall, the cutover bog habitats which make up the majority of the site are judged to be sub-optimal for this species. Furthermore, there are concentrations of the species within the wider surroundings (Lough Ree) in optimal habitat. Lough Ree is a traditional Whooper Swan site which provides permanent wintering habitat. During periods of flooding, Whooper Swan were found to utilise the site opportunistically for foraging.

Mallard (Green Listed BoCCI)

Irish breeding birds are resident and are augmented by migrants from Iceland. Additionally, birds bred for hunting are released each autumn in many locations throughout the country (Boland and Crowe

2012). The wintering population numbers 38,000 birds. Mallard are the most widespread waterfowl species in Ireland, occurring in almost all available wetland habitats in Ireland.

Mallard were frequently recorded during vantage point surveys. The majority of records were of birds commuting along the River Shannon or feeding on flooded land within the bog group of Mountdillon (offsite). October 2014 to March 2018 there was a combined total of 303 separate flights record at the site, as per CRM (2018). On the 15th of December 2015, the largest recorded flock (30 birds) was observed feeding in an area of flooded bog at Derrycashel (offsite). Occasionally birds were recorded feeding in drains or in flooded areas of bog onsite. Numbers observed onsite were well below national importance estimates (290 birds constitute a flock of national importance). I-WeBS surveys of the hinterland of the proposed development site regularly recorded this species at Fortwilliam Turlough, along the River Shannon, and in flooded fields adjacent to the river.

The total flight activity recorded from vantage point surveys for Mallard amounted to 42,650 seconds (CRM 2018). Much of the recorded flight activity was recorded from vantage points that overlooked the River Shannon. Given the total watch time (5,736,600 seconds) the number of flight lines recorded was found to be low. Numbers recorded per flight ranged from one to eight. The results of the collision risk analysis are below the threshold level of a 1% increase in annual mortality (Percival 2003) required for potentially significant effects. There are no regular flight paths across the site. The distribution of Mallard flights are shown in EIAR Appendix 6.1. The species is judged not to be dependent on the onsite habitats based on occasional site use, the levels of flight activity and flock size. Similar suitable habitat is present in the area. In addition, the cutover nature of the majority of habitats onsite limits the potential for a significant population to exist within the site boundary.

Golden Plover (Red Listed BoCCI, Annex I EC Birds Directive)

An estimated 150 breeding pairs of Golden Plover are present in the Republic of Ireland (ROI) (Lauder and Donaghy 2008); however, the wintering population is more abundant numbering 170,000 birds AI (Boland and Crowe 2012). Birds within Ireland are partially migrants wintering on the coast or suitable inland habitat. This species is widely distributed around the coast and at some inland sites throughout the country. Breeding is limited to the uplands of the west and north-west of the country. Golden Plover are among the species of special conservation interest for the Lough Ree SPA.

The species was regularly recorded during the survey period 2014 to 2018. There was a combined total of 110 flights of the species over the winter periods 2014/ 15, 2015/ 16, 2016/ 17 and 2017/ 18 (CRM 2018). Winter observations included records of large flocks (maximum count 800); however, these observations were typically confined to the River Shannon and adjacent fields. Flocks which were noted as feeding/ roosting onsite were typically smaller, ranging from 1 to 180 individuals. All breeding season observations of this species were made in April/ May. There were 22 observations in total made between 2015, 2016 and 2017 breeding season surveys. The location of the proposed development is

outside the breeding range for this species in Ireland. No evidence of breeding was observed for this species and it is considered that all observations of Golden Plover at the site were of non-breeding individuals. I-WeBS surveys of the hinterland of the proposed development site recorded Golden Plover principally along the River Shannon and in flooded fields adjacent to the river. Flock size ranged from 20 to 600 birds (2017/ 18). The Fortwilliam Turlough, located approximately 5km to the west of the proposed development site, was also notable for its 2016/ 17 and 2017/ 18 wintering population of Golden Plover (maximum site count was 2,000 and 520 birds respectively). The site peak count at Fortwilliam Turlough is considered a nationally important flock (1% of the national population is 1,200 birds).

The total flight activity recorded from vantage point surveys for Golden Plover amounted to 1,365,026 seconds (CRM 2018). Much of the recorded flight activity was recorded from vantage points that overlooked the River Shannon. Given the total watch time (5,736,600 seconds) the number of flight lines recorded was found to be low. The results of the collision risk analysis are of low potential significance (CRM 2018), i.e. there was a measurable collision risk (at least one collision in 30 years), however, the additional mortality due to collision risk is below the 1% threshold (Percival 2003). The distribution of Golden Plover flights are shown in EIAR Appendix 6.1. Golden Plover flocks were found to only use the site occasionally and the relative level of flight activity and flock size were low. Additionally, the wider surroundings contain similar suitable habitat utilised by larger flocks, e.g. flooded fields adjacent to the River Shannon. Therefore, the species were judged not to be dependent on the habitats of the site.

Lapwing (Red Listed BoCCI)

An estimated 2,000 breeding pairs of Lapwing are present in ROI (Lauder and Donaghy 2008). The wintering population reaches 210,000 annually AI (Boland and Crowe 2012). It is unknown if breeding birds within Ireland are resident, or migrants which arrive in the autumn to coastal areas or suitable inland habitat. This species is thinly distributed across the country as a breeder. Lapwings are named of special conservation interest for the Lough Ree SPA.

This species was recorded infrequently within the study area over the course of breeding and wintering surveys. There were 55 flights recorded, predominantly, during the 2014/ 15, 2015/ 16, 2016/ 17 and 2017/ 18 winter months (CRM 2018). Seventeen individuals in total were recorded during the winter 2014/ 15 survey (three in October 2014 and fourteen in January 2015). Lapwings were recorded on four separate occasions throughout the winter 2015/ 16 survey period – the largest flock observed was on the 14th of December 2015 when 53 birds were recorded on a flooded bog to the north of the proposed development site on Mountdillon bog (offsite) (EIAR Appendix 6.1). During the 2016/ 17 survey period there were frequent observations of Lapwing; however, the majority were recorded outside the site boundary near the banks of the River Shannon (EIAR Appendix 6.1). There were no breeding season observations in 2015. One flight was recorded on the 21st of June 2016; the flock flew below the

potential collision height (PCH) and numbered 13 individuals (see EIAR Appendix 6.1). This observation was judged to be a commuting flight. During the 2017 surveys only four flights were recorded for this species within the study area. No evidence of breeding was noted within the proposed development site; however, a displaying bird was recorded within approximately 1km of the northern boundary at Cloonkeel (in April and June 2017). During the 2010 Copland Study (Copland 2011), Lapwing were recorded as a probable breeder at Derrycashel bog. Derrycashel bog is an area of cutaway bog fringing the River Shannon to the north of the site. This record was made to the northeast of Derryaroge bog. I-WeBS surveys of the hinterland of the proposed development site recorded Lapwing principally along the River Shannon and in flooded fields adjacent to the river. Flock size ranged from 1-180 birds (2017/ 18). The Fortwilliam Turlough located approximately 5km to the west of the proposed development site was also notable for its 2016/17 wintering population of Lapwing (maximum site count was 720 birds). Flock size was below national importance estimates (1% of the national population is 1,100 birds).

The total flight activity recorded during vantage point surveys for Lapwing amounted to 253,024 seconds (CRM 2018). Much of the flight activity was recorded from vantage points that overlooked the River Shannon. Given the total watch time (5,736,600 seconds) the number of flight lines recorded was found to be low. The results of the collision risk analysis are below the threshold level of a 1% increase in annual mortality (Percival 2003) required for potentially significant effects. The distribution of Lapwing flights are shown in EIAR Appendix 6.1. This species is judged not to be dependent on the onsite habitats based on occasional site use, the levels of flight activity and low flock size. Similar habitat is present in the wider area. In addition, the active peat production which is ongoing at the site limits the potential for a significant population to exist within the site boundary.

Common Tern (Annex I EU Birds Directive)

An estimated 4,189 breeding pairs of Common Tern are present in Ireland AI (Hannon *et al.* 1997). Birds within Ireland are migrants wintering in Africa. This species is widely distributed around the coast and at some inland sites throughout the country. The Common Tern within the wider area of the proposed development site forms a species of conservation interest of the Lough Ree SPA. The 90 pairs recorded at Lough Ree constitute 2.1% of the all-Ireland breeding population, making Lough Ree a nationally important site for breeding Common Tern (Department of Arts, Heritage and the Gaeltacht [DAHG] 2015).

Common Terns were infrequently observed over the course of the breeding bird surveys carried out within the study area (EIAR Appendix 6.1). This species was not recorded during the 2015 breeding season. The first observations were made during the 2016 breeding season, when two vantage points were added which overlooked the River Shannon to the north of the site. Three flights were recorded on the following dates 30th and 31st of May and once on the 17th of June 2016, twice during a dawn survey at VP1 and once during a dawn survey from VP2. During the 2017 breeding season surveys two flights

were recorded for this species. The majority of observations were of individuals commuting along the River Shannon.

Numbers per flight ranged from one to two birds (CRM 2018). Collision risk is not considered of potential significance for this species as flight activity was concentrated along the River Shannon and away from the proposed turbine locations. The distribution of Common Tern flights are shown in EIAR Appendix 6.1. There is a Common Tern breeding colony on Lough Ree. However, there is no suitable foraging or breeding habitat onsite and this species does not generally make long distance flights over land between their breeding and feeding areas. Therefore, this species is not dependent on the onsite habitats.

Other Observations

Other special conservation interest species of the Lough Ree SPA that were recorded in low numbers and infrequently include: Tufted Duck, Goldeneye, Wigeon, Teal, Shoveler, Little Grebe and Coot (Table 7-2). These species were mainly recorded off-site and/or along the River Shannon; therefore, it is considered there is limited potential for significant adverse effects on these species as a result of the proposed development. Common Scooter was not recorded either at the site or off-site.

Table 7-2: Observations of Other Occasional Special Conservation Interest Species Recorded in the Study Area

Species	Location of Record	Year of Record
Tufted Duck	Recorded off-site at Fortwilliam Turlough, Cordora Turlough, Turreen Turlough, Ballyleague and on the River Shannon.	Winter 2016/17
Goldeneye	Frequently recorded foraging along the River Shannon or Lough Ree.	Winter 2017/ 18
	Recorded off-site at Ballyleague and River Shannon.	Winter 2016/17
Wigeon	Recorded off-site at Cloonkeel, Ballyleague, Cordora Turlough, Fortwilliam Turlough, Turreen Turlough, on the River Shannon and on flooded bog to south of the site.	Winter 2016/17
	Recorded off site along the River Shannon.	Winter 2017/18
Teal	One observation of four individuals from west to east across the proposed development site (over half way up the site).	Winter 2014/15
	Recorded off-site at Mountdillon Bog (near VP2) on two occasions over the course of the survey period. Flocks were seen both feeding and roosting near to flooded areas of bog.	Winter 2015/16
	Recorded off-site along the River Shannon.	Winter 2016/17
	Recorded off-site along the River Shannon.	Winter 2017/18
Shoveler	Recorded off-site at Fortwilliam Turlough, Cordora Turlough and Turreen Turlough.	Winter 2016/17

Species	Location of Record	Year of Record
Little Grebe	Recorded off-site on River Shannon, Mountdillon Ponds and flooded bog to the south of the site.	Winter 2016/17
Coot	The highest record for this species comprised four birds observed on the River Shannon, outside the site boundary.	Winter 2016/17

7.2.2 Lough Ree SAC

7.2.2.1 Qualifying Interests and Conservation Objectives of the Lough Ree SAC

The Lough Ree SAC is located downstream of the proposed development situated 2.5km due east. There are eight species and/ or habitat types (qualifying interests) for which the site is designated (see Table 7-3).

Table 7-3: Qualifying Interests and Conservation Objectives of the Lough Ree SAC

Qualifying Interests (* indicates Priority Annex I Habitats)	Conservation Objectives
Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation [3150]	To restore the favourable conservation condition
Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210]	To restore the favourable conservation condition
Degraded raised bogs still capable of natural regeneration [7120]	To restore the favourable conservation condition
Alkaline fens [7230]	To maintain the favourable conservation condition
Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]	The status of Old sessile oak woods with Ilex and Blechnum in the British Isles as a qualifying Annex I habitat for the Lough Ree SAC is currently under review. The outcome of this review will determine whether a site-specific conservation objective is set for this habitat.
Limestone pavement [8240]	To maintain the favourable conservation condition
Bog woodland [91D0]	To restore the favourable conservation condition
Otter (*Lutra lutra*) [1355]	To maintain the favourable conservation condition

7.2.2.2 Description of Lough Ree SAC Qualifying Interests Recorded in the Study Area

The following qualifying interest habitats and species do not occur within the ZoI of the proposed development and are therefore not discussed in detail below; natural eutrophic lakes with Magnopotamion or Hydrocharition type vegetation [3150], semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210], degraded raised bogs still capable of natural regeneration [7120], alkaline fens [7230], old sessile oak woods with Ilex and Blechnum in the British Isles [91A0], limestone pavement [8240] and bog woodland [91D0].

European Otter

The otter (*Lutra lutra*) is fully protected in Ireland under the Irish Wildlife Act 1976 (as amended). It is also listed on the Irish Red Data book as "International Importance". The otter is also protected under Annex II of the EU Habitats Directive giving it strict protection as a species of community interest for which EU nations must designate SAC. The otter is also listed on Appendix II of the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention, 1982) of which Ireland has ratified. There is a known population of otters present around Lough Ree (DAHG 2016).

No evidence of otter holts (breeding site) were noted within the proposed development site, however otter signs were located in Derryadd, and spraints (droppings/ scat) were found in a drainage ditch in the north east of Lough Bannow Bog, both within the proposed development site during ecological survey work carried out by Bord na Móna between 2010 and 2012 (see EIAR Appendix 6.3). This ditch connects to the nearby Royal Canal. It is likely Otter use this drainage ditch to commute to and from the Royal Canal. This drainage ditch was found to provide little/no foraging opportunities for otter. No otter signs were recorded during the protected mammal survey in April 2018; however, in November 2017 there was an ad hoc record of an otter spraint recorded (offsite) on the railway bridge (over the Shannon) at VP 2 (location: N 01064 72271).

7.2.3 Ballykenny-Fisherstown Bog SPA

7.2.3.1 Special Conservation Interest Species of the Ballykenny-Fisherstown SPA

The Ballykenny-Fisherstown Bog SPA is located approximately 4.5km directly north of the proposed development site. The proposed development is situated downstream of the SPA. The SPA is designated for one special conservation interest, i.e. Greenland White-fronted Goose. The conservation objective for this site is to maintain or restore the favourable conservation condition for the bird species listed as a special conservation interest for this SPA.

At the time this site was designated as a SPA it was being used by part of the Loughs Kilglass and Forbes Greenland White-fronted Goose population. The geese appear to have since abandoned the peatland sites in favour of grassland sites elsewhere. The site was regularly utilised up until the 1980s.

7.2.3.2 Description of Ballykenny-Fisherstown Bog SPA Special Conservation Interest Species Recorded in the Study Area

Greenland White-fronted Goose (Annex I EU Birds Directive)

An estimated 10,977 birds winter in Ireland, with the majority of this population occurring on the Wexford slobs (Boland and Crowe 2012). Outside of Wexford the population has a localised distribution; on peatlands and turloughs scattered throughout the midlands, west and north of the country. The species is increasingly abandoning traditional peatland sites in favour of agricultural fields. Greenland White-fronted Geese are a qualifying interest of the Ballykenny-Fisherstown Bog SPA (4.5km to the north of the site), although the species has not been recorded at the site in recent years.

During a consultation meeting with NPWS, it was pointed out that there is a Greenland White-fronted Goose roost on Inchcleraun island, Lough Ree.

During the winter bird field surveys undertaken from 2014/15 to 2017/18, there was a single record of this species noted within the study area. On the 11th of November 2015 three birds were recorded feeding in drains and flooded bog onsite (Derryadd bog). There was no flight activity recorded within the study area. The exceptional rainfall which occurred during the 2015/ 16 winter and resulting flooding (McCarthy 2016), created a temporary feeding opportunity onsite. This species is deemed not dependent on the habitats onsite based on the single observation of a flock onsite which was well below the threshold of national importance (109 birds constitutes a flock of national importance).

7.2.4 River Shannon Callows SAC

7.2.4.1 Qualifying Interests and Conservation Objectives of the River Shannon Callows SAC

The River Shannon Callows SAC is located downstream of the proposed development situated 22.8km due south. There are five species and/ or habitat types (qualifying interests) for which the site is designated (see Table 7-3).

Table 7-4: Qualifying Interests and Conservation Objectives of the River Shannon Callows SAC

Qualifying Interests (* indicates Priority Annex I Habitats)	**Conservation Objectives**
Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410]	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.
Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*) [6510]	
Limestone pavement [8240]	
Alluvial forests with Alnus glutinosa and Fraxinus excelsior (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0]	
Otter (*Lutra lutra*) [1355]	

7.2.4.2 Description of River Shannon Callows SAC Qualifying Interests Recorded in the Study Area

The following qualifying interest habitats and species do not occur within the ZoI of the proposed development and are therefore not discussed in detail below; Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410], Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*) [6510], Limestone pavement [8240], and Alluvial forests with Alnus glutinosa and Fraxinus excelsior (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0].

European Otter

The River Shannon Callows SAC holds a population of Otter (DAHG 2013). No evidence of otter holts (breeding site) were noted within the proposed development site, however otter signs were located in Derryadd, and spraints (droppings/ scat) were found in a drainage ditch in the north east of Lough Bannow Bog, both within the proposed development site. This ditch connects to the nearby Royal Canal. It is likely Otter use this drainage ditch to commute to and from the Royal Canal. This drainage ditch was found to provide little/no foraging opportunities for otter. No otter signs were recorded during the protected mammal survey in April 2018; however, in November 2017 there was an ad hoc record of an otter spraint recorded (offsite) on the railway bridge (over the Shannon) at vantage point VP 2 (location: N 01064 72271).

7.3 CONSERVATION OBJECTIVES AND POTENTIAL DIRECT AND INDIRECT EFFECTS

Potential direct and indirect effects associated with the proposed development which have the potential to adversely affect the integrity of the relevant European sites are considered below. An ecological impact assessment of the potential impacts on European sites was conducted, utilising a standard source-receptor-pathway model where in order for an impact to occur all three elements of this mechanism must be in place (as per the AA Screening Report). Potential impacts from the proposed development on the qualifying interest(s)/ special conservation interest species of a European site should be considered in relation to the species-specific conservation objectives.

7.3.1 Lough Ree SPA

7.3.1.1 Potential Effects

Construction Phase

Habitats which are not within the boundary of a designated site but occur within the wider surroundings may provide supporting habitat to the species for which the site is designated. This can be the case particularly where mobile species such as birds are involved. The potential significant adverse effects on avian communities within the vicinity of the proposed development site during the construction phase have been divided into two main areas; habitat loss and fragmentation (direct), and disturbance displacement (indirect). These effects are associated with both the direct habitat loss associated with construction and the indirect disturbance caused by the activity of machinery and staff within the proposed development site.

The following special conservation interest species have been screened out from potential adverse effects during the construction phase:

- Common Scoter, Goldeneye and Common Tern are not considered further as the proposed development site does not provide suitable habitat for these species. In addition, the results of the field surveys undertaken indicates these species rarely occur within the study area (EIAR

Appendix 6.1). Therefore, it was determined the proposed development will not result in any adverse effects on the population of these species during the construction phase.

- Similarly, the following species have also been screened out without the need for further assessment based on low frequency of observations within the study area; Wigeon, Tufted Duck, Teal, Shoveler, Little Grebe and Coot. These species were recorded very rarely or not at all; therefore, it was determined the proposed development will not result in any adverse effects on the population of these species during the construction phase (EIAR Appendix 6.1).

Of the special conservation interest species of the Lough Ree SPA, using the precautionary principle, potential adverse effects during the construction phase cannot be ruled out for the remaining four species, i.e. Whooper Swan, Mallard, Lapwing and Golden Plover.

The wetlands of Lough Ree and by association the water bird communities of the SPA are dependent on good water quality. Water quality perturbations associated with construction activity have potential to impact upon the ecologically sensitive waterways in the vicinity of the proposed development. Therefore, the smaller streams and drainage ditches of the proposed development site require water quality protection measures. For turbine locations in proximity to watercourses, works that could give rise to impacts would be associated with sediment release during the erection of turbines or potential contamination of surface water from concrete and/ or fuels used during construction.

Operational Phase

At the proposed development site, potential exists for birds flying through the airspace occupied by operating turbines to collide with turbines (direct effect). To determine collision risk to key avian target species a Collision Risk Model was generated (CRM 2018). The method of analysis has been developed by Band *et al.* (2007). For the purposes of the analysis all collisions are considered fatal, either directly or indirectly through injury. The modelling methods differ between species. Contributing factors used in the analysis include; the duration of the flight within the possible collision zone, the number of birds per observation, wingspan and flight speed, individual's body lengths, the number of hours in which a given species can be expected to be active and the time of year in which a species is likely to be present. The particulars of bird species and specifications of the turbine in-combination contribute to CRM analysis. The results of the CRM were used to inform the design phase of the proposed development, specifically the positioning of the turbines away from sensitive areas in order to avoid potential adverse effects on special conservation interest species. It was not possible to determine a collision risk for several species due to the very low occurrence of the species within the study area. These species include; Wigeon, Teal, Tufted Duck, Little Grebe, Common Scoter, Shoveler, Goldeneye and Coot. Of the special conservation interest species for the Lough Ree SPA, using the precautionary principle, potential adverse effects associated with collision risk during the operational phase cannot be ruled out for the remaining five species, i.e. Whooper Swan, Mallard, Golden Plover, Lapwing and Common Tern.

Additionally, the presence of turbines in the landscape could potentially deter birds from using the area and its surroundings, resulting in a disturbance displacement effect (indirect effect). Disturbance can result in potential adverse effects if it reduces the availability of resources for avian receptors. The majority of studies which show a disturbance effect relate to waterfowl, over distances of up to 800m (wintering birds) and 300m (breeding birds) (Percival 2003). An additional possible disturbance effect is the disruption to flight lines, which may result from a wind farm acting as a partial barrier to bird movements. Such a disturbance effect could be felt as either a barrier to a migration route or between a roost and feeding site. Disturbance can result in displacement of birds from an area which can in turn result in effective habitat loss or a reduction in the quality of the habitat, thereby leading to a reduction in bird density locally (Pearce-Higgins *et al.* 2009). However, the effect of disturbance displacement is expected to decrease over time. The foraging behaviour of local avian communities is expected to adjust as habituation occurs to the disturbance (Langston and Pullan 2003). Given the potential for habituation to occur, disturbance displacement effects are considered to be short term. In addition, Percival (2001) recommends locating turbines at a minimum of 200m apart to facilitate the free movement of birds and thereby avoid a barrier effect. In the present case all turbines are proposed to be located at distances greater than 400m from their nearest neighbour. Of the special conservation interest species for the Lough Ree SPA, using the pre-cautionary principle, potential adverse effects associated with disturbance displacement during the operational phase cannot be ruled out for the following four species; Whooper Swan, Mallard, Lapwing and Golden Plover.

7.3.1.2 Conservation Objectives

A detailed site-specific conservation objectives document is not currently available for Lough Ree SPA. However, based on site-specific conservation objectives documents available for other European sites with equivalent special conservation interest species, and in conjunction with considering the generic conservation objective “To maintain or restore the favourable conservation condition for the bird species listed as special conservation interests for this SPA”, a set of site-specific conservation objectives has been compiled for the special conservation interest species of Lough Ree SPA and used to inform this assessment. This sets out the attributes, measures and targets that would be expected to define the favourable conservation condition of special conservation interest species within Lough Ree SPA. Site-specific conservation objectives documents were not available from other European sites for the following species: Little Grebe, Tufted Duck and Common Scoter. In this situation the attributes, measures and targets that would be expected to define the favourable conservation condition of species that had the same seasonal use of the SPA were used, e.g. the attributes, measures and targets used to assess breeding Common Tern was used to assess breeding Common Scoter.

Table 7-5: Evaluation of Potential Adverse Effects on the Conservation Objectives from the Proposed Development

Attributes and Measures	Target	Evaluation of Potential Adverse Effects Requiring Mitigation
Little Grebe (*Tachybaptus ruficollis*) [A004]; Whooper Swan (*Cygnus cygnus*) [A038]; Wigeon (*Anas penelope*) [A050];Teal (*Anas crecca*) [A052]; Mallard (*Anas platyrhynchos*) [A053]; Tufted Duck (*Aythya fuligula*) [A061]; Goldeneye (*Bucephala clangula*) [A067]; Coot (*Fulica atra*) [A125]; Shoveler (*Anas clypeata*) [A056]; Golden Plover (*Pluvialis apricaria*) [A140] (Wintering); and Lapwing (*Vanellus vanellus*) [A142]. **To maintain or restore the favourable conservation condition of the species in the Lough Ree SPA, which is defined by the following list of attributes and targets:**		
Population trend: Percentage change	Long term population trend stable or increasing	Yes. The proposed development could result in the mortality of special conservation interest species of this SPA through collisions with operating turbines. The potential for adverse effects from the proposed development which could undermine the conservation objectives of this SPA requires evaluation and potential mitigation
Distribution: Range, timing and intensity of use of areas	No significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	Yes. Potential impacts from the proposed development includes habitat loss, disturbance displacement and barrier effects, therefore there is potential for a decrease in the numbers or range of areas used by waterbird species. The potential for adverse effects from the proposed development which could undermine the conservation objectives of this SPA requires evaluation and potential mitigation.
Common Tern (*Sterna hirundo*) [A193] (Breeding); and Common Scoter (*Melanitta nigra*) [A065] **To maintain or restore the favourable conservation condition of the species in the Lough Ree SPA, which is defined by the following list of attributes and targets:**		
Breeding population abundance: apparently occupied nests (AONs): Number	No significant decline	Yes. The proposed development site does not contain suitable foraging or breeding habitat for these species. This limits the potential for significant adverse effects as a result of the proposed development. However, mortality effects may result from birds colliding with operating turbines. This potential adverse effect therefore requires evaluation and potential mitigation.
Productivity rate: fledged young per breeding pair: Mean number	No significant decline	

Attributes and Measures	Target	Evaluation of Potential Adverse Effects Requiring Mitigation
Distribution: breeding colonies: Number; location; area (hectares)	No significant decline	

7.3.2 Lough Ree SAC

7.3.2.1 Potential Effects

The onsite infrastructure has been carefully positioned away from watercourses to ensure there will be no direct impacts on qualifying interest species/habitats of this SAC during the operational phase, e.g. otter.

No qualifying interest habitats will be directly affected by the proposed development during the construction phase. However, given the nature of the proposed development and in the absence of mitigation and/ or best practice construction standards, the following qualifying interest habitats/ species are potentially vulnerable to indirect water quality impacts from the proposed development during the construction phase:

- Natural eutrophic lakes (habitat code: 3150);
- Degraded raised bog (habitat code: 7120);
- Alkaline fens (habitat code: 7230); and
- Otter (species code: 1355).

These habitats/ species require good water quality to maintain/ restore a favourable conservation status.

The sensitivity of an environmental receptor is based on its ability to absorb an effect without perceptible change. No EPA monitoring locations were recorded on the streams adjacent to the proposed development site. However, samples were recorded on the River Shannon 1km downgradient of Lanesborough Power Station and 4km upgradient at Termonbarry village. The most recent EPA results for these monitoring points indicate that the quality of water at this location is Q3 – “Moderately Polluted” and Q3-4 – “Slightly Polluted”. Thus, the hydrological environment is considered to be of moderate sensitivity for receptors draining to the River Shannon via hydrological links.

Potential indirect effects on freshwater habitats within the SAC arising from the construction phase include, deterioration of water quality due to sediment release during the excavation of turbine foundations, hardstanding areas, borrow pits, substation, internal haul roads and amenity roads, or potential contamination of water from concrete and / or fuels during construction. Such potential effects in the absence of mitigation could cause indirect adverse effects on aquatic ecology as follows:

- Sedimentation – temporary smothering of gravel beds with consequent loss of fish and spawning habitat;
- Sediment deposition can also provide a base for growth of filamentous algae on gravel beds, leading to a build-up of sediment and loss of suitable habitat for crayfish and spawning habitat for lamprey and salmonids;

- Sedimentation effects in the absence of mitigation include smothering fish eggs and causing mortalities in fish of all ages, reducing abundance of food and impeding movement of fish;
- Sedimentation effects in the absence of mitigation also include smothering of food prey for juvenile salmonids i.e. macro invertebrates;
- Accidental leakage / spillage of oil and fuels from construction vehicles can have indirect effects on fish, fish food and fish habitats and other aquatic species;
- A reduction in water quality can have an indirect effect on Otter through a reduction in prey availability; and
- The spread of invasive species resulting from the action of construction activities could have a prolonged adverse effect on aquatic habitats which could have the potential to indirectly effect prey availability for Otters.

Potential adverse effects on water quality and potential for the introduction of invasive species are considered to be short term slight negative effects as they are likely to occur during the construction phase only.

The following activities have been identified as having the potential to impact fauna during the construction phase; disturbance due to increased human activity and vehicular access, and habitat loss/ displacement and/ or damage. Excavation works can result in disturbance impacts for otters to a distance of up to 150m, as per NRA guidelines (NRA 2008).

The majority of the water features within the proposed development site consist of drains. As these drains dry up during prolonged dry periods, these non-permanent water features are considered to provide sub-optimal habitat for Otters. Otter signs were recorded in Derryadd and spraints (droppings) were found in a drainage ditch in the north east of Lough Bannow bog. The potential for direct disturbance effects on Otter has been minimised by carefully positioning the proposed onsite infrastructure away from potential Otter habitat. Direct impacts on otter breeding/ resting sites are not predicted given there were no confirmed holts/ resting places recorded within the proposed development site. However, it is possible Otter holts occur outside of the proposed development site within 150m of proposed construction works areas. Considering suitable otter habitat within 150m of the proposed development is limited and potential disturbance effects are restricted to the construction phase, it was determined there will be no significant adverse effects on otter populations within and in the vicinity of the proposed development during the construction phase. During the operational phase the level of operational traffic and ongoing maintenance is expected to be sufficiently low so as to avoid any disturbance effects on fauna that utilise the proposed development site.

7.3.2.2 Conservation Objectives

The specific attributes and targets used to define the conservation objectives of the qualifying interest habitats and species of the Lough Ree SAC are presented in Table 7-6. The potential for the proposed development to adversely affect the species-specific conservation objectives are also considered.

Table 7-6: Evaluation of Potential Adverse Effects on the Conservation Objectives from the Proposed Development

Attributes and Measures	Target	Evaluation of Potential Adverse Effects Requiring Mitigation
Natural eutrophic lakes with Magnopotamion or Hydrocharition – type Vegetation [3150] **To restore the favourable conservation condition of the habitat in the Lough Ree SAC, which is defined by the following list of attributes and targets:**		
Habitat area	Area stable or increasing, subject to natural processes	Yes. An accidental pollution event during construction or operation, of a sufficient magnitude, could potentially adversely affect water quality downstream in Lough Ree and any associated natural processes within the habitat in Lough Ree SAC.
Habitat distribution	No decline, subject to natural processes	
Typical species	Typical species present, in good condition and demonstrating typical abundance and distribution	Yes. An accidental pollution event during construction or operation, of a sufficient magnitude, could potentially adversely affect the species composition downstream within Lough Ree; particularly where the pollutant is silt/sediment, hydrocarbons or cement-based materials.
Vegetation composition: characteristic zonation	All characteristic zones should be present, correctly distributed and in good condition	Yes. An accidental pollution event during construction or operation, of a sufficient magnitude, could potentially adversely affect the species composition downstream within Lough Ree; particularly where the pollutant is silt/sediment, hydrocarbons or cement-based materials.
Vegetation distribution: maximum depth	Maintain maximum depth of vegetation, subject to natural processes	No. The proposed development is not located within or adjacent to the SAC, therefore there will be no effect on water level.
Hydrological regime: water level fluctuations	Maintain appropriate natural hydrological regime necessary to support the habitat	No. The proposed development is not located within or adjacent to the SAC, therefore there will be no effect on water level.
Lake substratum various quality	Maintain appropriate substratum type, extent and chemistry to support the vegetation	Yes. An accidental pollution event during construction or operation, of a sufficient magnitude, could potentially adversely affect the species composition downstream within Lough Ree; particularly where the pollutant is silt/sediment or cement-based materials.
Water quality: transparency	Maintain/ restore appropriate Secchi transparency. There should be no decline in Secchi depth/ transparency	

Attributes and Measures	Target	Evaluation of Potential Adverse Effects Requiring Mitigation
Water quality nutrients	Maintain the concentration of nutrients in the water column to sufficiently low levels to support the habitat and its typical species	Yes. An accidental pollution event during construction or operation, of a sufficient magnitude, could potentially adversely affect the species composition downstream within Lough Ree; particularly where the pollutant is silt/sediment.
Water quality: phytoplankton biomass	Maintain appropriate water quality to support the habitat, including good chlorophyll a status	Yes. An accidental pollution event during construction or operation, of a sufficient magnitude, could potentially adversely affect the species composition downstream within Lough Ree; particularly where the pollutant is silt/sediment.
Water quality: phytoplankton composition	Maintain appropriate water quality to support the habitat, including good phytoplankton composition status	
Water quality: attached algal biomass	Maintain trace/ absent attached algal biomass (<5% cover) and good phytobenthos status	
Water quality: macrophyte status	Restore good macrophyte status	
Acidification status	Maintain appropriate water and sediment pH, alkalinity and cation concentrations to support the habitat, subject to natural processes	Yes. An accidental pollution event during construction or operation, of a sufficient magnitude, could potentially adversely affect the species composition downstream within Lough Ree; particularly where the pollutant is cement based material.
Water colour	Maintain appropriate water colour to support the habitat	Yes. An accidental pollution event during construction or operation, of a sufficient magnitude, could potentially adversely affect the species composition downstream within Lough Ree; particularly where the pollutant is silt/sediment.
Dissolved organic carbon (DOC)	Maintain appropriate organic carbon levels to support the habitat	
Turbidity	Maintain appropriate turbidity to support the habitat	Yes. An accidental pollution event during construction or operation, of a sufficient magnitude, could potentially adversely affect the species composition downstream within Lough Ree; particularly where the pollutant is silt/sediment.

Attributes and Measures	Target	Evaluation of Potential Adverse Effects Requiring Mitigation
Fringing habitat	Maintain the area and condition of fringing habitat necessary to support the natural structure and functioning of the lake habitat	Yes. An accidental pollution event during construction or operation, of a sufficient magnitude, could potentially adversely affect the species composition downstream within Lough Ree; particularly where the pollutant is silt/sediment or cement-based materials.
Semi-natural dry grassland and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (*important orchid sites) [6210] **To restore the favourable conservation condition of the habitat in the Lough Ree SAC, which is defined by the following list of attributes and targets:**		
Habitat area	Area stable or increasing, subject to natural processes	No. The Lough Ree SAC is located 2.5km west of the proposed development. Surface water pathways exist; however, given semi-natural dry grassland and scrubland facies is a terrestrial habitat with no intrinsic dependence on surface water interactions to support the vegetation composition or structure, the proposed development will not adversely affect any of the attributes and targets supporting the favourable conservation status of this qualifying interest habitat.
Habitat distribution	No decline, subject to natural processes	
Vegetation composition: typical species	At least seven positive indicator species present, including two ‘’high quality’’ species	
Vegetation composition: negative indicator species	Negative indicator species collectively not more than 20% cover, with cover by an individual species not more than 10%	
Vegetation composition: non-native species	Cover of non-native species not more than 1%	
Vegetation composition: woody species and bracken	Cover of woody species (except certain listed species) and bracken (*Pteridium aquilinum*) not more than 5% cover	
Vegetation structure: broadleaf herb: grass ratio	Broadleaf herb component of vegetation between 40 and 90%	
Vegetation structure: sward height	At least 30% of sward between 5cm and 40cm tall	
Vegetation structure: litter	Litter cover not more than 25%	
Physical structure: bare soil	Not more than 10% bare soil	
Physical structure: distribution	Area showing signs of serious grazing or other disturbance less than 20m^2	

Attributes and Measures	Target	Evaluation of Potential Adverse Effects Requiring Mitigation
Degraded raised bogs still capable of natural regeneration [7120] **To restore the favourable conservation condition of the habitat in the Lough Ree SAC, which is defined by the following list of attributes and targets:**		
Habitat area: Hectares	Restore area of active raised bog to 70.1ha, subject to natural processes	No. The proposed development is located approximately 9km from this habitat within the Lough Ree SAC and will not involve any works within or adjacent to the SAC that would affect the hydrological regimes or vegetation quality that support the degraded raised bog habitat, nor will the proposed development impede the ability to restore this habitat for the same reasons. Therefore, any potential impacts associated with the construction phase of the proposed development will not adversely affect the area, distribution, vegetation quality or vegetation composition of degraded raised bog habitat in the Lough Ree SAC.
Habitat distribution: Occurrence	Restore the distribution and variability of active raised bog across the SAC	
High bog area: Hectares	No decline in extent of high bog necessary to support the development and maintenance of active raised bog	
Hydrological regime: water levels – Centimetres	Restore appropriate water levels throughout the site	
Hydrological regime: flow patterns – Flow direction; slope	Restore, where possible, appropriate high bog topography, flow directions and slopes	
Transitional areas between high bog and adjacent mineral soils (including cutover areas) – Hectares; distribution	Restore adequate transitional areas to support/protect active raised bog and the services it provides	
Vegetation quality: central ecotope, active flush, soaks, bog woodland – Hectares	Restore 35.1ha of central ecotope/active flush/soaks/bog woodland as appropriate	
Vegetation quality: microtopographical features – Hectares	Restore adequate cover of high quality microtopographical features	
Vegetation quality: bog moss (Sphagnum) species – Percentage cover	Restore adequate cover of bog moss (Sphagnum) species to ensure peat-forming capacity	
Typical ARB species: flora – Occurrence	Restore, where appropriate, typical active raised bog flora	

Attributes and Measures	Target	Evaluation of Potential Adverse Effects Requiring Mitigation
Typical ARB species: fauna – Occurrence	Restore, where appropriate, typical active raised bog fauna	
Elements of local distinctiveness – Occurrence	Maintain features of local distinctiveness, subject to natural processes	
Negative physical indicators – Percentage cover	Negative physical features absent or insignificant	No. The proposed development is located approximately 9km from this habitat within the Lough Ree SAC and will not involve any works within or adjacent to the SAC that would directly affect the percentage cover or vegetation composition of this habitat type. Lough Ree SAC is located downstream of the proposed development and is connected via surface water pathways; however, raised bog habitat is primarily rain water fed, draining to the surrounding drainage network and streams/rivers. Therefore, any potential impacts to water quality during construction pose no risk of indirectly affecting the percentage cover or vegetation composition of degraded raised bog habitat.
Vegetation composition: native negative indicator species – Percentage cover	Native negative indicator species at insignificant levels	
Water quality – Hydrochemical measures	Water quality on the high bog and transitional areas close to natural reference conditions	No. The proposed development is located approximately 9km from this habitat within the Lough Ree SAC and will not involve any works within or adjacent to the SAC that would directly affect the water quality on the high bog and transitional areas. Lough Ree SAC is located downstream of the proposed development and is connected via surface water pathways; however, raised bog habitat is primarily rain water fed, draining to the surrounding drainage network and streams/rivers. Therefore, any potential impacts to water quality during construction pose no risk of indirectly affecting the degraded raised bog habitat.

Attributes and Measures	Target	Evaluation of Potential Adverse Effects Requiring Mitigation
Air quality: nitrogen deposition – kg N/ha/year	Air quality surrounding bog close to natural reference conditions. The total N deposition should not exceed 5kg N/ha/yr	No. Dust generated during construction is only likely to be deposited in measurable quantities in the immediate vicinity of the construction works. The proposed development is located approximately 9km from degraded raised bog habitat within the SAC, therefore there is no pathway for adverse effects to occur, i.e. the Lough Ree SAC is located at such a distance away from the proposed development it poses no risk of affecting nitrogen deposition levels.
Vegetation composition: non-native invasive species – Percentage cover	Non-native invasive species at insignificant levels and not more than 1% cover	Yes. Given all watercourses within the proposed development site drain to the River Shannon, a pathway for the spread of non-native invasive species to the SAC exists. This impact could adversely affect the vegetation composition of this habitat within the SAC.
Alkaline fens [7230] **To maintain the favourable conservation condition of the habitat in the Lough Ree SAC, which is defined by the following list of attributes and targets:**		
Habitat area: Hectares	Area stable or increasing, subject to natural processes	Yes. An accidental pollution event during construction or operation, of a sufficient magnitude, could potentially adversely affect water quality downstream in Lough Ree and any associated alkaline fen habitat in Lough Ree SAC.
Habitat distribution: Occurrence	No decline, subject to natural processes	
Hydrological regime	Appropriate natural hydrological regimes necessary to support the natural structure and functioning of the habitat	No. The proposed development will not involve any works within or adjacent to this SAC that would affect the hydrological regime that supports alkaline fen habitat; there is no connectivity and therefore there will be no adverse effects on this target.
Peat formation – Flood duration	Active peat formation, where appropriate	No. The proposed development will not involve any works within or adjacent to this SAC that would affect the flood duration and peat formation that supports alkaline fen habitat; therefore, there will be no adverse effects on this target.

Attributes and Measures	Target	Evaluation of Potential Adverse Effects Requiring Mitigation
Water quality – nutrients	Maintain appropriate water quality to support the natural structure and functioning of the habitat	Yes. An accidental pollution event during construction or operation, of a sufficient magnitude, could potentially adversely affect water quality in onsite watercourses which drain to the Lough Ree SAC.
Vegetation structure: typical species	Maintain vegetation cover of typical species including brown mosses and vascular plants	Yes. The Lough Ree SAC is located 2.5km west of the proposed development. Surface water pathways exist; therefore, there is a risk that during construction non-native invasive species capable of colonising terrestrial or wetland habitats could be spread, via onsite watercourses, to alkaline fen habitat within the SAC. This could have an indirect adverse effect on vegetation structure in alkaline fen habitat in Lough Ree SAC.
Vegetation composition: trees and shrubs – Percentage	Cover of scattered native trees and shrubs less than 10%	Yes. The Lough Ree SAC is located 2.5km west of the proposed development. Surface water pathways exist; therefore, there is a risk that during construction non-native invasive species capable of colonising terrestrial or wetland habitats could be spread, via onsite watercourses, to alkaline fen habitat within the SAC. This could have an indirect adverse effect on vegetation composition in alkaline fen habitat in Lough Ree SAC.
Physical structure: disturbed bare ground – Percentage	Cover of disturbed bare ground less than 10%. Where tufa is present, disturbed bare ground less than 1%	No. The proposed development is remote from Lough Ree SAC and will not involve any works within the SAC that would result in the increased percentage of bare ground cover. Any potential indirect effects such as effects on water quality during construction, or any risk of introducing non-native invasive species, poses no risk of increasing the percentage cover of disturbed bare ground.
Physical structure: drainage – Percentage	Areas showing signs of drainage as a result of drainage ditches or heavy trampling less than 10%	No. The proposed development is remote from Lough Ree SAC and will not involve any works within the SAC that would result in direct or indirect drainage of alkaline fen habitat.

Attributes and Measures	Target	Evaluation of Potential Adverse Effects Requiring Mitigation
Limestone pavements [8240] **To maintain the favourable conservation condition of the habitat in the Lough Ree SAC, which is defined by the following list of attributes and targets:**		
Habitat area: Hectares	Area stable or increasing, subject to natural processes.	No. The existing surface water network of watercourses is the only potential impact pathway connecting the proposed development to Lough Ree SAC. As limestone pavement is a terrestrial habitat with no intrinsic dependence on surface water interactions to support the vegetation composition or structure, the proposed development will not adversely affect any of the attributes and targets supporting the favourable conservation status of limestone pavement habitat in Lough Ree SAC.
Habitat distribution: Occurrence	No decline, subject to natural processes	
Vegetation composition: typical species – Number at a representative number of monitoring stops	At least seven positive indicator species present	
Vegetation composition: bryophyte layer – Percentage at a representative number of monitoring stops	Bryophyte cover at least 50% on wooded pavement	
Vegetation composition: negative indicator species – Percentage at a representative number of monitoring stops	Collective cover of negative indicator species on exposed pavement not more than 1%	
Vegetation composition: negative indicator species – Percentage at a representative number of monitoring stops	Collective cover of negative indicator species on exposed pavement not more than 1%	
Vegetation composition: non-native species – Percentage at a representative number of monitoring stops	Cover of non-native species not more than 1% on exposed pavement; on wooded pavement not more than 10% with no regeneration	
Vegetation composition: scrub – Percentage at a representative number of monitoring stops	Scrub cover no more than 25% of exposed pavement	

Attributes and Measures	Target	Evaluation of Potential Adverse Effects Requiring Mitigation
Vegetation composition: bracken cover – Percentage at a representative number of monitoring stops	Bracken (*Pteridium aquilinum*) cover no more than 10% on exposed pavement	
Vegetation structure: woodland canopy – Percentage at a representative number of monitoring stops	Canopy cover on wooded pavement at least 30%	
Vegetation structure: dead wood – Occurrence in a representative number of monitoring stops	Sufficient quantity of dead wood on wooded pavement to provide habitat for saproxylic organisms	
Physical structure: disturbance – Occurrence in a representative number of monitoring stops	No evidence of grazing pressure on wooded pavement	
Indicators of local distinctiveness: Occurrence	Indicators of local distinctiveness are maintained.	
Old sessile oak woods with Ibex and Blechnum in the British Isles [91A0] **The status of Old sessile oak woods with Ilex and Blechnum in the British Isles as a qualifying Annex I habitat for the Lough Ree SAC is currently under review. The outcome of this review will determine whether a site-specific conservation objective is set for this habitat.**		No. The existing surface water network of watercourses is the only potential impact pathway connecting the proposed development to Lough Ree SAC. As this is a terrestrial habitat with no intrinsic dependence on surface water interactions to support the vegetation composition or structure, the proposed development will not adversely affect any of the attributes and targets supporting the favourable conservation status of this habitat in Lough Ree SAC.
Bog woodland [91D0] **To restore the favourable conservation condition of the habitat in the Lough Ree SAC, which is defined by the following list of attributes and targets:**		
Habitat area: Hectares	Area stable or increasing, subject to natural processes.	Yes. An accidental pollution event during construction or operation, of a sufficient

Attributes and Measures	Target	Evaluation of Potential Adverse Effects Requiring Mitigation
Habitat distribution: Occurrence	No decline, subject to natural processes	magnitude, could potentially adversely affect water quality downstream in Lough Ree and any associated natural processes within this habitat in Lough Ree SAC.
Vegetation composition: positive indicator species	Birch (Betula pubescens) bog moss (Spagnum species) and at least five other species present	Yes. The proposed development is located 2.5km west of the Lough Ree SAC and will not involve any works within or adjacent to the SAC that would directly affect bog woodland vegetation composition or woodland structure. However, surface water pathways exist; therefore, there is a risk that during construction non-native invasive species capable of colonising terrestrial or wetland habitats could be spread, via onsite watercourses, to bog woodland habitat within the SAC. This could have an indirect adverse effect on vegetation composition and woodland structure in bog woodland habitat in Lough Ree SAC.
Vegetation composition: negative indicator species	Both native and non-native invasive species absent or under control. Total cover should be less than 10%	
Woodland structure: cover and height of birch	A minimum 30% cover of birch (Betula pubescens) with a median canopy height of 4m	
Woodland structure: dwarf shrub cover	Dwarf shrub cover not more than 50%	
Woodland structure: ling cover	Ling (Calluna vulgaris) cover not more than 40%	
Woodland structure: bryophyte cover	Bryophyte cover at least 50%, with bog moss (Sphagnum spp.) cover at least 25%.	
Woodland structure: tree size classes	Each size class present	
Woodland structure: senescent and dead wood	Senescent or dead wood present	
Otter (*Lutra lutra*) [1355] **To restore the favourable conservation condition of the species in the Lough Ree SAC, which is defined by the following list of attributes and targets:**		
Distribution	No significant decline	Yes. No Otter holts or couches were recorded within the proposed development site during field surveys; however, Otter may utilise habitats within the proposed development site for commuting or foraging. Disturbance of these Otter caused by activities during the construction phase and decommissioning phase may have an adverse effect on their distribution.

Attributes and Measures	Target	Evaluation of Potential Adverse Effects Requiring Mitigation
Extent of terrestrial habitat	No significant decline. Area mapped and calculated as 330.6ha along river banks/ lakes shoreline/around pools	No. Given no works are proposed within or adjacent to the SAC and the proposed development site is located approximately 2.5km from the SAC, there will be no direct or indirect significant adverse effects on the extent of terrestrial or freshwater habitats as a result of the proposed development.
Extent of freshwater (river) habitat	No significant decline. Length mapped and calculated as 22.7km	
Extent of freshwater (lake) habitat	No significant decline. Area mapped and calculated as 2097.4ha	
Couching sites and holts	No significant decline	No. Given no works are proposed within or adjacent to the SAC and the proposed development site is located approximately 2.5km from the SAC, there will be no direct or indirect adverse effect on couching sites and holts as a result of the proposed development. Furthermore, no Otter holts or couches were recorded within the proposed development site during field surveys.
Fish biomass available	No significant decline	Yes. An accidental pollution event during construction or operation of a sufficient magnitude could impact fish through silt smothering spawning grounds or affecting respiration, chemical contaminants physically damaging fish or causing mortality as a result of toxins. Such impacts could, at least temporarily have an adverse effect on fish biomass available.
Barriers to connectivity	No significant increase.	No. Given no works are proposed within or adjacent to the SAC and the proposed development site is located approximately 2.5km from the SAC, there will be no direct or indirect adverse effect on connectivity as a result of the proposed development

7.3.3 Ballykenny-Fisherstown SPA

7.3.3.1 Potential Effects

Construction Phase

The proposed development lies within the ZoI of the Ballykenny-Fisherstown SPA, i.e. the distance separating the two sites (4.5km) is less than the core foraging distance (5-8km) for Greenland White-fronted Goose (SNH 2016), which is a special conservation interest for this SPA. Suitable habitats which are not within the boundary of the designated site but are within core foraging distances for the species of interest may provide supporting habitat to this population. Therefore, potential impacts associated with the proposed development on Greenland White-fronted Goose have been considered in terms of habitat loss/ fragmentation and disturbance displacement. Adverse effects may arise from the direct loss of habitat resulting from the construction of site infrastructure and the increased level of activity at the site during the construction phase.

Operational Phase

At the proposed development site birds which use the airspace around turbines are susceptible to collision with operating turbines. The swept area of the rotor blade is the area in which a collision is theoretically possible. Potential collision height is therefore defined as the area of space occupied by the turbine rotors. Potential collision height will vary between wind farms and with the specification of the manufacturer.

The presence of turbines in the landscape may deter Greenland White-fronted Goose from entering the site and/ or its surroundings. However, as previously stated, Greenland White-fronted Geese were only recorded on a single occasion at the proposed development site. On that occasion they were not recorded flying at the PCH; and were recorded feeding in drains and flooded bog onsite (Derryadd bog). This low frequency of occurrence limits the potential for ecologically significant adverse effects.

7.3.3.2 Conservation Objectives

A detailed site-specific conservation objectives document is not currently available for Ballykenny-Fisherstown SPA. However, based on site-specific conservation objectives documents available for other European sites with equivalent special conservation interest species, and in conjunction with considering the generic conservation objective “To maintain or restore the favourable conservation condition for the bird species listed as special conservation interest for this SPA”, a set of site-specific conservation objectives has been compiled for the special conservation interest species of Ballykenny-Fisherstown SPA and used to inform this assessment. This sets out the attributes, measures and targets that would be expected to define the favourable conservation condition of special conservation interest species within Ballykenny-Fisherstown SPA.

Table 7-7: Evaluation of Potential Adverse Effects on the Conservation Objectives from the Proposed Development

Attributes and Measures	Target	Evaluation of Potential Adverse Effects Requiring Mitigation
Greenland White-fronted Goose (*Anser albifrones flavirostris*) [A395] **To maintain or restore the favourable conservation condition of the species in the Ballykenny-Fisherstown SPA, which is defined by the following list of attributes and targets:**		
Population trend: Percentage change	Long term population trend stable or increasing	Yes. The proposed development could result in the mortality of SCI species from this SPA through collisions with operating turbines. The potential for adverse effects from the proposed development which could undermine the conservation objectives of this SPA requires evaluation.
Distribution: Range, timing and intensity of use of areas	No significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	Yes. Potential impacts associated with the proposed development includes; habitat loss, disturbance displacement and barrier effects. These impacts may have an adverse effect on the numbers or range of areas used by waterbird species. The potential for adverse effects associated with the proposed development, which could undermine the conservation objectives of the SPA, requires evaluation.

7.3.4 River Shannon Callows SAC

7.3.4.1 Potential Effects

The onsite infrastructure has been carefully positioned away from watercourses to ensure there will be no direct impacts on qualifying interest species/habitats of this SAC during the operational phase, e.g. otter.

No qualifying interest habitats will be directly affected by the proposed development during the construction phase. However, given the nature of the proposed development and in the absence of mitigation and/ or best practice construction standards, the following qualifying interest habitat/ species are potentially vulnerable to indirect water quality impacts from the proposed development during the construction phase:

- Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) (habitat code: 6410);
- Alluvial forests with Alnus glutinosa and Fraxinus excelsior (*Alno-Padion, Alnion incanae, Salicion albae*) (habitat code: 91E0); and
- Otter (species code: 1355).

This habitat and species require good water quality to maintain/ restore a favourable conservation status.

The sensitivity of an environmental receptor is based on its ability to absorb an effect without perceptible change. No EPA monitoring locations were recorded on the streams adjacent to the proposed development site. However, samples were recorded on the River Shannon 1km downgradient of Lanesborough Power Station and 4km upgradient at Termonbarry village. The most recent EPA results for these monitoring points indicate that the quality of water at this location is Q3 – "Moderately Polluted" and Q3-4 – "Slightly Polluted". Thus, the hydrological environment is considered to be of moderate sensitivity for receptors draining to the River Shannon via hydrological links.

Potential indirect effects on freshwater habitats within the SAC arising from the construction phase include, deterioration of water quality due to sediment release during the excavation of turbine foundations, hardstanding areas, borrow pits, substation, internal haul roads and amenity roads, or potential contamination of water from concrete and / or fuels during construction. Such potential effects in the absence of mitigation could cause indirect adverse effects on aquatic ecology as follows:

- Sedimentation – temporary smothering of gravel beds with consequent loss of fish and spawning habitat;
- Sediment deposition can also provide a base for growth of filamentous algae on gravel beds, leading to a build-up of sediment and loss of suitable habitat for crayfish and spawning habitat for lamprey and salmonids;
- Sedimentation effects in the absence of mitigation include smothering fish eggs and causing mortalities in fish of all ages, reducing abundance of food and impeding movement of fish;
- Sedimentation effects in the absence of mitigation also include smothering of food prey for juvenile salmonids i.e. macro invertebrates;
- Accidental leakage / spillage of oil and fuels from construction vehicles can have indirect effects on fish, fish food and fish habitats and other aquatic species;
- A reduction in water quality can have an indirect effect on Otter through a reduction in prey availability; and
- The spread of invasive species resulting from the action of construction activities could have a prolonged adverse effect on aquatic habitats which could have the potential to indirectly effect prey availability for Otters.

Potential adverse effects on water quality and potential for the introduction of invasive species are considered to be short term slight negative effects as they are likely to occur during the construction phase only.

The following activities have been identified as having the potential to impact fauna during the construction phase; disturbance due to increased human activity and vehicular access, and habitat loss/ displacement and/ or damage. Excavation works can result in disturbance impacts for otters to a distance of up to 150m, as per NRA guidelines (NRA 2008).

The majority of the water features within the proposed development site consist of drains. As these drains dry up during prolonged dry periods, these non-permanent water features are considered to provide sub-optimal habitat for Otters. Otter signs were recorded in Derryadd and spraints (droppings) were found in a drainage ditch in the north east of Lough Bannow bog. The potential for direct disturbance effects on Otter has been minimised by carefully positioning the proposed onsite infrastructure away from potential Otter habitat. Direct impacts on otter breeding/ resting sites are not predicted given there were no confirmed holts/ resting places recorded within the proposed development site. However, it is possible Otter holts occur outside of the proposed development site within 150m of proposed construction works areas. Considering suitable otter habitat within 150m of the proposed development is limited and potential disturbance effects are restricted to the construction phase, it was determined there will be no significant adverse effects on otter populations within and in the vicinity of the proposed development during the construction phase. During the operational phase the level of operational traffic and ongoing maintenance is expected to be sufficiently low so as to avoid any disturbance effects on fauna that utilise the proposed development site.

7.3.4.2 Conservation Objectives

A detailed site-specific conservation objectives document is not currently available for the River Shannon Callows SAC. However, based on site-specific conservation objectives documents available for other European sites with equivalent qualifying interest habitats and species, and in conjunction with considering the generic conservation objective “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”, a set of site-specific conservation objectives has been compiled for the qualifying interest habitats and species and used to inform this assessment. This sets out the attributes, measures and targets that would be expected to define the favourable conservation condition of qualifying interest species and habitats within River Shannon Callows SAC. The specific attributes and targets used to define the conservation objectives of the qualifying interest habitats and species of the River Shannon Callows SAC are presented in Table 7-8. The potential for the proposed development to adversely affect the species-specific conservation objectives are also considered.

Table 7-8: Evaluation of Potential Adverse Effects on the Conservation Objectives from the Proposed Development

Attributes and Measures	Target	Evaluation of Potential Adverse Effects Requiring Mitigation
[6410] *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) **To maintain or restore the favourable conservation condition of the habitat in the River Shannon Callows SAC, which is defined by the following list of attributes and targets:**		
Habitat area: Hectares	Area stable or increasing, subject to natural processes	Yes. An accidental pollution event during construction or operation of a sufficient magnitude could potentially affect the area of wet grassland *Molinia* meadows in the SAC, where the habitat has a direct interaction with the River Shannon through seasonal flooding.
Habitat distribution: Occurrence	No decline, subject to natural processes	Yes. An accidental pollution event during construction or operation of a sufficient magnitude could potentially affect the distribution of wet grassland *Molinia* meadows in the SAC, where the habitat has a direct interaction with the River Shannon through seasonal flooding.
Vegetation composition: typical species – Number at a representative number of monitoring stops	At least seven positive indicator species present, including one 'high quality' species as listed in O'Neill *et al.* (2013)	Yes. An accidental pollution event during construction or operation of a sufficient magnitude could potentially affect the abundance of wet grassland *Molinia* meadows indicator species in the SAC, where the habitat has a direct interaction with the River Shannon through seasonal flooding. Although unlikely, given the SAC is approximately 22.8km downstream of the proposed development, there remains a risk that non-native invasive species capable of colonising terrestrial habitats along the River Shannon could be spread to *Molinia* meadow habitat in the SAC via the surface water network during construction and/or operation. Introducing non-native invasive plant species could negatively affect the number, abundance and diversity of typical species.
Vegetation composition: negative indicator species – Percentage at a representative number of monitoring stops	Negative indicator species collectively not more than 20% cover, with cover by an individual species not more than 10%	No. The Proposed Project will not directly affect *Molinia* meadow habitat within the SAC and therefore, will not affect negative indicator species cover on *Molinia* meadow habitat (non-native species as per O'Neill *et al*. 2013). However, non-native invasive plant species could also be considered separate to that list – and could have the potential to negatively affect *Molinia* meadow habitat areas – see below.

Attributes and Measures	Target	Evaluation of Potential Adverse Effects Requiring Mitigation
Vegetation composition: non-native species – Percentage at a representative number of monitoring stops	Non-native species cover not more than 1%	Yes. Although unlikely, given the SAC is approximately 22.8km downstream of the proposed development, there remains a risk that non-native invasive species capable of colonising terrestrial wetland habitats along the River Shannon could be spread to *Molinia* meadow habitat in the SAC via the surface water network during construction and/or operation.
Vegetation composition: moss species – representative number of monitoring stops	Hair mosses (*Polytrichum* spp.) not more than 25% cover	Yes. An accidental pollution event during construction or operation of a sufficient magnitude could potentially affect the vegetation composition of wet grassland *Molinia* meadows, where the habitat has a direct interaction with the River Shannon through seasonal flooding.
Vegetation structure: woody species and bracken – Percentage at a representative number of monitoring stops	Cover of woody species and bracken (*Pteridium aquilinum*) not more than 5% cover	No. The Proposed Project will not directly affect *Molinia* habitat within the SAC and poses no risk of affecting the cover of woody species or bracken.
Vegetation structure: broadleaf herb: grass ratio – Percentage at a representative number of monitoring stops	Broadleaf herb component of vegetation between 40 and 90%	Yes. An accidental pollution event during construction or operation of a sufficient magnitude could potentially affect the vegetation structure of wet grassland *Molinia* meadows, where the habitat has a direct interaction with the River Shannon through seasonal flooding. Although unlikely, given the SAC is approximately 22.8km downstream of the proposed development, there remains a risk that non-native invasive species capable of colonising terrestrial habitats along the River Shannon could be spread to *Molinia* meadow habitat in the SAC via the surface water network during construction and/or operation. Introducing non-native invasive plant species could negatively affect the broadleaf herb:grass ratio.

Attributes and Measures	Target	Evaluation of Potential Adverse Effects Requiring Mitigation
Vegetation structure: sward height – Percentage at a representative number of monitoring stops	At least 30% of sward between 10cm and 80cm tall	Yes. An accidental pollution event during construction or operation of a sufficient magnitude could potentially affect the vegetation structure of wet grassland *Molinia* meadows, where the habitat has a direct interaction with the River Shannon through seasonal flooding. Although unlikely, given the SAC is approximately 22.8km downstream of the proposed development, there remains a risk that non-native invasive species capable of colonising terrestrial habitats along the River Shannon could be spread to *Molinia* meadow habitat in the SAC via the surface water network during construction and/or operation. Introducing non-native invasive plant species could negatively affect sward height.
Vegetation structure: litter – Percentage at a representative number of monitoring stops	Litter cover not more than 25%	No The proposed development will not directly affect *Molinia* habitat within the SAC and poses no risk of affecting the percentage litter cover.
Physical structure: bare soil – Percentage at a representative number of monitoring stops	Not more than 10% bare soil	No The proposed development will not affect, or contribute to, levels of grazing or habitat disturbance in the SAC that would affect the cover of bare ground within *Molinia* habitat.
Physical structure: disturbance – Square metres	Area showing signs of serious grazing or other disturbance less than 20m²	No The proposed development will not affect, or contribute to, physical disturbance levels in the SAC that would damage *Molinia* habitat.
[6510] Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*) **To maintain or restore the favourable conservation condition of the habitat in the River Shannon Callows SAC, which is defined by the following list of attributes and targets:**		
Habitat area: Hectares	Area stable or increasing, subject to natural processes	No The existing surface water network of watercourses is the only potential impact pathway connecting the proposed development to the River Shannon Callows SAC. As
Habitat distribution: Occurrence	No decline, subject to natural processes	

Attributes and Measures	Target	Evaluation of Potential Adverse Effects Requiring Mitigation
Vegetation composition: typical species – Number at a representative number of monitoring stops	At least seven positive indicator species present, including one 'high quality' species as listed in O'Neill *et al.* (2013)	lowland hay meadows are terrestrial habitats with no intrinsic dependence on surface water interactions to support the vegetation composition or structure, the proposed development poses no risk of affecting any of the attributes and targets supporting the favourable conservation status of Limestone pavement habitat in the River Shannon Callows SAC.
Vegetation composition: negative indicator species – Percentage at a representative number of monitoring stops	Negative indicator species collectively not more than 20% cover, with cover by an individual species not more than 10%	
Vegetation composition: non-native species – Percentage at a representative number of monitoring stops	Non-native species cover not more than 1%	
Vegetation structure: woody species and bracken – Percentage at a representative number of monitoring stops	Cover of woody species and bracken (*Pteridium aquilinum*) not more than 5% cover	
Vegetation structure: broadleaf herb: grass ratio – Percentage at a representative number of monitoring stops	Broadleaf herb component of vegetation between 40 and 90%	
Vegetation structure: sward height – Percentage at a representative number of monitoring stops	At least 50% of sward between 10cm and 50cm tall	
Vegetation structure: litter – Percentage at a representative number of monitoring stops	Litter cover not more than 25%	
Physical structure: bare soil – Percentage at a representative number of monitoring stops	Not more than 5% bare soil	

Attributes and Measures	Target	Evaluation of Potential Adverse Effects Requiring Mitigation
Physical structure: disturbance – Square metres	Area showing signs of serious grazing or other disturbance less than 20m²	
[8240] *Limestone pavements **To restore the favourable conservation condition of the habitat in the River Shannon Callows SAC, which is defined by the following list of attributes and targets:**		
Habitat area: Hectares	Area stable or increasing, subject to natural processes.	No The existing surface water network of watercourses is the only potential impact pathway connecting the proposed development to the River Shannon Callows SAC. As Limestone pavement is a terrestrial habitat with no intrinsic dependence on surface water interactions to support the vegetation composition or structure, the proposed development poses no risk of affecting any of the attributes and targets supporting the favourable conservation status of Limestone pavement habitat in the River Shannon Callows SAC.
Habitat distribution: Occurrence	No decline, subject to natural processes	
Vegetation composition: typical species – Number at a representative number of monitoring stops	At least seven positive indicator species present	
Vegetation composition: bryophyte layer – Percentage at a representative number of monitoring stops	Bryophyte cover at least 50% on wooded pavement	
Vegetation composition: negative indicator species – Percentage at a representative number of monitoring stops	Collective cover of negative indicator species on exposed pavement not more than 1%	
Vegetation composition: negative indicator species – Percentage at a representative number of monitoring stops	Collective cover of negative indicator species on exposed pavement not more than 1%	
Vegetation composition: non-native species – Percentage at a representative number of monitoring stops	Cover of non-native species not more than 1% on exposed pavement; on wooded pavement not more than 10% with no regeneration	
Vegetation composition: scrub – Percentage at a representative number of monitoring stops	Scrub cover no more than 25% of exposed pavement	

Attributes and Measures	Target	Evaluation of Potential Adverse Effects Requiring Mitigation
Vegetation composition: bracken cover – Percentage at a representative number of monitoring stops	Bracken (*Pteridium aquilinum*) cover no more than 10% on exposed pavement	
Vegetation structure: woodland canopy – Percentage at a representative number of monitoring stops	Canopy cover on wooded pavement at least 30%	
Vegetation structure: dead wood – Occurrence in a representative number of monitoring stops	Sufficient quantity of dead wood on wooded pavement to provide habitat for saproxylic organisms	
Physical structure: disturbance – Occurrence in a representative number of monitoring stops	No evidence of grazing pressure on wooded pavement	
Indicators of local distinctiveness: Occurrence	Indicators of local distinctiveness are maintained. This includes species on the Flora (Protection) Order, 2015 and/or the red data lists, and other rare or localised species, as well as archaeological and geological features, which often support distinctive species	
[91E0] *Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) **To maintain or restore the favourable conservation condition of the habitat in the River Shannon Callows SAC, which is defined by the following list of attributes and targets:**		
Habitat area Hectares	Area stable or increasing, subject to natural processes	No. The existing surface water network of watercourses is the only potential impact pathway connecting the proposed development to alluvial woodland habitat within the River Shannon Callows SAC. Any potential effects on water quality during construction, or any risk of introducing non-native invasive species, poses no risk of affecting the woodland area.

Attributes and Measures	Target	Evaluation of Potential Adverse Effects Requiring Mitigation
Habitat distribution Occurrence	No decline, subject to natural processes	No. The existing surface water network of watercourses is the only potential impact pathway connecting the proposed development to alluvial woodland habitat within the River Shannon Callows SAC. Any potential effects on water quality during construction, or any risk of introducing non-native invasive species, poses no risk of affecting the distribution of alluvial woodlands in the SAC.
Woodland size Hectares	Area stable or increasing. Where topographically possible, 'large' woods at least 25ha in size and 'small' woods at least 3ha in size	No. The existing surface water network of watercourses is the only potential impact pathway connecting the proposed development to alluvial woodland habitat within the River Shannon Callows SAC. Any potential effects on water quality during construction, or any risk of introducing non-native invasive species, poses no risk of affecting the size of alluvial woodlands in the SAC.
Woodland structure: cover and height Percentage and metres	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semimature trees and shrubs; and well-developed herb layer	Yes. Although unlikely, given the SAC is more than 22km downstream of the proposed development, there remains a risk that non-native invasive species capable of colonising alluvial woodland habitats along the banks of the River Shannon could be spread to alluvial forest habitat in the SAC via the surface water network during construction and/or operation. Introducing non-native invasive plant species could affect the structure of the woodland community, most likely through non-native invasive plant species outcompeting and overgrowing the shrub and herb layers in the woodland.

Attributes and Measures	Target	Evaluation of Potential Adverse Effects Requiring Mitigation
Woodland structure: community diversity and extent Hectares	Maintain diversity and extent of community types	Yes. An accidental pollution event during construction or operation, of a sufficient magnitude, could potentially negatively affect sensitive woodland plant species where the habitat has a direct interaction with the River Shannon through seasonal flooding (some of which may considered locally distinctive). Although unlikely, given the SAC is approximately 22.8km downstream of the proposed development, there remains a risk that non-native invasive species capable of colonising alluvial woodland habitats along the shores of the River Shannon could be spread to alluvial forest habitat in the SAC via the surface water network during construction and/or operation. Introducing non-native invasive plant species could negatively affect the number, abundance and diversity of any locally distinctive species. Both of these potential impacts could affect the diversity of the woodland community.
Woodland structure: natural regeneration Seedling:sapling:pole ratio	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	Yes. Although unlikely, given the SAC is approximately 22.8km downstream of the proposed development, there remains a risk that non-native invasive species capable of colonising alluvial woodland habitats along the shores of the River Shannon could be spread to alluvial forest habitat in the SAC via the surface water network during construction and/or operation. Introducing non-native invasive plant species could affect the natural regeneration of woodland flora, most likely through non-native invasive plant species outcompeting and overgrowing the shrub and herb layers in the woodland.
Hydrological regime: flooding depth/height of water table Metres	Appropriate hydrological regime necessary for maintenance of alluvial vegetation	No. The proposed development will not involve any works within or adjacent to the SAC that would affect the hydrological regimes that support the alluvial woodland habitat, nor will the proposed development impede the ability to restore this habitat for the same reasons.

Attributes and Measures	Target	Evaluation of Potential Adverse Effects Requiring Mitigation
Woodland structure: dead wood m³ per hectare; number per hectare	At least 30m³/ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter (greater than 20cm diameter in the case of alder (Alnus glutinosa))	No. The existing surface water network of watercourses is the only potential impact pathway connecting the proposed development to alluvial forest habitat within the River Shannon Callows SAC. Any potential effects on water quality during construction, or any risk of introducing non-native invasive species, poses no risk of affecting the abundance of dead wood in the alluvial woodlands.
Woodland structure: veteran trees - Number per hectare	No decline	No. The existing surface water network of watercourses is the only potential impact pathway connecting the proposed development to alluvial forest habitat within the River Shannon Callows SAC. Any potential effects on water quality during construction pose no risk of affecting the numbers/abundance of woodland tree species.
Woodland structure: indicators of local distinctiveness – Occurrence	No decline	Yes. An accidental pollution event during construction or operation, of a sufficient magnitude, could potentially negatively affect sensitive woodland plant species where the habitat has a direct interaction with the River Shannon through seasonal flooding. Although unlikely, given the SAC is more approximately 22.8km downstream of the proposed development, there remains a risk that non-native invasive species capable of colonising terrestrial woodland habitats along the River Shannon could be spread to alluvial forest habitat in the SAC via the surface water network during construction and/or operation. Introducing non-native invasive plant species could negatively affect the number, abundance and diversity of any locally distinctive species.
Vegetation composition: native tree cover – Percentage	No decline. Native tree cover not less than 95% Species reported in Perrin *et al.* (2008)	No. The existing surface water network of watercourses is the only potential impact pathway connecting the proposed development to alluvial forest habitat within the River Shannon Callows SAC. Any potential effects on water quality during construction pose no risk of affecting the numbers/abundance/composition of woodland tree species.

Attributes and Measures	Target	Evaluation of Potential Adverse Effects Requiring Mitigation
Vegetation composition: typical species – Occurrence	A variety of typical native species present, depending on woodland type, including alder (*Alnus glutinosa*), willows (*Salix* spp) and, locally, oak (*Quercus robur*) and ash (*Fraxinus excelsior*) Species reported in Perrin *et al.* (2008)	Yes. An accidental pollution event during construction or operation, of a sufficient magnitude, could potentially negatively affect sensitive native woodland plant species where the habitat has a direct interaction with the River Shannon through seasonal flooding. Although unlikely, given the SAC is approximately 22.8km downstream of the proposed development, there remains a risk that non-native invasive species capable of colonising terrestrial woodland habitats along the River Shannon could be spread to alluvial forest habitat in the SAC via the surface water network during construction and/or operation. Introducing non-native invasive plant species could negatively affect the number, abundance and diversity of native woodland species.
Vegetation composition: negative indicator species - Occurrence	Negative indicator species, particularly non-native invasive species, absent or under control The following are the most common invasive species in this woodland type: beech (Fagus sylvatica), sycamore (Acer pseudoplatanus), cherry laurel (Prunus laurocerasus), Himalayan balsam (Impatiens glandulifera)	Yes. Although unlikely, given the SAC is approximately 22.8km downstream of the proposed development, there remains a risk that non-native invasive species capable of colonising terrestrial woodland habitats along the River Shannon could be spread to alluvial forest habitat in the SAC via the surface water network during construction and/or operation.
[1355] Otter *Lutra lutra* **To maintain or restore the favourable conservation condition of Otter in the River Shannon Callows SAC, which is defined by the following list of attributes and targets:**		
Distribution: Percentage positive survey sites	No significant decline	No. As the proposed development is more than 22km from the SAC, it poses no risk of disturbing or displacing Otter from habitat areas used within the SAC during construction or operation.

Attributes and Measures	Target	Evaluation of Potential Adverse Effects Requiring Mitigation
Extent of terrestrial habitat: Hectares	No significant decline. Area not currently mapped or calculated along river banks	No. As the proposed development will not have any direct impacts on habitats, or result in any habitat loss within the SAC, the extent of terrestrial habitat available to Otter will not be affected.
Extent of freshwater (river) habitat: Kilometres	No significant decline. Length not currently mapped or calculated	No. As the proposed development will not have any direct impacts on habitats, or result in any habitat loss within the SAC, the extent of terrestrial habitat available to Otter will not be affected.
Extent of freshwater (lake) habitat: Hectares	No significant decline. Area not currently mapped or calculated	No. As the proposed development will not have any direct impacts on habitats, or result in any habitat loss within the SAC, the extent of terrestrial habitat available to Otter will not be affected.
Couching sites and holts: Number	No significant decline	Yes An accidental pollution event during construction or operation of a sufficient magnitude could (at least temporarily) potentially affect usage of holt/couch sites available for Otter in the SAC.
Fish biomass available: Kilograms	No significant decline	Yes. An accidental pollution event during construction or operation of a sufficient magnitude could impact fish through silt smothering spawning grounds or affecting respiration, chemical contaminants physically damaging fish or causing mortality as a result of toxins. Such impacts could result in a reduction in fish numbers, at least temporarily.
Barriers to connectivity: Number	No significant increase	No. Given no works are proposed within or adjacent to the SAC and the proposed development site is located approximately 22.8km from the SAC, there will be no direct or indirect adverse effect on connectivity as a result of the proposed development.

Attributes and Measures	Target	Evaluation of Potential Adverse Effects Requiring Mitigation
Mortality risk posed by construction works	Not defined in any existing conservation objectives document	Yes. The mortality risk posed to Otter by construction works is related to both direct mortality, due to potential interaction with construction machinery/vehicles, and/or indirect mortality, due to an accidental pollution event resulting in mortality through contaminant/toxin poisoning. Although the SAC is more than 22km downstream of the proposed development, Otters can have home ranges extending over tens of kilometres and there is the potential that Otters using watercourses hydrologically linked to the SAC form part of, or are linked to, the qualifying interest Otter population of the River Shannon Callows SAC.

7.3.5 Decommissioning Phase

The decommissioning phase of the proposed development could result in disturbance to local fauna. Local fauna may be disturbed by the noise and physical presence activities of personnel and machinery during decommissioning works. The majority of mammal species are considered sufficiently mobile so as to take temporary avoidance measures during decommissioning activities. Birds may also become temporarily displaced during these works. Disturbance can result in displacement of birds from an area which can result in effective habitat loss or a reduction in the quality of the habitat, thereby leading to a reduction in bird density locally (Pearce-Higgins *et al.* 2009). To avoid potential adverse effects on nesting birds, decommissioning activities will be timed to avoid the main period of sensitivity for birds, i.e. March 1st to August 31st. Furthermore, disturbance is expected to be temporary to short-term in duration; therefore, any potential adverse effects are not considered significant. The removal of turbines offsite will result in direct positive effects associated with the return of semi-natural habitat to areas which previously contained site infrastructure.

In the absence of control or mitigation measures, there may be a risk to surface water quality in the vicinity and downstream of the decommissioning works from contaminant surface water run-off and/or accidental spillage or pollution. This could result in the loss of habitat area or indirect habitat degradation due to water quality impacts. It is unlikely that a pollution event of a magnitude that would affect the conservation objectives of the qualifying interests/special conservation interest species would occur during the decommissioning phase; however, as a precautionary measure appropriate mitigation measures will be required to avoid potential adverse effects on any European site.

7.3.6 Summary of Potential Impacts and the Evaluation of Significant Adverse Effects

Table 7-9: Summary of Potential Impacts and the Evaluation of Significance of Adverse Effects from the Proposed Development on European Sites and their Qualifying Interests/Special Conservation Interest Species in the Absence of Mitigation

Relevant European Sites[3] and Qualifying Interests/Special Conservation Interest Species that have a Potential to be Adversely Affected	Summary of Potential Impacts and Adverse Effects (in the absence of mitigation)	Assessment – Significant Adverse effect (Yes/No)
Lough Ree SPA: **Whooper Swan**	**Habitat Loss and Fragmentation:** Land taken during the construction phase of the development will be discernible, but the overall character of habitats will be similar to the pre-development circumstance. The exceptional rainfall during the 2015/ 16 winter period resulted in the flooding of proportionately small sections of the site which provided a temporary feeding opportunity to local water birds. However, the site does not provide enduring winter roosting/ foraging habitat for Whooper Swan during normal rainfall years. Furthermore, the site is heavily drained which limits the potential for flooding. Based on a consistent survey effort from 2014 to 2018, the species was recorded occasionally during winter months. Given that the internal infrastructure (including the burrow pit areas during the construction phase only) constitutes a small proportion (c. 51.8 ha/ 2.7%) of the total proposed development site (1,908ha) and a relatively small area of habitat loss, the wide-ranging nature of the species, and the availability of similar suitable habitats in the surroundings (e.g. bog/ heath/ grassland), there is no potential for a significant adverse effect.	No
	Disturbance Displacement: Disturbance due to construction works can result in effective habitat loss through displacement. This effect will be short term in nature for the duration of the construction phase. The exceptional rainfall of the 2015/ 16 winter period flooded sections of the site which provided a temporary feeding opportunity to local water birds. However, usually this site does not provide optimal roosting/ foraging habitat for Whooper Swan during normal rainfall years. In the absence of flooding, the habitats of the site will not attract this	No

[3] European sites "screened in" as part of the Appropriate Assessment Screening Process (See Section 7.1).

Relevant European Sites[3] and Qualifying Interests/Special Conservation Interest Species that have a Potential to be Adversely Affected	Summary of Potential Impacts and Adverse Effects (in the absence of mitigation)	Assessment – Significant Adverse effect (Yes/No)
	species to the area. Additionally, as the site continues to revegetate with scrub it will become less attractive to feeding waterbirds. The species is unlikely to be displaced (by construction effects) from the wider area based on the occasional use of the site during flooding events. Given the short-term nature of the construction works and the availability of optimal habitats in the surroundings (River Shannon catchment), there is no potential for a significant adverse effect.	
	Collision Risk: The population-level consequences of predicted collision risks can be assessed by considering the additional mortality that would be caused (assuming that the collision risk is non-additive) relative to background mortality rates in the population, with a threshold level of a 1% increase in annual mortality used to determine whether the impact will be significant (Percival 2003; see EIAR Appendix 6.5 for further details). Collision risk is predicted to be very low with 0.14 collisions predicted for this species within the nominal 30-year operational lifetime of the proposed development. The collision risk analysis predicts only a slight change to the baseline conditions. The change is considered barely distinguishable, approximating a 'no change' situation. Additionally, it is proposed to install a small section of overhead line to facilitate connection to an existing 110 kV overhead power line. There are two overhead powerline connection options and one underground option. The underground option will have no impact. The proposed length of the overhead line connection measures from the angle mast to the substation are 480m (northern substation at Derryadd bog) and 1km (southern substation at Derryadd bog). Overhead powerlines can present a hazard to birds through collision related mortality. However, given the presence of the existing overhead power line in both locations and the short length of the proposed grid connection, it is considered that the potential additional collision risk for local birds is of low concern. It is considered likely that birds will	No

Relevant European Sites[3] and Qualifying Interests/Special Conservation Interest Species that have a Potential to be Adversely Affected	Summary of Potential Impacts and Adverse Effects (in the absence of mitigation)	Assessment – Significant Adverse effect (Yes/No)
	become accustomed to the presence of the proposed overhead power line in the landscape, which will further reduce collision risk. Therefore, it can be concluded that the collision risk for Whooper Swan is Negligible and that there is no potential for a significant adverse effect.	
	Disturbance Displacement and Barrier Effect: The potential for disturbance displacement effects associated with avoidance of operating turbines at the proposed development site need to be examined. This could result in effective habitat loss. Any effect of disturbance displacement is expected to decrease over time as the foraging behaviour of local avian communities adjusts and they become habituated to the disturbance (Langston and Pullan 2003). The literature suggests disturbance distances for swans of up to 200-560m (Rees 2012). As a result of habituation swans feed closer to turbines later in the winter as food resources deplete (Fijn *et al.* 2012). McGuinness *et al.* (2015) suggests that Whooper Swan can be sensitive to disturbance up to a distance of 600m around I-WeBS sites. All local I-WeBS sites are at distances of greater than 1.5km from proposed turbine locations, as per the BWI I-WeBS online map viewer. Disturbance displacement is not a factor for this population of Whooper Swan based on the opportunistic use of the site during temporary flooding events and the concentration of the majority of the local population offsite along the River Shannon. Furthermore, should displacement occur extensive areas of alternative suitable habitat existing within the River Shannon catchment and adjacent agricultural fields. In the Netherlands, Bewick Swan have been shown to avoid operating turbines without resorting to large deflections from their course when flying either around or between turbines (Fijn *et al.* 2012). Overall, operational disturbance displacement are deemed to no significant adverse effect. In the event a barrier effect exists for migrating birds; the additional energy expenditure involved in birds diverting around the proposed development is not considered significant in the context of the overall distances involved in migrating. Moreover, water birds utilise natural features in the landscape such as watercourses to navigate (Robinson *et al.*	No

Relevant European Sites[3] and Qualifying Interests/Special Conservation Interest Species that have a Potential to be Adversely Affected	Summary of Potential Impacts and Adverse Effects (in the absence of mitigation)	Assessment – Significant Adverse effect (Yes/No)
	2010) thus it can be reasonably concluded that the majority of water birds will be attracted to the River Shannon (offsite) when migrating.	
Lough Ree SPA: **Mallard**	**Habitat Loss and Fragmentation:** Land taken during the construction phase of the development will be discernible, but the overall character of habitats within the site will be similar to the pre-development circumstance. The exceptional rainfall during the 2015/ 16 winter period flooded sections of the site which provided a temporary feeding opportunity to local water birds. However, the site does not provide optimal roosting/ foraging habitat for Mallard during normal rainfall years. Based on a consistent survey effort from 2014 to 2018, the species was recorded occasionally year-round (primarily within River Shannon catchment). Given that the internal infrastructure (including borrow pit areas during the construction phase only) constitutes a small proportion (c. 51.8 ha/ 2.7%) of the total proposed development site (1,908ha) and the availability of similar suitable habitats in the surroundings (e.g. bog/ heath/ grassland), there is no potential for a significant adverse effect.	No
	Disturbance Displacement: No nest sites were located for this species onsite or within habitats fringing the site. Given the short-term duration of construction works, the low number of observations and the availability of similar suitable habitats in the surroundings (e.g. bog/ heath/ grassland), there is no potential for a significant adverse effect.	No
	Collision Risk: The population-level consequences of predicted collision risks can be assessed by considering the additional mortality that would be caused (assuming that the collision risk is non-additive) relative to background mortality rates in the population, with a threshold level of a 1% increase in annual mortality used to determine whether the impact will be significant (Percival 2003; see EIAR Appendix 6.5). Collision risk is predicted to be very low with up to 0.3 collisions predicted within the nominal 30-year operational lifetime of the proposed development. The collision risk analysis predicts only a slight change to the baseline conditions. The change is considered barely distinguishable, approximating a 'no	No

Relevant European Sites[3] and Qualifying Interests/Special Conservation Interest Species that have a Potential to be Adversely Affected	Summary of Potential Impacts and Adverse Effects (in the absence of mitigation)	Assessment – Significant Adverse effect (Yes/No)
	change' situation. Additionally, it is proposed to install a small section of overhead line to facilitate connection to an existing 110 kV overhead power line. There are two overhead powerline connection options. and one underground option. The underground option will have no impact. The proposed length of the overhead line connection measures from the angle mast to the substation are 480m (northern substation at Derryadd bog) and 1km (southern substation at Derryadd bog). Overhead powerlines can present a hazard to birds through collision related mortality. However as has been previously stated; given the presence of the existing overhead power line in both locations and the short length of the proposed grid connection, it is considered that the potential additional collision risk for local birds is of low concern. It is considered likely that birds will become accustomed to the presence of the proposed overhead power line in the landscape, which will further reduce collision risk. Therefore, it can be concluded that the collision risk for Mallard is Negligible and that there is no potential for a significant adverse effect.	
	Disturbance Displacement and Barrier Effect: There is limited potential for disturbance displacement effects associated with avoidance of operating turbines at the proposed development site. This could result in effective habitat loss. Any effect of disturbance displacement is expected to decrease over time as the foraging behaviour of local avian communities adjusts and they become habituated to the disturbance (Langston and Pullan 2003). The majority of observations of this species were made in habitats fringing the site, primarily along the River Shannon to the north-west of the proposed development site. The favourable conservation status of this species limits the potential for ecologically significant adverse effects. There was no breeding recorded within the study area. Langston and Pullan (2003) noted no disturbance related effects associated with operating turbines for Mallard.	No

Relevant European Sites[3] and Qualifying Interests/Special Conservation Interest Species that have a Potential to be Adversely Affected	Summary of Potential Impacts and Adverse Effects (in the absence of mitigation)	Assessment – Significant Adverse effect (Yes/No)
	Given the low frequency of occurrence, the low numbers per observation, and the absence of a regular flight path across the site, there is no potential for a significant adverse effect.	
Lough Ree SPA: **Golden Plover**	**Habitat Loss and Fragmentation:** Land taken during the construction phase of the development will be discernible, but the overall character of habitats will be similar to the pre-development circumstance. On rare occasions this species was found to roost onsite. Golden Plover were found not to be dependent on the habitats onsite based on the occasional site usage. Based on a consistent survey effort from 2014 to 2018, the species was recorded occasionally during winter months. Given that the internal infrastructure (including borrow pit areas during the construction phase only) constitutes a small proportion (c. 51.8 ha/ 2.7%) of the total proposed development site (1,908ha) and the availability of similar suitable habitats in the surroundings (e.g. bog/ heath/ grassland), this species was found not to be dependent on the habitats onsite for feeding, roosting or breeding and therefore there is no potential for a significant adverse effect.	No
	Disturbance Displacement: Disturbance due to construction works can result in effective habitat loss through displacement. This effect will be short term in nature for the duration of the construction phase. Potential exists for this species to experience disturbance effects in the non-breeding season during construction works. Disturbance displacement was found by Hötker *et al.* (2006) to be dependent on the availability of similar suitable habitat within the surroundings. Considering Golden Plover were found to only use the site occasionally, the relative level of flight activity and flock size were low, and the wider surroundings contains similar suitable habitat (e.g. bog/ heath/ grassland), disturbance displacement due to construction works will have no significant adverse effect on Golden Plover.	No
	Collision Risk: The population-level consequences of predicted collision risks can be assessed by considering the additional mortality that would be caused (assuming that the collision risk is non-additive) relative to background mortality rates in the population, with an	No

Relevant European Sites[3] and Qualifying Interests/Special Conservation Interest Species that have a Potential to be Adversely Affected	Summary of Potential Impacts and Adverse Effects (in the absence of mitigation)	Assessment – Significant Adverse effect (Yes/No)
	threshold level of a 1% increase in annual mortality used to determine whether the impact will be significant (Percival 2003; see EIAR Appendix 6.5). The increase in annual mortality due to collisions is predicted to be 0.12%. The collision risk analysis predicts only a minor shift away from baseline conditions. This change will be discernible but is not ecological significant. Additionally, it is proposed to install a small section of overhead line to facilitate connection to an existing 110 kV overhead power line. There are two overhead powerline connection options and one underground option. The underground option will have no impact. The proposed length of the overhead line connection measures from the angle mast to the substation are 480m (northern substation at Derryadd bog) and 1km (southern substation at Derryadd bog). Overhead powerlines can present a hazard to birds through collision related mortality. However as has been previously stated; given the presence of the existing overhead power line in both locations and the short length of the proposed grid connection, it is considered that the potential additional collision risk for local birds is of low concern. It is considered likely that birds will become accustomed to the presence of the proposed overhead power line in the landscape, which will further reduce collision risk. Therefore, there is no significant adverse effect on Golden Plover.	
	Disturbance Displacement and Barrier Effect: There is limited potential for disturbance displacement effects associated with avoidance of operating turbines at the proposed development site. This could result in effective habitat loss. Any effect of disturbance displacement is expected to decrease over time as the foraging behaviour of local avian communities adjusts and they become habituated to the disturbance (Langston and Pullan 2003). A review of the literary suggests no significant effect of disturbance displacement for this species (Fielding and Haworth 2015). Hotker et al., (2006) observed Golden Plover to	No

Relevant European Sites[3] and Qualifying Interests/Special Conservation Interest Species that have a Potential to be Adversely Affected	Summary of Potential Impacts and Adverse Effects (in the absence of mitigation)	Assessment – Significant Adverse effect (Yes/No)
	approach operating turbines to within 175m in the non-breeding season. The population recorded at the proposed development site and within the surroundings is a wintering population. The majority of observations of this species have been of flocks foraging/ roosting on bare peat. Flocks recorded onsite were found to be small, numbering 1-180 individuals. Golden Plover have been shown to utilise the proposed development site in low numbers, with the majority of the local population favouring habitats located offsite. No regular flight paths emerged from the field survey work. The majority of the local population has been noted to occur in the fields surrounding the River Shannon to the north-west of the proposed development site. The proposed development site is located in an open landscape; this topographical characteristic limits the potential for a barrier effect. Studies have shown this species to be capable of navigating between operating turbines, even during the hours of darkness (Langston and Pullan 2003). In the event a barrier effect exists for migrating birds; the additional energy expenditure involved in birds diverting around the wind farm are not considered significant in the context of the overall distances involved in migrating. In late March 2018, all Golden Plover recorded during vantage point surveys were noted in flight along the River Shannon. These birds were considered to be migrating birds, navigating north along the Shannon. Therefore, disturbance displacement and barrier effects will have no significant adverse effect on Golden Plover.	
Lough Ree SPA: **Lapwing**	**Habitat Loss and Fragmentation:** Land utilised during the construction phase of the development will be discernible, but the overall character of habitats within the site will be similar to the pre-development circumstance. Based on a consistent survey effort from 2014 to 2018, Lapwing were found to be predominantly a wintering population. The species is considered not to be dependent on the onsite habitats. Given that the internal infrastructure (including borrow pit areas during the construction phase only) constitutes a small proportion (c. 51.8 ha/ 2.7%) of the total proposed development site (1,908ha) and the availability of	No

Relevant European Sites[3] and Qualifying Interests/Special Conservation Interest Species that have a Potential to be Adversely Affected	Summary of Potential Impacts and Adverse Effects (in the absence of mitigation)	Assessment – Significant Adverse effect (Yes/No)
	similar suitable habitats in the surroundings (e.g. bog/ heath/ grassland), there is no potential for a significant adverse effect.	
	Disturbance Displacement: Disturbance due to construction works can result in effective habitat loss through displacement. This effect will be short term in nature for the duration of the construction phase. The majority of records for this species were made during the winter months; this species is therefore most vulnerable to potential disturbance effects during construction works in the winter. Disturbance displacement was found by Hotker *et al.* (2006) to be dependent on the availability of similar suitable habitat within the surroundings. Lapwing were found to only use the site occasionally, the relative level of flight activity and flock size were low, and the wider surroundings contains similar suitable habitat (e.g. bog/ heath/ grassland); therefore, disturbance displacement due to construction works will not result in significant adverse effects for this species. Therefore, there is no potential for a significant adverse effect due to disturbance displacement.	No
	Collision Risk: The population-level consequences of predicted collision risks can be assessed by considering the additional mortality that would be caused (assuming that the collision risk is non-additive) relative to background mortality rates in the population, with a threshold level of a 1% increase in annual mortality used to determine whether the impact will be significant (Percival 2003; see Appendix 6.5). The increase in annual mortality due to collisions is predicted to be 0.04%. The collision risk analysis predicts only a minor shift away from baseline conditions. This change will be discernible but of limited ecological significance. Additionally, it is proposed to install a small section of overhead line to facilitate connection to an existing 110 kV overhead power line. There are two overhead powerline connection options and one underground option. The underground option will have no impact. The proposed length of the overhead line connection measures from the angle mast to the	No

Relevant European Sites[3] and Qualifying Interests/Special Conservation Interest Species that have a Potential to be Adversely Affected	Summary of Potential Impacts and Adverse Effects (in the absence of mitigation)	Assessment – Significant Adverse effect (Yes/No)
	substation are 480m (northern substation at Derryadd bog) and 1km (southern substation at Derryadd bog). Overhead powerlines can present a hazard to birds through collision related mortality. However as previously stated; given the presence of the existing overhead power line in both locations and the short length of the proposed grid connection, it is considered that the potential additional collision risk for local birds is of low magnitude. It is considered likely that birds will become accustomed to the presence of the proposed overhead power line in the landscape, which will further reduce collision risk. Therefore, there will be no significant adverse effect on lapwing.	
	Disturbance Displacement and Barrier Effect: There is limited potential for disturbance displacement effects associated with avoidance of operating turbines at the proposed development site. This could result in effective habitat loss. Any effect of disturbance displacement is expected to decrease over time as the foraging behaviour of local avian communities adjusts and they become habituated to the disturbance (Langston and Pullan 2003). Numerous studies have shown no significant disturbance displacement through avoidance for this species (Pearce-Higgins *et al.* 2009). For the most part, records of Lapwing were made during the non-breeding season. Onsite records were low in number (maximum flock size was 70 individuals). There were no records of breeding (onsite) from survey work carried out at the proposed development site or from historical data. The ongoing commercial peat production at the proposed development site restricts the potential for a significant population to exist onsite. The proposed development site is located in an open landscape; this topographical characteristic limits the potential for a barrier effect. In the event a barrier effect exists for migrating birds; the additional energy expenditure involved in birds diverting around the wind farm are not considered significant in the context of the overall distances involved in migrating. Langton and Pullan (2003) have shown this species to be adept at navigating between operating turbines. Given the present of similar suitable habitat nearby,	No

Relevant European Sites[3] and Qualifying Interests/Special Conservation Interest Species that have a Potential to be Adversely Affected	Summary of Potential Impacts and Adverse Effects (in the absence of mitigation)	Assessment – Significant Adverse effect (Yes/No)
	the low frequency of occurrence, the low numbers per observation, and the absence of a regular flight path across the site, disturbance displacement and barrier effects will have no significant adverse effect on lapwing.	
Lough Ree SPA: **Common Tern**	**Collision Risk:** Common Tern flight activity was concentrated along the River Shannon (away from proposed turbine locations and grid connections) and as a result collision risk is not predicted to have ecologically significant adverse effect for this species (see EIAR Appendix 6.5).	No
Lough Ree SAC: **Natural eutrophic lakes (habitat code: 3150), Degraded raised bog (habitat code: 7120), Alkaline fens (habitat code: 7230)**	**Water Quality**: Construction activities have the potential to introduce pollutants (e.g. hydrocarbons and cement run-off) and increase sediment loading in receiving watercourses. In addition, construction activities have the potential to introduce alien invasive species which have potential to further adversely affect the receiving environment. Construction machinery has the potential to act as a vector for invasive plant material on to the site. In particular, invasive aquatic plants can out-compete native species and/or clog waterways and Himalayan balsam exposes river banks to increased risk of erosion in the autumn when the plant dies back for the non-growing season. In the absence of mitigation measures it is not possible to rule out a significant adverse effect.	Yes
Lough Ree SAC: **Otter**	**Fishery value**: Construction activities have the potential to introduce pollutants (e.g. hydrocarbons and cement run-off) and increase sediment loading in receiving watercourses. In addition, construction activities have the potential to introduce alien invasive species which have potential to further adversely affect the receiving environment. Construction machinery has the potential to act as a vector for invasive plant material on to the site. In particular invasive aquatic plants can out-compete native species and/or clog waterways and Himalayan balsam exposes river banks to increased risk of erosion in the autumn when the plant dies back for the non-growing season. Such impacts could have long-term indirect effects on fishery species composition, diversity and abundance in affected areas. A	Yes

Relevant European Sites[3] and Qualifying Interests/Special Conservation Interest Species that have a Potential to be Adversely Affected	Summary of Potential Impacts and Adverse Effects (in the absence of mitigation)	Assessment – Significant Adverse effect (Yes/No)
	reduction in available (fish) prey could reduce the capacity of the habitat to support a healthy Otter population. In the absence of mitigation measures it is not possible to rule out a significant adverse effect.	
	Habitat Loss is not considered to be of high concern for mammals within the proposed development site; given that the internal infrastructure constitutes a small proportion (51.8 ha/ 2.7%) of the total proposed development site (1,908ha) and the availability of similar suitable habitats in the surroundings (e.g. bog/ heath/ grassland). Therefore, there is no significant adverse effect.	No
	Disturbance displacement: Disturbance due to construction works can result in effective habitat loss through displacement. This effect will be short term in nature for the duration of the construction phase. Given no otter holts were recorded within the proposed development site and the sub-optimal suitability of habitats within the proposed development site for Otter, there is no potential for an adverse effect.	No
Ballykenny-Fisherstown Bog SPA: **Greenland White-fronted Goose**	On the 11th of November 2015 three birds were recorded feeding in drains and flooded bog onsite (Derryadd bog). There was no flight activity recorded within the study area (i.e. no predicted collision risk). The exceptional rainfall which occurred during the 2015/ 16 winter and resulting flooding, created a temporary feeding opportunity onsite. This species is deemed not dependent on the habitats onsite based on the single observation of a flock onsite which was well below the threshold of national importance (109 birds constitutes a flock of national importance). There is no potential for a significant adverse effect arising from habitat loss and fragmentation, disturbance displacement, barrier effects and collision risk.	No
River Shannon Callows SAC: **Alluvial forests with Alnus glutinosa and Fraxinus excelsior (*Alno-Padion, Alnion incanae,*	**Water Quality:** Construction activities have the potential to introduce pollutants (e.g. hydrocarbons and cement run-off) and increase sediment loading in receiving watercourses. In the absence of mitigation measures it is not possible to rule out a significant adverse effect.	Yes

Relevant European Sites[3] and Qualifying Interests/Special Conservation Interest Species that have a Potential to be Adversely Affected	**Summary of Potential Impacts and Adverse Effects (in the absence of mitigation)**	**Assessment – Significant Adverse effect (Yes/No)**
***Salicion albae*) (Habitat code: 91E0])**		
River Shannon Callows SAC: **Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) (habitat code: 6410)**	**Water Quality:** Construction activities have the potential to introduce pollutants (e.g. hydrocarbons and cement run-off) and increase sediment loading in receiving watercourses. In the absence of mitigation measures it is not possible to rule out a significant adverse effect.	Yes
River Shannon Callows SAC: **Otter (*Lutra lutra*) (Habitat code: 1355).**	**Fishery value:** Construction activities have the potential to introduce pollutants (e.g. hydrocarbons and cement run-off) and increase sediment loading in receiving watercourses. Such impacts could have long-term indirect effects on fishery species composition, diversity and abundance in affected areas. A reduction in available (fish) prey could reduce the capacity of the habitat to support a healthy Otter population. The foraging range for Otter can be up to 20km. However, the proposed development is located 22.8km away from this SAC; therefore, there is no potential for a significant adverse effect.	No

8 DESIGN AND MITIGATION MEASURES

The following proposed mitigation measures have been included as part of the proposed development to ensure that, in view of the European sites' conservation objectives and beyond any scientific doubt, the proposed development will not adversely affect the integrity of the sites concerned, i.e. the Lough Ree SAC and SPA, River Shannon Callows SAC and the Ballykenny-Fisherstown SPA. The preparation of this NIS and the proposed mitigation measures has involved collaboration from a range of experts across fields of ecology, hydrology and engineering.

Construction Phase Mitigation

During the construction phase of the proposed development, the following mitigation measures are proposed to avoid adverse effects on key ecological receptors:

- Where areas of potentially sensitive breeding bird habitat (e.g. birch scrub) is proposed to be removed during construction, these works will be timed to avoid the breeding birds nesting season, i.e. March 1st to August 31st. This measure will remove any potentially significant adverse effect.
- The majority of construction activities will take place during daylight hours, thereby avoiding disturbance to nocturnal fauna. Drewitt and Langston (2006) present this recommendation as industry best practise. On occasion deliveries may arrive outside daylight hours and concrete pours for the turbine foundations may commence and conclude at dawn/ dusk. This will be an infrequent occurrence of short duration and will therefore not have any significant adverse effects on Otter – the only qualifying interest for the Lough Ree and River Shannon Callows SACs that may be affected by such activities.
- No turbines are located in high (local) value habitats and all are located in habitats not evaluated as key ecological receptors for any of the European sites and typically of low ecological value. This mitigation by avoidance will avoid potential habitat loss for key avian species.
- The proposed turbine locations and access routes will avoid potential breeding sites that protected mammals such as otter typically use including; stream/ rivers and associated riparian habitats and bridges. This measure will avoid any potentially significant adverse effect.
- Following detailed design consideration, and as required, temporary silt screens will be installed in drains/ small streams deemed to be possibly at risk of water pollutant discharge. Mitigation for in-stream works will follow IFI recommendations as per EIAR Chapter 8.
- During the construction phase as part of the CEMP, ecological monitoring will take place by a suitably qualified Ecological Clerk of Works (ECoW). The role of the ECoW will include:
    - Supervision of construction works and ensure compliance with legislation;
    - Monitoring habitats and species during the course of construction works and effectiveness of mitigation;
    - Provision of advice regarding the avoidance and minimisation of potential disturbance to wildlife;

  - Provide recommendations on appropriate responses/ actions to site specific issues (e.g. identification of previously unrecorded breeding sites during construction works); and
  - Liaison with NPWS, IFI and other prescribed authorities, when required.
- If encountered during construction, the spread and introduction of alien invasive species and noxious weeds will be avoided by adopting appropriate mitigation measures as per guidance issued by the NRA (2010). The mitigation/control measures adopted will depend on the type of invasive species encountered. Although no non-native invasive plant species (as per the Third Schedule Part 1 of the European Communities Regulations 2011) were recorded during baseline surveys; any invasive plant material noted (during construction activities) on site will be removed off site and disposed of at appropriate licensed waste disposal facility. Any alien invasive species found to occur within 15m of working areas will require a specialist method statement for its eradication to avoid the spread of invasive species, this will ensure compliance with the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011). The presence of alien invasive species and requirement for actions will be confirmed by the ECoW prior to the commencement of works.

Surface Water Impact Mitigation:

Inland Fisheries Ireland were consulted with during the scoping and drafting of the EIAR (see EIAR Chapter 1) will be consulted with in the development of a Construction Management Plan. Their requirements must be adhered to. Mitigation measures to be employed during the construction phase to protect water quality include:

- No in-stream works shall be carried out without the written approval of IFI. Works in watercourses must be carried out between July-September unless otherwise agreed with IFI.
- Silt traps will be constructed at locations to intercept run-off to the drainage networks and will not be constructed immediately adjacent to natural watercourses and will be designed to take account of particle size and volumes of water requiring treatment, retention time.
- Consideration will be given to judicious positioning of silt fences.
- Natural flow paths will not be interrupted or diverted so as to give rise to create potential for erosion.
- Pre-cast concrete will be used where possible with all work done in the dry and isolated from any water that may enter the drainage network for a period sufficient to cure the concrete.
- Specific and controlled vehicle washout areas will be provided.
- All natural watercourses to be traversed during site development and road construction will be effectively bridged prior to commencement of further construction activities.
- No watercourses will be crossed using fords. The creation of fords through introduction of stone is prohibited.
- Bridge design will follow IFI recommendations.

- Design of crossing structures will have a carrying capacity of a 1 in 100-year fluvial flood flow whilst maintaining a minimum freeboard of 300mm, with design in accordance with OPW requirements.
- Crossing structures must and will be designed and installed to;
    - Allow maintenance of channel profile and gradient,
    - Be capable of passing debris which may arise during flood flow conditions,
    - Ensure adequate light penetration,
    - Not result in damage to riparian habitat or necessitate construction within 2.5m of waters, and
    - Provide fishing access at locations, specified by IFI.
- Crossing structures (bridges, culverts etc) must maintain the natural channel gradient, width and substrate configuration, be buried to a minimum of 500mm below stream bed at natural gradient (never exceed 5% when baffles required and preferably not exceed 3%). As baffles can reduce hydraulic efficiency of culverts, appropriate capacity provision must be included in overall design. Box culverts must be 3m high on angling waters. The availability of suitably sized material to initiate "simulation" of the stream bed is preferable to faunal passage through culverts. Culverts will be positioned where the watercourse is straightest and aligned with its bed.
- Bank protection works upstream and downstream of new structures must ensure stability with boulders a minimum of 0.5 ton. Each course of boulders must be backfilled with topsoil. Gabions are not a preferred option.
- Routes to and from temporary crossing structures will be designed and installed so drainage falls away from the watercourse being crossed. In the event that the fall of ground does not permit sufficient control on drainage, additional earthworks settlement areas shall be provided.
- Temporary crossing structures must be fenced with terram, silt fencing, or similar material to prevent wind blow carrying dusts and other potentially polluting matter to water.
- Side armour (e.g. reinforced concrete traffic barriers) will be provided on temporary crossing structures to ensure machinery cannot drive over its edge or force the discharge of material from the bridge deck to waters.
- Site selection for temporary crossings must have regard to all access and construction needs ranging from fencing contractors' vehicles to the longest/widest wheelbase of multi-axle cranes.
- It is not permissible, except in exceptional circumstances to reposition temporary crossing structures where these are not of a clear span type.
- Design of permanent crossing structures (including culverts) must be based on its technical and economic feasibility to pass fish and macro-invertebrates, protect fish habitats, provision of angling and commercial fishing access (if relevant) and erosion and sedimentation.
- Culverting of long stretches of fisheries water is extremely undesirable and must be avoided where possible.

Operational Phase Mitigation

During the operational phase of the development, identified potential adverse effects on key ecological receptors will be avoided. The following mitigation measures are proposed to achieve this:

- In order to avoid a potential barrier effect on birds as a result of the positioning of the proposed turbines close together, the turbines have been positioned at distances greater than 400m apart as per recommendations in Percival (2001).
- In order to reduce any collision risk between special conservation interest species and the proposed development, turbines were not placed on Cloonbony Bog or in the northern section of Derryarogue Bog to ensure a suitable setback distance between the River Shannon, Lough Ree SPA, Ballykenny Fisherstown SPA and the proposed development was achieved.
- In the event an overhead power line is selected as the preferred grid connection, bird flight diverters will be installed as per best practise guidelines (EirGrid 2012).

Decommissioning Phase Mitigation

The expected life span of the proposed wind farm development is 30 years; accordingly, mitigation measures listed below will be amended as appropriate to best practice at the time of decommissioning.

- Decommissioning activities associated with decommissioning of the wind farm proposed development will be undertaken outside of the bird nesting period, which begins on March 1st and continues until August 31st, in order to protect nesting birds. All birds and their nesting places are protected under the Irish Wildlife Act 1976 (as amended). This will be restricted to those areas where sensitive species are found to be breeding. Breeding bird surveys will be carried out before decommissioning takes place in order to identify any potentially sensitive areas.
- Decommissioning operations will be undertaken during daylight hours to avoid undue disturbance to nocturnal fauna resident locally.
- The proposed development area site will be allowed to naturally re-colonise with birch scrub and emergent wetland vegetation and thereby increase its the ecological value of the site following decommissioning.

8.1 SUMMARY

For the most part, potential adverse effects associated with the proposed development have been avoided or reduced by incorporating key intrinsic design measures to protect the qualifying interests/special conservation interest species of the relevant European sites (see Section 8). However, despite these design measures, mitigation measures are also required and will be implemented under the supervision of an ECoW to ensure the proposed development will not affect the conservation objectives of the relevant European sites. Mitigation measures are listed in Section 8 but are also detailed below with regards how they related to specific qualifying interests with a potential to be adversely affected.

Table 8-1: Summary of Qualifying Interests with a Potential for Adverse Effects and the Proposed Mitigation Measures

Relevant European Sites[4] and Qualifying Interests/Special Conservation Interest Species that have a Potential to be Adversely Affected	Summary of Potential Impacts and Adverse Effects (in the absence of mitigation)	Proposed Mitigation Measure
Lough Ree SAC: **Natural eutrophic lakes (habitat code: 3150), Degraded raised bog (habitat code: 7120), Alkaline fens (habitat code: 7230)**	**Water Quality**: Construction activities have the potential to introduce pollutants (e.g. hydrocarbons and cement run-off) and increase sediment loading in receiving watercourses. In addition, construction activities have the potential to introduce alien invasive species which have potential to further adversely affect the receiving environment. Construction machinery has the potential to act as a vector for invasive plant material on to the site. In particular, invasive aquatic plants can out-compete native species and/or clog waterways and Himalayan balsam exposes river banks to increased risk of erosion in the autumn when the plant dies back for the non-growing season. In the absence of mitigation measures it is not possible to rule out a significant adverse effect.	Yes. Measures to prevent the spread of non-native invasive species during construction and/or operation will be implemented to ensure they are not introduced to Lough Ree SAC (see Surface Water Impact Mitigation in Section 8). Measures to maintain water quality in receiving watercourses during construction will be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the proposed development on habitats in Lough Ree SAC are avoided (see Surface Water Impact Mitigation in Section 8).
Lough Ree SAC: **Otter**	**Fishery value**: Construction activities have the potential to introduce pollutants (e.g. hydrocarbons and cement run-off) and increase sediment loading in receiving watercourses. In addition, construction activities have the potential to introduce alien invasive species which have potential to further adversely affect the receiving environment. Construction machinery has the potential to act as a vector for invasive plant material on to the site. In particular invasive aquatic plants can out-compete native species and/or clog waterways and Himalayan balsam exposes river banks to increased risk of erosion in the autumn	Yes. Measures to prevent the spread of non-native invasive species during construction and/or operation will be implemented to ensure they are not introduced to Lough Ree SAC (see Surface Water Impact Mitigation in Section 8). Measures to maintain water quality in receiving

[4] European sites "screened in" as part of the Appropriate Assessment Screening Process (See Section 7.1).

Relevant European Sites[4] and Qualifying Interests/Special Conservation Interest Species that have a Potential to be Adversely Affected	Summary of Potential Impacts and Adverse Effects (in the absence of mitigation)	Proposed Mitigation Measure
	when the plant dies back for the non-growing season. Such impacts could have long-term indirect effects on fishery species composition, diversity and abundance in affected areas. A reduction in available (fish) prey could reduce the capacity of the habitat to support a healthy Otter population. In the absence of mitigation measures it is not possible to rule out a significant adverse effect.	watercourses during construction will be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the proposed development on habitats in Lough Ree SAC are avoided (see Surface Water Impact Mitigation in Section 8).
River Shannon Callows SAC: **Alluvial forests with Alnus glutinosa and Fraxinus excelsior (*Alno-Padion, Alnion incanae, Salicion albae*) (Habitat code: 91E0])**	**Water Quality:** Construction activities have the potential to introduce pollutants (e.g. hydrocarbons and cement run-off) and increase sediment loading in receiving watercourses. In the absence of mitigation measures it is not possible to rule out a significant adverse effect.	Yes. Measures to prevent the spread of non-native invasive species during construction and/or operation will be implemented to ensure they are not introduced to River Shannon Callows SAC (see Surface Water Impact Mitigation in Section 8). Measures to maintain water quality in receiving watercourses during construction will be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the proposed development on habitats in River Shannon Callows SAC are avoided (see Surface Water Impact Mitigation in Section 8).
River Shannon Callows SAC: **Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) (habitat code: 6410)**	**Water Quality:** Construction activities have the potential to introduce pollutants (e.g. hydrocarbons and cement run-off) and increase sediment loading in receiving watercourses. In the absence of mitigation measures it is not possible to rule out a significant adverse effect.	Yes. Measures to prevent the spread of non-native invasive species during construction and/or operation will be implemented to ensure they are not introduced to River Shannon Callows SAC (see Surface Water Impact Mitigation

Relevant European Sites[4] and Qualifying Interests/Special Conservation Interest Species that have a Potential to be Adversely Affected	Summary of Potential Impacts and Adverse Effects (in the absence of mitigation)	Proposed Mitigation Measure
		in Section 8). Measures to maintain water quality in receiving watercourses during construction will be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the proposed development on habitats in River Shannon Callows SAC are avoided (see Surface Water Impact Mitigation in Section 8).

9 IN-COMBINATION EFFECTS

9.1 PROJECTS CONSIDERED AS PART OF THE IN-COMBINATION ASSESSMENT

Information on the relevant projects within the vicinity of the proposed development was compiled on October 31, 2018 and verified on January 29, 2019. The information was sourced from a search of the local authorities planning registers, EPA website, planning applications, EIS documents and planning drawings which facilitated the identification of past and future projects, their activities and their potential environmental impacts. The projects considered in relation to the potential for in-combination effects and for which all relevant data was reviewed, include those listed below.

Derraghan Ash Disposal Facility (Longford Co. Co. – Ref 17/320)

The development is an increase in the capacity of the operational Ash Disposal Facility to allow for the deposition of 130,000 tonnes of dry ash over and above the 550,000 tonnes permitted under Longford County Council Reg. The ash will be disposed of within engineered cells, constructed under the existing permission, and the facility will utilise permitted site services including the existing site entrance from the R392 and other site infrastructure. The facility will exclusively accept ash from Lough Ree Power Station in Lanesborough (Lanesboro) and will operate until 31st December 2020. Lough Ree Power Station and the associated Ash Disposal Facility are licenced by the EPA under an Industrial Emissions (IE) Licence [Ref. P061002]. Permission awarded on 22/02/18.

Peat Extraction: Mountdillion Group (EPA IPC 504-01)

The development is the ongoing extraction of peat (milling, harrowing, ridging and harvesting of peat into stockpiles, transportation of peat via internal rail network) from the Mountdillion group of bogs located in Counties Longford and Roscommon.

Lough Ree Peat Fired Power Station (Longford Co. Co. Planning Ref 01/115)

The development is a peat-fired electric power generation plant, comprising of a single unit having a nominal total electricity rating of 100 megawatts at Lanesboro, and an ash disposal facility for the deposit of peat ash in a landfill to accommodate up to 550,000 tonnes of ash. Planning permission was awarded on the 14/06/2001.

Lough Ree Power Station

Planning permission (Planning ref. 17/320) was recently granted for increasing the capacity of the Lanesborough Power Station ash disposal field at Derraghan 1.5km southwest of Lough Bannow Bog. It should also be noted that an imminent planning application is very likely to be submitted in respect of the continued use and conversion to biomass of Lanesborough Power Station, which is located within the settlement of Lanesborough on the southern bank of the River Shannon. It is considered that the any in-combination effects between the proposed Derryadd Wind Farm and either or both of these developments, which represent continuation and small-scale expansion of existing activities, will be

Imperceptible. The significant energy infrastructure that exists in the local area is Lough Ree Power located to the west of Derryaroge Bog, and its associated grid infrastructure in the form of 110 kV pylons network (in particular the Lanesborough/Richmond and Lanesborough/Mullingar lines). The site on which the proposed development will be located is cutover peatland that is currently being used for peat extraction by Bord na Móna to predominantly provide fuel for the nearby Lough Ree Power Station at Lanesborough. The continued operation of the Lough Ree Power Station is dependent on an extension of its existing planning permission. Thus, there is potential that the Power Station could be removed from the Lanesborough skyline. If an extension to the existing consent is achieved then the plant will continue to operate and as such forms part of the Do Nothing Scenario. The predominant land use of the site and central study area is commercial scale peat extraction for the purposes of energy generation and there is a substantial peat-fired power station at the settlement of Lanesborough near the north-western periphery of the site.

Roosky Wind Farm (Roscommon Co. Co. Planning Ref 13/3005)

A development comprising 2 no. turbines at Ballaghaderreen, Co. Roscommon. The original application (PD/07/2255) was amended in 2013 to extend the duration of the planning permission and apply for turbines with a stated 85m hub height and 125m blade diameter. This wind farm has been constructed.

Skrine Wind Farm (Roscommon Co. Co. Planning Ref 04/103)

Roscommon County Council register reference 04/103 (Appeal Ref. 20.208733) – a grant of planning permission issued to Provento Ireland PLC on 19/1/2005 for a development comprising 2 no. turbines at Skrine, Athleague. The turbines have a stated 64m hub height and 70m blade diameter. An extension of time was granted to Gaelectric on this planning permission, extending it until 18/1/2010. This wind farm has been constructed.

Sliabh Bawn Windfarm (Roscommon Co. Co. Planning Ref 10/507)

Roscommon County Council register reference 10/507 (Appeal Ref. 20.239743) – a grant of planning permission issued to Coillte Teo. on 27/3/2012 for a development comprising 20 turbines at Sliabh Bawn, Strokestown, County Roscommon. The planning permission has a life of 10 years with a permission for the windfarm for a period of 25 years from the date of commissioning. The wind farm has been constructed and is operational since March 2017.

Cloon – Lanesboro 110 kV Overhead Line (Longford Co. Co. Planning Ref. 18/139)

Longford County Council register reference 18/139 – a grant of planning permission for development on 21/08/18 at the site of the existing Cloon to Lanesboro 110 kV Overhead Line, approximately 65 kilometres long. Approximately 37km of the existing circuit is located within the functional area of Galway County Council with approximately 27km located in County Roscommon and approximately 120 metres located in County Longford. The refurbishment works within County Longford will be undertaken at structure EM365, located within the Lanesboro Substation in the townland of Aghamore

(Rathcline By). The development will consist of the refurbishment of the Cloon - Lanesboro 110 kV Overhead Line which will primarily include: replacement of a large proportion of existing structures, the breaking out and reconstruction of the concrete foundation and shear blocks at the majority of end/angle mast structures, painting of mast structures, replacement of insulators, crossarms, stays and/or fittings on existing structures; and the fitting of bird flight diverters and stay guards. No additional structures are proposed along the existing circuit. Any replacement structures will be constructed at, or immediately adjacent to, the existing structures they will replace, and will be of a generally similar height and appearance.

Middleton House Solar Farm (Longford Co. Co. Planning Ref 18/35)

Longford County Council register reference 18/35 – a grant of planning permission issued to Harmony Solar on 15/08/2018 for a ten year permission for a solar farm on a site of approximately 51.38 hectares consisting of the following: up to 216,000m^2 of solar photo-voltaic panels on ground mounted steel frames to generate between 35MW to 50MW of electrical energy; substation and control room and associated hard standing; 14 no. inverter/transformer stations; underground power and communication cables & ducts; boundary security fence; CCTV cameras; upgraded internal access tracks; new internal access tracks and associated drainage infrastructure; provision of passing areas on lands adjacent to the L-11261 local road; access will be via the L-11261 local road through the upgrade of an existing agricultural entrance and at the existing entrance to Middleton House; and temporary construction compounds and all associated site services & works at the townlands of Middleton, Ballycore, Treanboy and Newtown,, near the village of Killashee, Co. Longford.

Fisherstown Solar Farm (Longford Co. Co. Planning Ref. 18/146)

Longford County Council register reference 18/146 – a grant of planning permission for development on 26/08/18 at a site comprising lands within the property of the former Atlantic Mills factory. The development will comprise the construction of a solar farm with an export capacity of approximately 4MW comprising photovoltaic panels on ground mounted frames, with associated infrastructure including a switch gear control room (to be developed at 1 of 2 location options on site. No additional works proposed to the existing substation on site as part of this application), ducting and electrical cabling, internal access roads, fencing and all associated site development works at Fisherstown, Clondra, Co. Longford.

9.2 PLANS CONSIDERED AS PART OF THE IN-COMBINATION ASSESSMENT

The following key plans were identified as having the potential to act in-combination with the proposed development to potentially affect the relevant European sites, as noted in Section **Error! Reference source not found.**.

- Longford County Development Plan 2015 – 2021;
- River Basin Management Plan 2018 – 2021 (released in April 2018); and

- Bord na Móna Draft Rehabilitation Plans. In 2013, Bord na Móna submitted draft rehabilitation plans for each of the Bord na Móna bogs, as per IPC Licence Condition 10 requirements. The plans were further updated in 2015, following rehabilitation trails.

Within the River Basin Management Plan 2018 – 2021 (released in April 2018), extractive or anthropogenic pressures are identified as a significant pressure on a catchment scale basis. As is detailed in the River Basin Management Plan 2018 – 2021, Bord Na Móna is in the process of phasing out the extraction of peat for energy production by 2030. In 2013, Bord na Móna submitted draft rehabilitation plans for each of the Bord na Móna bogs, as per IPC Licence Condition 10 requirements. The plans were further updated in 2015, following rehabilitation trials. The main elements required for rehabilitation post peat production are stabilisation of former bare peat areas largely attained through natural processes of revegetation which may require enhancement by targeted management such as fertiliser/ seeding; surface manipulation and/ or hydrological management (drain/ outfall blocking). Following peat production these rehabilitation measures will be put in place at the site. Commercial peat extraction has decreased at the three bogs since the 2000's. The surrounding peatlands will continue to be managed in accordance with the relevant EPA IPC Licence.

9.3 IN-COMBINATION EFFECT ASSESSMENT

Any other plans or projects which have impact pathways connecting them to the same European sites as those within the ZoI of the proposed development have the potential to act in-combination and have significant adverse effects on these European sites. In-combination/ cumulative effects can be defined as the additional changes caused by a proposed development in conjunction with other similar developments (SNH 2012). A planning search was carried out for similar developments within a 15km buffer around the proposed development, in line with the buffer for the initial desk study review undertaken before the ZoI was determined.

The Derraghan Ash Disposal facility, Peat extraction on Mountdillion and the ongoing operation of Lough Ree Peat Fired Power station can be considered together with the development with respect to the in-combination effects. All three developments operate or will operate under EPA licences and as such will have carried out Appropriate Assessments in their own right. Furthermore, each of these projects have dedicated, detailed and monitored surface water management in place as part of their respect EPA licences. In the context that the proposed development will not have a significant adverse effect, there is no potential for in combination effects with these projects.

There are no existing or permitted wind farms in Co. Longford. The Roosky wind farm in Co. Roscommon is located approximately 14.5km to the north of the proposed development. The Skrine wind farm in Co. Roscommon is located approximately 19km to the south-west of proposed development. Considering that the proposed development will not have a significant adverse effect and

that both of these wind farms are remote from the potentially impacted SACs/SPAs there is no potential for in-combination effects arising with the proposed development.

The Sliabh Bawn wind farm is located approximately 8km west of the proposed development. This development is comprised of 20 electricity generating wind turbines. The total site area is approximately 833ha and ranges in elevation from 70m to 262m (ordnance datum). This development also contains hardstandings, a substation, a permanent meteorological mast, a communication mast and associated roads. This development is located approximately 5km south-east of Strokestown Co. Roscommon. The two sites are separate by lands of mixed agricultural use, lowland bog and the River Shannon. The two developments will have an effect on habitats onsite, however any in-combination effects will be limited by the differing nature of the habitats at each development, i.e. the Sliabh Bawn site is dominated by coniferous plantation; this habitat type is rare at the proposed development site and is generally considered of low ecological value. The in-combination effects which may affect local/ regional avian communities includes:

- In-combination collision risk;
- In-combination habitat loss and disturbance displacement; and
- Creating a barrier to dispersal for regular movement or for migration.

There is potential for collision risk for species of bird which utilise the habitats of the two wind farms or birds which commute between the two sites. However, at Sliabh Bawn no species recorded onsite were of high conservation concern, as per the site's Environmental Impact Assessment (EIS). The majority of species recorded at this site were passerines which are of low risk of collision and also do not form part of the Species of Conservation Interests for either Lough Ree or Ballykenny/Fisherstown SPAs. Given the favourable conservation status of the species recorded at Sliabh Bawn together with the low predicted risk of collisions identified for the species occurring onsite, there will be no in-combination effect with this project regarding collision risk.

It is typically considered that a barrier effect is more likely to have an adverse effect on large flocks of migrating water birds than other species groups such as raptors. The European Union (2011) highlighted the risks associated with turbines when placed along migration routes or between feeding and roosting/ breeding locations. Migrating water birds require corridors within the landscape along which to migrate. Percival (2001) recommends locating turbines at a minimum of 200m apart to facilitate the free movement of birds, thereby avoiding a barrier effect. The Sliabh Bawn wind farm and the proposed development are separated by a distance of 8km; this distance is considered sufficiently large enough to not produce a combined barrier effect, based on Percival (2001) recommendations.

Direct habitat loss for birds as a result of land taken by wind farm developments is typically not considered a major concern outside of nationally and internationally important sites for birds. The

turbines at the two wind farms are considered sufficiently separated (8km), so as to avoid the potential for in-combination habitat loss or displacement effects.

Robinson *et al.* (2010) stated that water birds show a preference for flight paths which follow natural watercourses in the landscape as opposed to flying over mountainous or hilly terrain. It is therefore reasonable to conclude that wintering water birds (locally) are likely to follow flightlines along the River Shannon corridor, and would be unlikely to cross either Sliabh Bawn wind farm or the proposed development during migration. Wind farms in the landscape can result in a barrier effect for foraging birds when turbines are located between foraging and roosting grounds. However, given the core foraging range of water birds wintering in the River Shannon catchment is generally less than 8km (e.g. Whooper Swan less than 5km [SNH 2016]), the Sliabh Bawn wind farm is considered too distant to result in such in-combination effects on foraging birds. Additionally, individual species accounts as detailed in Table 7-9 (e.g. Lapwing, Golden Plover and Whooper Swan) show some bird species to be adept at navigating between operating turbines.

On the 21st of August 2018 planning permission was granted for the refurbishment of the Cloon – Lanesboro 110 kV Overhead Line. Any replacement structure will be constructed at, or immediately adjacent to the existing structures they will replace and will be generally of similar height and appearance. The permission includes the requirement for bird flight diverters. Given the bird flight diverters and that birds will have become accustomed to the existing overhead line in the landscape significant, collision risk was assessed to be of Low magnitude. Therefore, given the low levels of collision risk associated with this project and the proposed development, it has been determined there will be no in-combination effects.

In relation to the Middleton House and Fisherstown Solar Farm the planning permission granted for these two sites includes the requirement for protective measures that will ensure the protection of European sites across all identified impact sources. Furthermore, given that the proposed development will implement the required best practice/mitigation measures and subsequently will not have a significant adverse effect and considering the separation distances between the developments (i.e. 1.5km and 5.9km respectively), it has been determined there will be no in-combination effects.
to result from the proposed development and existing activities in the wider area.

Based on the above assessment, there are no predicted operational adverse effects on the surface water and groundwater environment as a result of the proposed development. Therefore, given that the proposed development alone will not adversely affect the surface water and groundwater environment during operations there will be no possibility for any significant in-combination effects with any other plans or projects.

10 MONITORING

In order to ensure the proposed mitigation measures are correctly implemented and thereby effective, monitoring will be required, specifically related to local avian communities. This monitoring will be conducted by an appropriately qualified and experienced ornithologist/ ecologist in consultation with NPWS. The programme will aim to monitor factors which relate to collision risk, disturbance displacement/ barrier effects and habituation during the lifetime of the project. Monitoring will be run in parallel with the lifetime of the proposed development. A monitoring assessment will be conducted in years 1, 2, 3, 5, 10 and 15 (SNH 2009). The programme will aim to monitor factors which relate to collision risk, disturbance displacement/ barrier effects and habituation during the lifetime of the project. Survey methods will broadly follow SNH (2014) monitoring guideline protocols and will be at a similar frequency as the baseline surveys.

Migratory/ Wintering Waterfowl Surveys of local waterbodies;

- Vantage Point Surveys;
- Onsite Breeding Birds surveys; and
- Corpse search (birds and bats) at turbine bases.

Pre-construction surveys for Otter (resting or breeding places) along watercourses and woody vegetation will be carried out to confirm the conditions previously reported remain unchanged. There are no seasonal constraints for Otter surveys; however, Otter surveys will be conducted no more than 10 to 12 months in advance of construction. This is required to inform site clearance activities given the legal protection of Otter breeding sites. Works will require an agreed method statement and will be monitored by the ECoW in accordance with NRA guidelines (NRA 2008).

In order to ensure all construction works in and adjacent to waters are carried out in accordance with the protective mitigation measures outlined above, construction works shall be monitored by an ECoW in accordance with the Surface Water Management Plan (EIAR Appendix 8.4). The ECoW will inspect and monitor the water quality of surface waters in the vicinity of any works, paying particular attention to silt levels and will ensure maintenance of any sediment and erosion control measures (e.g. silt traps) are carried out as required.

The proposed mitigation measures are based on the best available scientific evidence; therefore, confidence can be placed in their success. Accordingly, the proposed development will not adversely affect the integrity of the relevant European sites.

11 RESIDUAL EFFECTS

None of the potential direct or indirect impacts associated with the proposed development will affect the conservation objectives of any of the qualifying interests or special conservation interest species of the Lough Ree SAC and SPA, the River Shannon Callows SAC and the Ballykenny-Fisherstown SPA.

Design and mitigation measures are included to ensure protection of the hydrological environment, to prevent the introduction and spread of invasive species, to ensure the proposed development does not present a barrier to birds, and to ensure it does not present a disturbance or mortality risk to the Otter population. As such, it has been determined there are no residual direct or indirect impacts that could adversely affect the integrity of the relevant European sites.

12 CONCLUSION OF APPROPRIATE ASSESSMENT

Following the implementation of the prescribed mitigation measures in Section 8 of this NIS, the proposed development will not, either individually or in-combination with other plans and projects, in view of the best scientific knowledge in the field, adversely affect the integrity of the Lough Ree SPA, Lough Ree SAC, Ballykenny-Fisherstown Bog SPA, River Shannon Callows SAC or any European site and there is no reasonable scientific doubt as to that conclusion.

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APPENDIX A

Relevant European Site Synopsis Reports

SITE SYNOPSIS

Site Name: Lough Ree SAC

Site Code: 000440

Lough Ree is the third largest lake in Ireland and is situated in an ice-deepened depression in Carboniferous limestone on the River Shannon system between Lanesborough and Athlone. The site spans Counties Longford, Roscommon and Westmeath. Some of its features (including the islands) are based on glacial drift. It has a very long, indented shoreline and hence has many sheltered bays. Although the main habitat, by area, is the lake itself, interesting shoreline, terrestrial and semi-aquatic habitats also occur.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

[3150] Natural Eutrophic Lakes
[6210] Orchid-rich Calcareous Grassland*
[7110] Active Raised Bog*
[7120] Degraded Raised Bog
[7230] Alkaline Fens
[8240] Limestone Pavement*
[91A0] Old Oak Woodlands
[91D0] Bog Woodland*
[1355] Otter (*Lutra lutra*)

The greater part of Lough Ree is less than 10 m in depth, but there are six deep troughs running from north to south, reaching a maximum depth of about 36 m just west of Inchmore. The lake has been classified as mesotrophic in quality, but the size of the system means that a range of conditions prevail depending upon, for example, rock type. This gives rise to local variations in nutrient status and pH, which in turn results in variations in the phytoplankton and macrophyte flora. Therefore species indicative of oligotrophic, mesotrophic, eutrophic and base-rich situations occur. The water of Lough Ree tends to be strongly peat-stained, restricting macrophytes to depths of less than 2 m, and as a consequence, macrophytes are restricted to sheltered bays, where a typical Shannon flora occurs. Species present include Intermediate Bladderwort (*Utricularia intermedia*), pondweeds (*Potamogeton* spp.), Quillwort (*Isoetes lacustris*), Greater Duckweed (*Spirodela polyrhiza*), stoneworts (*Chara* spp., including *C. pedunculata*) and Arrowhead (*Sagittaria sagittifolia*). The latter is a scarce species which is almost confined in its occurrence to the Shannon Basin.

Reedbeds of Common Reed (*Phragmites australis*) are an extensive habitat in a number of more sheltered places around the lake, but single-species 'swamps' consisting of such species as Common Club-rush (*Scirpus lacustris*), Slender Sedge (*Carex lasiocarpa*), Great Fen-sedge (*Cladium mariscus*) and two scarce species of sedge (*Carex appropinquata* and *C. elata*) also occur in suitable places. Some of these grade up into species-rich alkaline fen with Black Bog-rush (*Schoenus nigricans*) and Whorl-grass (*Catabrosa aquatica*), or freshwater marsh with abundant Water Dock (*Rumex hydrolapathum*) and Hemp-agrimony (*Eupatorium cannabinum*).

Lowland wet grassland is found in abundance around the shore and occurs in two types. One is 'callowland', grassland which floods in winter. This provides feeding for winter waterfowl and breeding waders. The other is an unusual community on stony wet lake shore which is found in many places around the lake, and is characterized by Water Germander (*Teucrium scordium*), a scarce plant species almost confined to this lake and Lough Derg.

Dry calcareous grassland occurs scattered around the lake shore. This supports typical species such as Yellow-wort (*Blackstonia perfoliata*), Carline Thistle (*Carlina vulgaris*) and Quaking-grass (*Briza media*). Orchids also feature in this habitat e.g. Bee Orchid (*Ophrys apifera*) and Common Spotted-orchid (*Dactylorhiza fuchsii*).

Limestone pavement occurs occasionally around the lake shore. The most substantial area is at Rathcline in the extreme north-east. While this has been planted with commercial forestry since the 1950s, it still displays a diverse representation of pavement types, from the typical clint-gryke system to large blocky pavements and scattered boulders. In all cases the pavement is covered by a bryophyte-rich flora, with abundant Ivy (*Hedera helix*), and a scrub layer dominated by Ash (*Fraxinus excelsior*), Hazel (*Corylus avellana*) and some Spindle (*Euonymus europaeus*). The ground flora is variable, though in places it is species-rich.

Dry broadleaved semi-natural woodland occurs in several places around the lake, most notably at St John's Wood and on Hare Island. St John's Wood is recognised as the largest and most natural woodland in the Midlands. Its canopy is dominated by Hazel, Pedunculate Oak (*Quercus robur*), Holly (*Ilex aquifolium*) and Ash, but a range of other trees and shrubs occur, including Wych Elm (*Ulmus glabra*), Yew (*Taxus baccata*), Wild Cherry (*Prunus avium*) and Irish Whitebeam (*Sorbus hibernica*). The ground flora of St. John's Wood is species-rich, and is remarkable for the presence of two species, Toothwort (*Lathraea squamaria*) and Bird's-nest Orchid (*Neottia nidus-avis*), which tend to occur in sites with a long history of uninterrupted woodland cover. The tree species composition on Hare Island is similar to that in St. John's Wood, with additional non-native species such as Sycamore (*Acer pseudoplatanus*) and Beech (*Fagus sylvatica*). This wood also has an exceptionally rich ground flora. Some of the smaller areas of woodland around Lough Ree are mixed woodland with a high percentage of exotics such as Beech. Some areas of well-developed Hazel scrub also occur.

Pockets of wet woodland occur around the lake. Most of these are dominated by willows (*Salix* spp.), Alder (*Alnus glutinosa*) and Downy Birch (*Betula pubescens*). In one such wood, at Ross Lough, the terrestrial alga, *Trentopohlia* sp., has a specialised niche on the willow trunks. The ground layer has a rich bryophyte flora (*Calliergon* spp. and *Sphagnum* spp.), scattered clumps of Greater Tussock-sedge (*Carex paniculata*) and a good diversity of herb species, including Water Dock and Fen Bedstraw (*Galium uliginosum*).

Small examples of raised bog occur, which are of interest in that they show a natural transition through wet woodland and/or swamp to lakeshore habitats. Active Raised Bog (ARB) habitat comprises areas of high bog that are wet and actively peat-forming, where the percentage cover of bog mosses (*Sphagnum* spp.) is high, and where some or all of the following features occur: hummocks, pools, wet flats, *Sphagnum* lawns, flushes and soaks. Results from surveys of the raised bog habitat in 2003 indicate the presence of 5.9 ha of Active Raised Bog (ARB). Also present are examples of Degraded Raised Bog (DRB) capable of regeneration. In general the vegetation of these degraded areas is dominated by typical raised bog species such as Cross-leaved Heath (*Erica tetralix*), Heather (*Calluna vulgaris*), Hare's-tail Cottongrass (*Eriophorum vaginatum*), Bog Asphodel (*Narthecium ossifragum*) and Deergrass (*Scirpus cespitosus*). Typically the degraded bog areas have a low cover of peat-forming bog mosses (*Sphagnum* spp.). The current extent of DRB as estimated using a recently developed hydrological modelling technique, based largely on Light Detection And Ranging (LiDAR) data, is 44.7 ha.

Associated with the extensive raised bog system at Clooncraff/Clonlarge are areas of bog woodland. At least two small areas of woodland occur on the raised bog domes. However it would appear that this habitat is in the early stages of development. The largest area is dominated by low trees of Downy Birch and Lodgepole Pine (*Pinus contorta*). Occasional trees of Scots Pine (*Pinus sylvestris*) also occur. The ground layer is wet and quaking with a lush carpet of mosses present, including various species of *Sphagnum*, *Pleurozium schreberi* and *Aulocomium palustre*. The main vascular plant species in the ground flora are Bog-rosemary (*Andromeda polifolia*), Cranberry (*Vaccinium oxycoccos*), Bog-myrtle (*Vaccinium myrtillus*), Hare's-tail Cottongrass and Deergrass. Bog Woodland is of particular conservation importance and is listed with priority status on the E.U. Habitats Directive. Bog Woodland is considered a variant of ARB.

At St. John's Wood, there is an interesting area of woodland that grows on cut-away peat. This is dominated by Downy Birch and Alder Buckthorn (*Frangula alnus*). The occurrence of the latter species in such abundance is unusual in Ireland.

Smaller lakes occur around the lake shore, especially on the east side, and these often have the full range of wetland habitats contained within and around them. A number of small rivers also pass through the site.

The site supports a number of rare plant species which are listed in the Irish Red Data Book. Alder Buckthorn and Bird Cherry (*Prunus padus*) are woodland

components at St. John's Wood and elsewhere. Narrow-leaved Helleborine (*Cephalanthera longifolia*) and Betony (*Stachys officinalis*), both of which are also legally protected under the Flora (Protection) Order, 1999, occur among the ground flora of Hare's Island (where the former occurs in notable abundance). They also occur in a number of other woods. The stonewort *Chara tomentosa* is present in shallow water around the lake, and Marsh Pea (*Lathyrus palustris*) occurs on some of the callowland. The rare Myxomycete fungus, *Echinostelium colliculosum,* has been recorded from St John's Wood.

The lake itself contains one of only two populations in Ireland of the endangered fish species, Pollan (*Coregonus autumnalis*), which is genetically different from Continental European stock. The shrimp *Mysis relicta* (Class Crustacea) occurs in this lake and is a relict of the glacial period in Ireland.

Small flocks of Greenland White-fronted Goose, an Annex I species on the E.U. Birds Directive, use several areas of callowland around the lake in winter. An average spring count of 92 individuals was obtained for this species over the six seasons 1988/89 to 1993/94, indicating that Lough Ree is a nationally important site for the species. The following bird counts are derived from 6 counts during the period 1984/85 to 1986/87: nationally important populations of Golden Plover (1,350), an Annex I species; Wigeon (1,306); Teal (584); Tufted Duck (1,317) and Coot (798). Other winter visitors are Whooper Swan (32), an Annex I species, Mute Swan (91), Little Grebe (48), Cormorant (91), Mallard (362), Shoveler (40), Pochard (179), Goldeneye (97), Curlew (178), Lapwing (1,751) and Dunlin (48). The callowland is also used by Black-tailed Godwit and other species on migration.

Some of the lake islands provide nesting sites for Common Tern, a species listed on Annex I of the E.U. Birds Directive. The Lough Ree colony, 86 pairs in 1995, is estimated as one of the largest of this species on midland lakes. The lake also provides excellent breeding habitat for wildfowl, including Common Scoter (30-40 pairs), a rare breeding species listed as "Endangered" in the Red Data Book, and Tufted Duck (>200 pairs). The woodlands and scrub around the lake and on the islands are a stronghold of the Garden Warbler (74 territories in 1997), a bird species mainly confined to the Shannon lakes in Ireland.

There is a population of Otter around the lake. This species is listed in the Red Data Book as being threatened in Europe and is protected under Annex II of the E.U. Habitats Directive.

Land uses within the site include recreation in the form of cruiser hire, angling, camping, picnicking and shooting. Chalet accommodation occurs at a few locations around the lake. Low-intensity grazing occurs on dry and wet grassland around the shore, and some hay is made within the site. Some of these activities are damaging, but in a very localised way, and require careful planning. The main threat to the aquatic life in the lake comes from artificial enrichment of the waters by agricultural and domestic waste, and also by peat silt in suspension which is increasingly limiting

the light penetration, and thus restricting aquatic flora to shallower waters. At present Lough Ree is less affected by eutrophication than Lough Derg.

Lough Ree and its adjacent habitats are of major ecological significance. Some of the woodlands around the lake are of excellent quality and include some of the best examples of this habitat in Ireland. St. John's Wood is particularly important; it is considered to be one of the very few candidates for ancient woodland in Ireland. The lake itself is an excellent example of a mesotrophic to moderate-eutrophic system, supporting a rare fish species and a good diversity of breeding and wintering birds.

SITE SYNOPSIS

SITE NAME: LOUGH REE SPA

SITE CODE: 004064

Situated on the River Shannon between Lanesborough and Athlone, Lough Ree is the third largest lake in the Republic of Ireland. It lies in an ice-deepened depression in Carboniferous Limestone. Some of its features (including the islands) are based on glacial drift. The main inflowing rivers are the Shannon, Inny and Hind, and the main outflowing river is the Shannon. The greater part of Lough Ree is less than 10 m in depth, but there are six deep troughs running from north to south, reaching a maximum depth of about 36 m just west of Inchmore. The lake has a very long, indented shoreline and hence has many sheltered bays. It also has a good scattering of islands, most of which are included in the site.

Beds of Common Reed (*Phragmites australis*) are an extensive habitat in a number of the more sheltered places around the lake; monodominant stands of Common Club-rush (*Scirpus lacustris*), Slender Sedge (*Carex lasiocarpa*) and Saw Sedge (*Cladium mariscus*) also occur as swamps in suitable places. Some of these grade into species-rich calcareous fen or freshwater marsh. Lowland wet grassland, some of which floods in winter, occurs frequently around the shore.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Whooper Swan, Wigeon, Teal, Mallard, Shoveler, Tufted Duck, Common Scoter, Goldeneye, Little Grebe, Coot, Golden Plover, Lapwing and Common Tern. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

Lough Ree is one of the most important Midland sites for wintering waterfowl, with nationally important populations of Little Grebe (52), Whooper Swan (139), Wigeon (2,070), Teal (1,474), Mallard (1,087), Shoveler (54), Tufted Duck (1,012), Goldeneye (205), Coot (338), Golden Plover (3,058) and Lapwing (5,793) – all figures are three year mean peaks for the period 1997/98 to 1999/2000. Other species which occur in winter include Great Crested Grebe (29), Cormorant (99), Curlew (254) and Black-headed Gull (307) as well as the resident Mute Swan (85). Greenland White-fronted Goose has been recorded on occasion on the flooded margins of the site.

The site supports a nationally important population of Common Tern (90 pairs in 1995). It is a traditional breeding site for Black-headed Gull and whilst a full survey has not been carried out in recent years, substantial numbers of nesting birds were present on at least one island in 2003. Lesser Black-backed Gull and Common Gull have bred in the past and may still breed. Lough Ree is a noted site for breeding duck and grebes: Tufted Duck (202 pairs) and Great Crested Grebe (32 pairs) – records from 1995. Of particular note is that Lough Ree is one of the two main sites in the

country for breeding Common Scoter, a Red Data Book species. Surveys have recorded 39 pairs and 32 pairs in 1995 and 1999 respectively. Cormorant also breeds on some of the islands within the site – 86 nests were recorded in 2010. The woodland around the lake is a stronghold for Garden Warbler and this scarce species probably occurs on some of the islands within the site.

Lough Ree SPA is of high ornithological importance for both wintering and breeding birds. It supports nationally important populations of eleven wintering waterfowl species. The site has a range of breeding waterfowl species, notably nationally important populations of Common Scoter and Common Tern. Of particular note is the regular presence of three species, Whooper Swan, Golden Plover and Common Tern, which are listed on Annex I of the E.U. Birds Directive. Parts of Lough Ree SPA are Wildfowl Sanctuaries.

SITE SYNOPSIS

SITE NAME: BALLYKENNY-FISHERSTOWN BOG SPA

SITE CODE: 004101

Ballykenny-Fisherstown Bog SPA is located on the border between Counties Longford and Roscommon in the north-central midlands and is underlain by Carboniferous limestone. It is centered around Lough Forbes, a naturally eutrophic lake on the River Shannon system which is fed also from the north by the River Rinn. The lake has well-developed swamp vegetation and displays natural transitions to seasonally flooded grassland, marsh and raised bog. The raised bogs, known as the Ballykenny-Fishertown complex, are separated by the Camlin River, which has further areas of callow grassland. The central core areas of the bogs are quite wet with a good complement of bog mosses (*Sphagnum* spp.) and well-developed hummocks. Ballykenny Bog is unusual in that some of its margins are intact, a rare feature in the Irish midlands. Between the Camlin River and this bog, a complete transition from raised bog to callow grasslands can be seen, while the interface between the bog and lake is colonised by a narrow band of deciduous woodland.

At the time this site was designated as a Special Protection Area (SPA) it was being used by part of the Loughs Kilglass and Forbes Greenland White-fronted Goose population. The geese appear to have since abandoned the peatland sites in favour of grassland sites elsewhere. The site was regularly utilised during the 1980s and Greenland White-fronted Goose is regarded as a special conservation interest for this SPA. The last record of Greenland White-fronted Goose at this site was in 1990/91 (111 individuals).

Merlin and Red Grouse have also been recorded within the site.

The lake and callow grasslands provide good habitat for a range of wintering waterfowl species though most occur in relatively low numbers: Cormorant (51), Whooper Swan (40), Wigeon (419), Teal (444), Tufted Duck (49) and Goldeneye (11) – are counts are two year mean peaks for the period 1998/99 to 1999/2000.

24.4.2012

SITE SYNOPSIS

Site Name: River Shannon Callows SAC

Site Code: 000216

The River Shannon Callows is a long and diverse site which consists of seasonally flooded, semi-natural, lowland wet grassland, along and beside the river between the towns of Athlone and Portumna. It is approximately 50 km long and averages about 0.75 km wide (reaching 1.5 km wide in places). Along much of its length the site is bordered by raised bogs (many, but not all, of which are subject to large-scale harvesting), esker ridges and limestone-bedrock hills. The soils grade from silty-alluvial to peat. This site has a common boundary, and is closely associated, with two other sites with similar habitats, River Suck Callows and Little Brosna Callows.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

[6410] *Molinia* Meadows
[6510] Lowland Hay Meadows
[8240] Limestone Pavement*
[91E0] Alluvial Forests*
[1355] Otter (*Lutra lutra*)

The River Shannon Callows is mainly composed of lowland wet grassland. Different plant communities occur, depending on elevation, and therefore flooding patterns. Two habitats listed on Annex I of the E.U. Habitats Directive are well-represented within the site – *Molinia* meadows and lowland hay meadows. The former is characterised by the presence of the Meadow Thistle (*Cirsium dissectum*) and Purple Moor-grass (*Molinia caerulea*), while typical species in the latter include Meadow Fescue (*Festuca pratensis*), Rough Meadow-grass (*Poa trivialis*), Downy Oat-grass (*Avenula pubescens*), Common Knapweed (*Centaurea nigra*), Ribwort Plantain (*Plantago lanceolata*) and Common Sorrel (*Rumex acetosa*). In places these two habitats grade into one another.

Low-lying areas of the callows with more prolonged flooding are characterised by Floating Sweet-grass (*Glyceria fluitans*), Marsh Foxtail (*Alopecurus geniculatus*) and wetland herbs such as Yellow-cress (*Rorippa* spp.), Water Forget-me-not (*Myosotis scorpioides*) and Common Spike-rush (*Eleocharis palustris*). Most of the callows consist of a plant community characterised by Creeping Bent (*Agrostis stolonifera*), Brown Sedge (*Carex disticha*), Common Sedge (*Carex nigra*), and herbs such as Marsh-marigold (*Caltha palustris*) and Marsh Bedstraw (*Galium palustre*), while the more elevated and peaty areas are characterised by low-growing sedges, particularly

Yellow Sedge (*Carex flava* agg.) and Star Sedge (*Carex echinata*). All these communities are very diverse in their total number of plant species, and include the scarce species Meadow-rue (*Thalictrum flavum*), Summer Snowflake (*Leucojum aestivum*) and Marsh Stitchwort (*Stellaria palustris*).

A further two Annex I habitats, both listed with priority status, have a minor though important presence within the site. Alluvial forest occurs on a series of alluvial islands just below the ESB weir near Meelick. Several of the islands are dominated by well-grown woodland consisting mainly of Ash (*Fraxinus excelsior*) and Willows (*Salix* spp.). The islands are prone to regular flooding from the river.

At Clorhane, an area of limestone pavement represents the only known example in Co. Offaly. It is predominantly colonised by mature Hazel (*Corylus avellana*) woodland, with areas of open limestone and calcareous grassland interspersed. The open limestone pavement comprises bare or moss -covered rock, or rock with a very thin calcareous soil cover supporting a short grassy turf. The most notable plant in the grassy area is a substantial population of Green-winged Orchid (*Orchis morio*), which occurs with such species as Sweet Vernal-grass (*Anthoxanthum odoratum*), Quaking-grass (*Briza media*), sedges (*Carex caryophyllea, C. flacca*), Common Bird's-foot-trefoil (*Lotus corniculatus*), Common Knapweed (*Centaurea nigra*), and Ribwort Plantain (*Plantago lanceolata*). Ferns associated with the cracks in the pavement include *Asplenium trichomanes, A. ruta-muraria, A. adiantum-nigrum* and *Polypodium australe.* Bryophytes include *Grimmia apocarpa* and *Orthotrichum* cf. *anomalum*. Anthills are common within the open grassland. The Hazel wood is well-developed and has herbaceous species such as Primrose (*Primula vulgaris*), Common Dog-violet (*Viola riviniana*), Wood-sorrel (*Oxalis acetosella*) and Herb-Robert (*Geranium robertianum*). The wood is noted for its luxuriant growth of epiphytic mosses and liverworts, with such species as *Neckera crispa* and *Hylocomium brevirostre*. Yew (*Taxus baccata*) occurs in one area.

Other habitats of smaller area but also of importance within the site are lowland dry grassland, drainage ditches, freshwater marshes and reedbeds. The dry grassland areas, especially where they exist within hay meadows, are species-rich, and of two main types: calcareous grassland on glacial material, and dry grassland on levees of river alluvium. The former can contain many orchid species, Cowslip (*Primula veris*), abundant Adder's-tongue (*Ophioglossum vulgatum*) and Spring-sedge (*Carex caryophyllea*), and both contain an unusually wide variety of grasses, including False Oat-grass (*Arrhenatherum elatius*), Yellow Oat-grass (*Trisetum flavescens*), Meadow Foxtail (*Alopecurus pratense*), and Meadow Brome (*Bromus commutatus*). In places Summer Snowflake also occurs.

Good quality habitats on the edge of the callows included in the site are wet broadleaved semi-natural woodland dominated by both Downy Birch (*Betula pubescens*) and Alder (*Alnus glutinosa*), and dry broadleaved woodland dominated by Hazel. There are also areas of raised bog, fen on old cut-away bog with Black Bog-rush (*Schoenus nigricans*), and a 'petrifying stream' with associated species-rich

calcareous flush which supports Yellow Sedge (*Carex lepidocarpa*), Blunt-flowered Rush (*Juncus subnodulosus*) and Stoneworts (*Chara* spp.).

Two species which are legally protected under the Flora (Protection) Order, 1999, occur in the site - Opposite-leaved Pondweed (*Groenlandia densa*) in drainage ditches, and Meadow Barley (*Hordeum secalinum*) on dry alluvial grassland. This is one of only two known inland sites for Meadow Barley in Ireland. The Red Data Book plant Green-winged Orchid is known from dry calcareous grasslands within the site, while the site also supports a healthy population of Marsh Pea (*Lathyrus palustris*).

The site is of international importance for wintering waterfowl as numbers regularly exceed the 20,000 threshold (mean of 34,985 for five winters 1994/94-1998/99). Of particular note is an internationally important population of Whooper Swans (287). A further five species have populations of national importance (all figures are means for five winters 1995/96-1999/00): Mute Swan (349), Wigeon (2972), Golden Plover (4254), Lapwing (11578) and Black-tailed Godwit (388). Species which occur in numbers of regional or local importance include Bewick's Swan, Tufted Duck, Dunlin, Curlew and Redshank. The population of Dunlin is notable as it is one of the few regular inland flocks in Ireland. Small flocks of Greenland White-fronted Goose use the Shannon Callows; these are generally associated with larger flocks which occur on the adjacent Little Brosna Callows and River Suck Callows.

Shoveler (an estimated 12 pairs in 1987) and Black-tailed Godwit (Icelandic race) (one or two pairs in 1987) breed within this site. These species are listed in the Red Data Book as being threatened in Ireland. The scarce bird Quail is also known to breed within the area. The callows has at times held over 40% of the Irish population of the globally endangered Corncrake, although numbers have declined in recent years. A total of 66 calling birds were recorded in 1999, but numbers have dropped significantly since then. The total population of breeding waders (Lapwing, Redshank, Snipe and Curlew) in 1987 was one of three major concentrations in Ireland and Britain. The population of breeding Redshank in the site was estimated to be 10% of the Irish population, making it nationally significant. Also, the Annex I species Merlin and Hen Harrier are regularly reported hunting over the callows during the breeding season and in autumn and winter.

This site holds a population of Otter, a species listed on Annex II of the E.U. Habitats Directive, while the Irish Hare, which is listed in the Irish Red Data Book, is a common sight on the callows.

The Shannon Callows are used for summer dry-stock grazing (mostly cattle, with some sheep and a few horses), and permanent hay meadow. About 30 ha is a nature reserve owned by voluntary conservation bodies. The River Shannon is used increasingly for recreational purposes with coarse angling and boating accounting for much of the visitor numbers. Intermittent and scattered damage to the habitats has occurred due to over-deepening of drains and peat silt deposition, water-skiing, ploughing and neglect of hay meadow (or reversion to pasture). However, none of these damaging activities can yet be said to be having a serious impact. Threats to the

quality of the site may come from the siting of boating marinas in areas away from centres of population, fertilising of botanically-rich fields, the use of herbicides, reversion of hay meadow to pasture, neglect of pasture and hay meadow, disturbance of birds by boaters, anglers, birdwatchers and the general tourist. The maintenance of generally high water levels in winter and spring benefits all aspects of the flora and fauna, but in this regard, summer flooding is a threat to breeding birds, and may cause neglect of farming.

The Shannon Callows has by far the largest area of lowland semi-natural grassland and associated aquatic habitats in Ireland, and one in which there is least disturbance of natural wetland processes. Botanically, it is extremely diverse with two legally protected species of plants and many scarce species. Excellent examples of two habitats listed on Annex I of the E.U. Habitats Directive occur within the site – *Molinia* meadows and lowland hay meadows with good examples of a further two Annex habitats (both with priority status). In winter the site is internationally important for numbers and species of waterfowl. In spring it feeds large numbers of birds on migration, and in summer it holds very large numbers of breeding waders, rare breeding birds and the endangered Corncrake, as well as a very wide variety of more common grassland and wetland birds. The presence of Otter, an Annex II species, adds further importance to the site.

APPENDIX B

Appropriate Assessment Screening Report

Appropriate Assessment Screening Report

for

Proposed Derryadd Wind Farm

at

Derryadd, Co. Longford

January 2019

TOBIN

Patrick J. Tobin & Co. Ltd.

REPORT

PROJECT: **Appropriate Assessment Screening Report for Proposed Derryadd Wind Farm, Co. Longford**

CLIENT: Bord na Móna Powergen Ltd

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DOCUMENT AMENDMENT RECORD

Client: Bord na Móna Powergen Ltd

Project: Appropriate Assessment Screening Report for Proposed Wind Farm at Derryadd, Co. Longford

Title: Appropriate Assessment Screening Report

PROJECT NUMBER: 10325				**DOCUMENT REF: 10325_Derryadd_AA_D.03**			
D05	AA Screening Report – Address Client Review	LK	09.01.19				
D04	AA Screening Report – Address Legal Review	LK	07.12.18				
D03	AA Screening Report	PC	04.10.18				
D02	AA Screening Report	PC	10.09.18				
D01	AA Screening Report	PC	08.08.18				
Revision	**Description & Rationale**	**Originated**	**Date**	**Reviewed**	**Date**	**Authorised**	**Date**
TOBIN Consulting Engineers							

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1 INTRODUCTION

The landholdings initially considered for a potential wind farm consisted of eight individual peat production Bord na Móna bogs, namely; Mountdillon, Derrycashel, Derraghan, Derryshannoge, Derrycolumb, Derryadd, Derryaroge and Lough Bannow. These eight bogs made up the onsite study area, October 2014 to March 2016. In April 2016, the onsite study area was reduced to four bogs namely; Derryadd, Derryarogue, a small section of Derryshannoge and Lough Bannow. These four bogs are considered the 'site' for the purposes of this screening report. They form part of the Mountdillon peat production group that is located in south County Longford and are shown in Figure 1. Appropriate Assessment (AA) is an assessment of whether a plan or project, individually or in-combination with other plans or projects, will have a significant effect on a European site, collectively known as the Natura 2000 network (as designated under the EC Habitats Directive 92/43/EEC or "the Habitats Directive", more formally referred to as Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora), in view of the site's conservation objectives.

2 THE APPROPRIATE ASSESSMENT PROCESS

2.1 INTRODUCTION

The purpose of an AA is to determine whether or not the proposed development would adversely affect the integrity of a European site(s). The Natura 2000 network is made up of Special Protection Areas (SPAs), established under the Council Directive 2009/147/EC (as amended) on the conservation of wild birds or "the Birds Directive", and Special Areas of Conservation (SACs), established under the Habitats Directive. The Natura 2000 network helps provide for the protection and long-term survival of Europe's most valuable and threatened species and habitats.

2.2 LEGISLATIVE BACKGROUND

Both the Habitats Directive and the Birds Directive have been transposed into Irish law by the European Communities (EC) (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011 as amended; hereafter referred to as the Birds and Habitats Regulations). The Birds Directive seeks to protect birds of special importance by the designation of SPAs. The Habitats Directive does the same for habitats and other species groups with the designation of SACs.

The requirement for an AA is outlined in Article 6(3) and further expanded upon in Article 6(4) of the Habitats Directive. Article 6(3) of the Habitats Directive requires that:-

> "*Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall*

agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public."

This provision is transposed into Irish law by Part XAB of the Planning and Development Acts, 2000-2017. Section 177U(4) of the said Acts provides for screening for Appropriate Assessment as follows:

"The competent authority shall determine that an appropriate assessment of [...] a proposed development [...] is required if it cannot be excluded, on the basis of objective information, that the [...] proposed development, individually or in combination with other plans or projects, will have a significant effect on a European site."

Section 177U(5) provides as follows:

"The competent authority shall determine that an appropriate assessment of a […] proposed development, […], is not required if it can be excluded, on the basis of objective information, that the […] proposed development, individually or in combination with other plans or projects, will have a significant effect on a European site."

Article 6(4) of the Habitats Directive requires that:-

"*If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted*."

In the case of Article 6(4), the type of Imperative Reasons of Overriding Public Interest (IROPI) that a competent authority can consider will depend on the nature of the site that will be affected:

- If the site hosts a priority habitat or species, the competent authority can only consider reasons relating to human health, public safety, or beneficial consequences of primary importance to the environment; or other imperative reasons of overriding public interest only after having regard to the opinion of the European Commission.
- For other sites the competent authority can consider other imperative reasons of overriding public interest including those relating to social or economic benefit in addition to those of human health, public safety, or beneficial consequences of primary importance to the environment.

Appropriate Assessment should be based on best scientific knowledge. This screening report informs the first stage in the process to be undertaken by the competent authority, i.e. determining if an Appropriate

Assessment is required. This screening report was informed by desk-based studies and field surveys undertaken between October 2014 and October 2018.

2.3 GUIDANCE AND APPROACH

This report has been carried out using the following guidance:

- Appropriate Assessment under Article 6 of the Habitats Directive: Guidance for Planning Authorities. Circular NPW 1/10 & PSSP 2/10;
- Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities (Department of Environment, Heritage and Local Government 2010 revision);
- Managing Natura 2000 Sites: The Provisions of Article 6 of the Habitat's Directive 92/43/EEC (European Commission 2000 and updated draft April 2015);
- Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites: Methodological Guidance on the Provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC (European Commission Environment Directorate-General 2001); and
- Guidance Document on Article 6(4) of the Habitats Directive 92/43/EEC. Clarification of the Concepts of Alternative Solutions, Imperative Reasons of Overriding Public Interest, Compensatory Measures, Overall Coherence. Opinion of the European Commission (European Commission January 2007, updated 2012).

The potential for effects on nature conservation interests was assessed, taking into consideration the habitats and species that are likely to be affected by the proposed development. This approach included consideration (as appropriate) of the following guidance documents:

- Scottish Natural Heritage (SNH) (2000). Wind Farms and Birds: Calculating a Theoretical Collision Risk Assuming no Avoidance Action;
- SNH (2006). Assessing Significance of Impacts from Onshore Wind Farms on Birds Outwith Designated Areas;
- SNH (2009). Monitoring the Impact of Onshore Wind Farms on Birds;
- SNH (2010). Avoidance Rates Information and Guidance Note: Use of Avoidance Rates in the SNH Wind Farm Collision Risk Model;
- SNH (2012). Assessing the Cumulative Impact of Onshore Wind Energy Developments;
- SNH (2014). Recommended Bird Survey Methods to Inform Impact Assessment of Onshore Wind Farms;
- SNH (2016). Assessing Connectivity with Special Protection Areas (SPAs);
- Fossitt (2000). A Guide to Habitats in Ireland. The Heritage Council;
- Environmental Protection Agency (EPA) (2002). Guidelines on the information to be contained in Environmental Impact Statements;

- EPA (2017). Guidelines on the information to be contained in Environmental Impact Assessment Reports. Draft, August 2017;
- Chartered Institute of Ecology and Environmental Management (CIEEM) (2016). Guidelines for Ecological Impact Assessment in the UK and Ireland;
- National Roads Authority (NRA) (2005). Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes;
- NRA (2006a). Guidelines for Assessment of Ecological Impacts of National Road Schemes (Revision 1, National Roads Authority);
- NRA (2006b). Guidelines for the Treatment of Otters prior to the Construction of National Roads Schemes. National Roads Authority, Dublin;
- NRA (2009a). Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes;
- NRA (2009b). Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes;
- NRA (2009c). Guidelines for Assessment of Ecological Impacts of National Road Schemes. (Revision 2, National Roads Authority);
- Smith *et al*. (2011). Best Practice Guidance for Habitat Survey and Mapping in Ireland;
- NRA (2010). Guidelines on the Management of Noxious Weeds and Non-Native Plan Species on National Roads;
- Murray A. (2003). Draft Methodology for a National Hedgerow Survey. Unpublished document for Network for Nature;
- Longford County Development Plan 2015 – 2021; and
- Bord na Móna (2016). Biodiversity Action Plan 2016-2021.

In addition, a detailed review of online published scientific literature was conducted. This included a detailed review of the National Parks and Wildlife Service (NPWS) website including mapping and available reports for relevant European sites and, in particular, sensitive qualifying interests described and their conservation objectives. The Environmental Protection Agency (EPA) Envision Map-viewer (www.epa.ie) and available reports were also reviewed.

2.4 APPROPRIATE ASSESSMENT METHODOLOGY

There are potentially four stages in the AA process; derived from the "*Assessment of Plans and Projects Significantly affecting Natura 2000 sites: Methodological Guidance on the Provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC*". The result of each stage determines whether a further stage in the process is required.

Stage One: Screening – This process identifies the likely significant effects upon a European site from a proposed project or plan. Its purpose is to determine whether a plan or project, which is not directly

connected to or necessary for the management of the site, individually or in-combination with other plans or projects is likely to have a significant effect upon the European site, in view of its conservation objectives and best scientific knowledge. An AA is required if it cannot be excluded, on the basis of objective information, that the proposed development, individually or in-combination with other plans or projects, will have a significant effect on a European site. It is not appropriate, at this screening stage, to take account of the measures intended to avoid or reduce harmful effects of a plan or project on European sites (as per clarification provided by the Court of Justice of the European Union [CJEU] in Case 323-17 People Over Wind and Peter Sweetman v Coillte). It is this stage that is the focus of this report.

Stage Two: Appropriate Assessment – In this stage, consideration is given to ascertain whether the plan or project would adversely affect the integrity of a European site(s), either alone or in-combination with other plans or projects, with respect to the European site's structure and function and its conservation objectives. This stage of the assessment is carried out by the consenting authority and is informed by a Natura Impact Statement (NIS). A NIS is required where there is uncertainty as to whether or not an adverse effect arises, uncertainty of the effect itself, or a potential effect has been defined which requires further procedures/mitigation to remove uncertainty of a defined impact (i.e. significant effects cannot be excluded). Where there are adverse effects, an assessment of the potential mitigation to ameliorate those effects is required. If the assessment results in a negative conclusion, i.e. adverse effects on the integrity of a site cannot be excluded (by design or mitigation) or there is uncertainty as to whether an adverse impact arises, then the process must consider alternatives (Stage 3) or proceed to Stage 4.

Stage Three: Assessment of Alternative Solutions – Where adverse effects on a European site are identified at the end of Stage Two despite the application of mitigation, this third stage examines alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of the European site.

Stage Four: Assessment Where Adverse Impacts Remain – The fourth and final stage applies where the project can only proceed for Imperative Reasons of Overriding Public Interest (IROPI), despite the plan or project resulting in adverse effects on a European site(s). This stage provides for an assessment of compensation measures to maintain or enhance the overall coherence of the Natura 2000 network.

This report details Stage One, preparation of a screening report to assist An Bord Pleanála (ABP) in their screening for the proposed Derryadd Wind Farm development. Definitions of conservation status, integrity and significance used in this assessment are defined in accordance with "*Managing Natura 2000 Sites: The Provisions of Article 6 of the Habitat's Directive 92/43/EEC*" (EC, 2000), as follows:

- *"The conservation status of a natural habitat is defined as the sum of the influences acting on a natural habitat and its typical species that may affect its long-term natural distribution, structure and functions as well as the long-term survival of its typical species";*
- *"The conservation status of a species is defined as the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its population";*
- *"The integrity of a European Site is defined as the coherence of the site's ecological structure and function, across its whole area, or the habitats, complex of habitats and/or populations of species for which the site is or will be classified"; and*
- *Significant effect should be determined in relation to the specific features and environmental conditions of the protected site concerned by the plan or project, taking particular account of the site's conservation objectives."*

3 SCREENING ASSESSMENT

3.1 INTRODUCTION

The Screening Stage of the AA process identifies any likely significant effects upon European sites from the project alone or in-combination with other projects or plans. A series of questions are asked during the Screening Stage of the AA process in order to determine:

a) whether a plan or project can be excluded from AA requirements because it is directly connected with or necessary to the management of a European site; and

b) whether the project or plan will have a potentially significant effect on a European site, either alone or in-combination with other projects or plans, in view of the site's conservation objectives or if residual uncertainty exists regarding potential effects.

This report comprises a screening assessment of the proposed development. Potential effects on European sites arising from the proposed development are considered.

3.2 DESCRIPTION OF THE PROPOSED DEVELOPMENT

The proposed development consists of a wind farm located approximately 3 kilometres (km) east of Lanesborough, Co. Longford, 4km west of Killashee, Co. Longford and 8km to the north of Newtowncashel Co. Longford. The wind farm is located on the Mountdillon group of peat extraction bogs in Co. Longford.

Planning permission is being sought from ABP for the installation of 24 No. wind turbines with a nominal capacity of 4 megawatts (MW) per turbine or approximately 96 MW in total. The turbines will have a blade tip height of a maximum of 185 metres (m) above the top of the foundation and will be accessible from internal access routes within the Bord na Móna site area.

The overall site area is 1,908 hectares (ha). The site is approximately 12km long in the northwest/southwest direction and approximately 4km wide in an east/west direction. The site lies between the towns and villages of Lanesborough, Derraghan, Keenagh and Killashee, while the main urban centre in the region, Longford Town, is 9km to the northeast from its nearest point. Derryaroge Bog to the north is adjacent to the River Shannon and Lough Bannow Bog is immediately to the west of the Royal Canal which runs in a north south direction.

The land use/activities on the site are a mixture of active peat extraction, peat extraction works (administration offices, machinery maintenance and storage, stores, canteen), bare cutaway peat, re-vegetation of bare peat, and two existing wind monitoring masts on Derryaroge Bog and Lough Bannow Bog. These works as well as the transportation of peat/ash by rail form part of the Bord na Móna Mountdillon peat production facility in Co. Longford.

At a local scale, the proposed development is situated between the Ballynakill River to the east and the Lough Bannow Stream to the west. All waterbodies ultimately discharge to the River Shannon. The proposed development is located within an operating peat extraction site. An extensive network of existing drainage channels are present throughout the peatland which is currently operated under the EPA regulated IPC licence P0504-01 Mountdillon bog group. Lough Ree is located downstream of the proposed development.

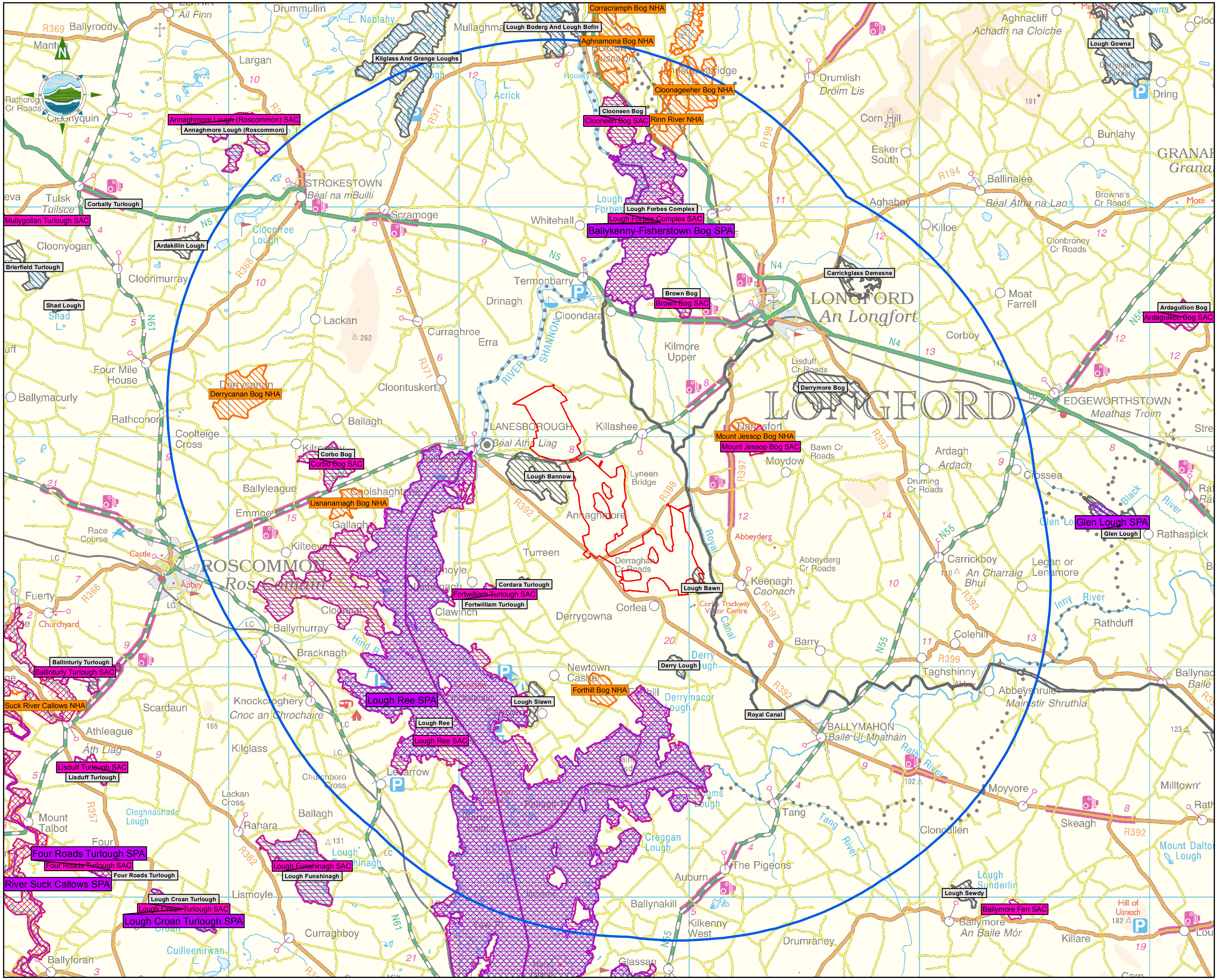
The surrounding landscape is a mixture of forestry, agricultural land and cutover/cutaway peatland. The landscape is predominately flat (Refer to Figure 1 for Site Location Map).

The proposed development consists of:

- 24 no. wind turbines with an overall blade tip height of up to 185m and all associated hard-standing areas;
- 5 no. borrow pits;
- 3 No. permanent Anemometry Masts up to a height of 120m;
- Provision of new internal site access roads (permanent and temporary), passing bays, amenity cycleways, car parking and associated drainage;
- 1 no. 110kV electrical substation, including battery storage, which will be constructed at one of two proposed locations on site: either Option A in Cloonfore townland or Option B in Derraghan More townland. The electrical substation will have 2 no. control buildings, associated electrical plant and equipment, battery storage containers and a wastewater holding tank;
- 5 no. temporary construction compounds, in the townlands of Cloonfore, Cloontabeg, Derraghan More, and Rappareehill (2 no.);
- All associated underground electrical and communications cabling connecting the wind turbines to the proposed substation at either Option A in Cloonfore or Option B in Derraghan More;
- All works associated with the connection of the proposed wind farm to the national electricity grid, which will be either to the existing Lanesborough/Richmond 110 kV line via overhead line (Option A) or to the existing Lanesborough/Mullingar 110 kV line via an underground or overhead line (Option B);
- Removal of existing meteorological masts;
- New access junctions, improvements and temporary modifications to existing public road infrastructure to facilitate delivery of abnormal loads and construction access, including locations on the N6, N61, N63, R392, R398, L11554, L1136 roads, access onto the local road in the townland of Cloonkeel, access onto the local road in the townland of Mount Davys and amenity access from the Royal Canal Tow Path (off the L5239);
- All related site works and ancillary development; and

- A 10-year planning permission and 30-year operational life from the date of commissioning of the entire wind farm.

Turbines will be transported to the site within the carriageway of existing roads along a specific haul route thereby avoiding potential significant adverse effects on any European site.



Legend

- Planning Application Boundary
- 15Km Buffer Zone
- Special Protection Area (SPA)
- Special Area of Conservation (SAC)
- Natural Heritage Areas (NHA)
- Proposed Natural Heritage Area (pNHA)

0 1 2 4 6
Kilometres

Issue	Date	Description	By	Chkd.
A	Jan. 2019	Final Issue	FH	LK

Client: BORD NA MÓNA Naturally Driven

Project: DERRYADD WIND FARM

Title: SITE LOCATION AND DESIGNATED SITES

Scale @ A3: 1:150,000

Prepared by: F. Healy | Checked: L. Kennedy | Date: January 2019

Project Director: D. Grehan

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Figure 1

Issue: A

3.3 DESCRIPTION OF THE EXISTING ENVIRONMENT

3.3.1 Desktop Study and Information Sources

The ecological desktop study completed for the proposed development comprised the following elements:

- Identification of European sites within the Zone of Impact (ZoI) of the proposed development area through the identification of potential pathways/links from the proposed development area and European sites and/or supporting habitats;
- Review of the NPWS site synopsis, Natura 2000 data forms, and conservation objectives for the European sites with a potential pathway from the proposed development[1];
- Review of available literature and web data. This included a detailed review of the NPWS and Biodiversity Data Centre websites including mapping and available reports[2] for relevant sites and in particular qualifying interests described and their conservation objectives; and
- Review of Bord na Móna habitat studies of the site carried out in 2012.

An outline of the key datasets and information sources reviewed throughout the assessment as part of the study are provided below:

- NPWS database of areas designated (and proposed) for nature conservation;
- National Biodiversity Data Centre database;
- Important Bird Areas (BirdWatch Ireland[3]);
- Water Framework Directive website (www.wfdireland.ie);
- Geographic Information Systems (GIS) Online mapping (http://dcenr.maps.arcgis.com/apps/MapSeries/index.html?appid=a30af518e87a4c0ab2fbde2aaac3c228);
- EPA Envision database (http://gis.epa.ie/Envision);
- Copeland, A. (2011). Birds on Cutaway Peatlands: Baseline Breeding Bird Population Survey. Project Report 2011. Unpublished report for Bord na Móna;
- Fitter, R., & Fitter, A. (1984). Collins Guide to the Grasses, Sedges, Rushes and Ferns of Britain and Northern Europe. William Collins Sons & Co. Ltd;
- Parnell, J., Curtis, T., & Cullen, E. (2012). Webbs An Irish Flora. Cork University Press; Hayden, T. J., & Harrington, R. (2000). Exploring Irish Mammals. Town House;
- Bang P. and Dahlstrom P. (2001). Animal Tracks and Signs. Oxford University Press, Oxford;
- Information on the status of EU protected habitats and species in Ireland (https://www.npws.ie/article-17-reports-0/article-17-reports-2013);
- Review of Ordnance Survey of Ireland (OSi) mapping (www.osi.ie) and aerial photography (Google Maps, Bing Maps, Lidar Mapping) for the proposed development and its environs.

[1] National Parks and Wildlife Service: http://www.npws.ie/protectedsites/ (Site Accessed December 2018)
[2] National Parks and Wildlife Service: http://www.npws.ie/mapsanddata/ (Site Accessed December 2018
[3] BirdWatch Ireland - Important Bird Areas: http://www.birdwatchireland.ie/Portals/0/images_large/iba.png (Site Accessed December 2018)

3.3.2 Field Surveys

Field surveys were undertaken by skilled and appropriately experienced observers between the periods October 2014 to October 2018 (see Table 3.1). The data collected was robust and allowed TOBIN Consulting Engineers (TOBIN) to draw accurate and coherent conclusions on the possible impacts of the proposed development on ecological receptors.

Table 3.1: Survey Works and Periods Conducted

Survey Period	Personnel	Surveys Conducted
October 2014 – March 2015	John Murphy (Senior Ecologist/Ornithologist), Caroline Hurley (Senior Ecologist), Austin Cooney (Ornithologist), Caroline Lalor (Ecologist), Hazel Tough (Ecologist) and Caoimhin O'Neill (Ecologist) of Malachy Walsh and Partners Engineering and Environmental Consultants.	Birds: Monthly vantage point (VP) surveys[4], 6 hours per VP per month. Winter transects survey, 2 visits, one early (November) and one late (March) visit.
April – August 2015		Birds: Monthly vantage point (VP) surveys, 6 hours per VP per month. Breeding birds transect survey, 2 visits, one early (May) and one late (July) visit.
September 2015 – March 2016		Birds: Monthly vantage point (VP) surveys, 6 hours per VP per month. Winter transects survey, 2 visits, one early (November) and one late (March) visit.
April – September 2016	Jessica Quinn (Ecologist/ Ornithologist), Allison Austin (Senior Ecologist), Christopher Walsh (Ecologist), Alan Booth (Ecologist), Kevin Delahunty (Ecologist), Brian Arneill (Independent Ornithologist), Nick Duff (Independent Ornithologist) and Austin Cooney (Independent Ornithologist) of TOBIN.	Birds: Monthly vantage point (VP) surveys, 6 hours per VP per month. Breeding bird transect surveys two visits March-July. Woodcock survey two visits, both in June. Monthly I-WeBS[5] of water bodies in the hinterland of the site (April - September).
September 2016 (1 day)	Daireann McDonnell (Senior Ecologist), Laura Kennedy (Senior Ecologist), Jessica Quinn (Ecologist/ Ornithologist), and Christopher Walsh (Ecologist) of TOBIN	Ecological walkover survey, records were made of habitats encountered and any signs of protected species at proposed turbine locations.
October 2016 – March 2017	John Murphy (Senior Ecologist/Ornithologist), Caroline Hurley (Senior Ecologist), Austin Cooney (Ornithologist), Caroline Lalor (Ecologist), Hazel Tough (Ecologist) and Caoimhin O'Neill (Ecologist) of Malachy Walsh and Partners Engineering and Environmental Consultants.	Birds: Monthly vantage point (VP) surveys, 6 hours per VP per month. I-WeBS of water bodies in the hinterland of the site.
June, July and November 2017	John Dillon (Hydrogeologist)	A walkover survey of the site to identify hydrological features on site including inter alia;

[4] At proposed wind farm sites vantage point surveys are typically used to evaluate the flight activity of a given location.
[5] Irish Wetland Bird Surveys

Survey Period	Personnel	Surveys Conducted
		wet ground, drainage patterns and distribution, exposures and drains. Peat probes, trial pitting and borehole testing.
April 2017 (1 day)	Padraig Cregg (Senior Ecologist) of TOBIN	Following the relocation of several turbines, these new locations were surveyed for habitats encountered and any signs of protected species.
April – September 2017	John Hehir (Assistant Ornithologist), Patrick Manley (Assistant Ornithologist) and Sean Ronayne (Assistant Ornithologist) of McCarthy Keville O'Sullivan Planning and Environmental Consultants.	Birds: Monthly vantage point (VP) surveys, 6 hours per VP per month, breeding walkover survey (3 visits, April - June), breeding raptor survey (4 visits, April - July) Woodcock survey (3 visits in June) and I-WeBS of water bodies in the hinterland of the site (August and September).
October 2017 – March 2018	Alan Booth (Ecologist), Shane Cully (Ornithologist) and Kevin Delahunty (Ecologist) of TOBIN	Birds: Monthly vantage point (VP) surveys, 6 hours per VP per month. I-WeBS of water bodies in the hinterland of the site, Hen Harrier Roost Surveys, Transect surveys.
April 2018 (3 days)	Joanne Allen Hamilton (Senior Ecologist) of TOBIN	Following the relocation of several turbines and internal roads, all infrastructure locations were surveyed for habitats encountered and any signs of protected species (including Otters).
March and April 2018	John Dillon (Hydrogeologist)	Peat probes, trial pitting, borehole testing and field analysis of water samples.
May – July 2018	Padraig Cregg (Senior Ecologist) and Kevin Delahunty (Ecologist) of TOBIN	Birds: Species specific Curlew and Woodcock surveys. These surveys were undertaken in areas where these species were previously recorded, Curlew survey (4 visits) and Woodcock survey (3 visits).
October 2018 (2 days)	Alan Booth (Ecologist) and Kilian Murphy (Ecologist) of TOBIN	Marsh Fritillary survey. This survey was undertaken in areas of suitable habitat.
October 2018 (1 day)	Dr. Maria Long (molluscan specialist)	Whorl Snail (vertigo sp.) study at Lough Bawn pNHA.

3.3.3 Existing Environment

The proposed development will be situated within a Bord na Móna landholding. This landholding continues to be used by Bord na Móna for primarily commercial peat extraction. Overall the site varies greatly, from areas which are re-vegetated since they have come out of production, to areas of bare peat which are still being harvested. The largest sections of active peat production can be found in Derryaroge and Lough Bannow bogs. In general, the areas which have come out of peat production contain habitats typical of re-vegetating cutover/cutaway bog with heath/scrub/woodland habitats on the relatively well drained portions of the proposed development site. At a local scale, the proposed development is located

between the Ballynakill River to the east and the Lough Bannow Stream to the west. All waterbodies ultimately discharge to the River Shannon.

Habitats on the proposed development site were surveyed most recently in April 2018 and were classified in accordance with Fossitt (2000). Seventeen habitat classes were recorded including:

- Cutover bog (PB4);
- Drainage ditches (FW4);
- Earth banks (BL2);
- Scrub (WS1);
- Bog woodland (WN7);
- Oak-ash-hazel woodland (WN2);
- Conifer plantation (WD4);
- Dry grassland mosaic (GS1 & GS2);
- Wet grassland (GS4);
- Raised bog (PB1);
- Poor fen and flush (PF2);
- Transition mire and quaking bog (PF3);
- Re-colonising bare ground (ED3);
- Depositing/lowland rivers (FW3);
- Other artificial lakes and ponds (FL8);
- Buildings and other artificial surfaces (BL3); and
- Mineral islands (WS1, GS1, GS4 & FP1).

There were nine Red Listed (BoCCI) species recorded over the four winter survey seasons. These species included; Wigeon, Black-headed Gull, Curlew, Golden Plover, Redshank, Herring Gull, Grey Wagtail, Lapwing and Meadow Pipit. Red Listed species in Ireland are those species which have suffered large declines in their population. Declines in wintering populations of several species including Wigeon has resulted in their Red Listing. Black-headed and Herring Gull are Red Listed due to a 70% and 90% decline respectively in their breeding population over the past 25 plus years. Curlew, Golden Plover and Lapwing are all listed for both their breeding and wintering populations. These species have suffered 32%, 66% and 68% declines respectively in their wintering populations. Redshank breeding populations have declined for some decades in Ireland. Grey Wagtails have suffered an 80% decline in their breeding population trending over the last 25 years[6]. Meadow Pipit are Red Listed due to short term declines in their breeding populations which are expected to recover in the short term.

[6] Colhoun and Cummins (2013) Birds of Conservation Concern in Ireland 2014-2019. Irish Birds 9: 523-544.

There were six bird species listed in Annex I of the Bird Directive recorded over the course of winter surveys within the study area, namely Golden Plover, Greenland White-fronted Goose, Hen Harrier, Kingfisher, Merlin and Peregrine Falcon. These species have been evaluated as "threatened" due to large historical declines and/ or as a result of habitat loss.

There were seven species recorded on the Red List (BoCCI) during breeding bird surveys (2015, 2016 and 2017). These species included; Black-headed Gull, Woodcock, Curlew, Golden Plover, Lapwing, Quail, Meadow Pipit. Curlew, Golden Plover and Lapwing are all listed for both their breeding and wintering populations. These species have suffered 70%, 52% and 74% declines respectively in their breeding populations.

In common with winter birds surveys the following Annex I listed species, Golden Plover, Hen Harrier, Merlin and Peregrine Falcon, were recorded during breeding season surveys. Two additional species were also recorded; Common Tern and Little Egret. The European populations of these species are under threat due to loss and deterioration in habitat[7].

The proposed development area contains scattered patches of woodland habitat, which provide potential foraging habitat for bat species. There is an acknowledged population of otters around Lough Ree[8]. No evidence of otter holts (breeding site) were noted within the proposed development site, however otter signs were located in Derryadd, and spraints (droppings) were found in a drainage ditch in the north east of Lough Bannow Bog during ecological survey work carried out by Bord na Móna between 2010 and 2012 (see EIAR Appendix 6.3). This ditch connects to the nearby Royal Canal. It is likely Otter use this drainage ditch to commute to and from the Royal Canal. This drainage ditch was found to provide little/no foraging opportunities for otter. Additionally, in November 2017 there was an ad hoc record of an otter spraint recorded (offsite) on the railway bridge (over the Shannon) at vantage point 2 (location: N 01064 72271). Visual sightings or signs of other mammal species recorded on site (not including bat species) were; badger, pine marten, squirrel (red or grey), fox, rabbit, and Irish hare. It is unlikely these species remain at the site for extended periods of time as the amount of suitable habitat (woodland, hedgerows, treelines, scrub) for these species is limited, with the exception of the Irish Hare which was noted on several occasions in grassland throughout the proposed development area.

[7] *Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds. 2009.*
[8] NPWS Lough Ree SAC site synopsis: https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY000440.pdf

3.4 ASSESSMENT OF EUROPEAN SITES

Table 3.2 outlines the qualifying interests for each European site within the potential ZoI and identifies whether there are possible source-receptor-pathway links via which adverse effects to the sites' qualifying interests and conservation objectives may occur. This was necessary in order to identify any potential significant effects from the proposed development on the qualifying interests of these European sites, or in-combination with other developments, that may result.

The initial step in the assessment of potential significant effects on European sites was the determination of the number and nature of the sites within the potential ZoI of the proposed development. The list of sites identified and outlined in Table 3.2 below were chosen using the following rationale. Initially sites within a 15km buffer from the site boundary were considered to be within the potential ZoI. In addition, using the precautionary principle, sites outside of the 15km buffer zone were also taken into account and assessed where potential pathways for impact were identified (see Table 3.2 and Figure 1).

Elements of the proposed development that may give rise to impacts and that will be considered for potential effects to European sites are as follows:

- Loss of and/or disturbance to supporting qualifying interest habitat or qualifying interest species;
- Release of sediment and pollutants which may be discharged into surface water drainage systems, particularly during high rainfall events;
- Potential for spillages of oils, fuels or other pollutants into groundwater;
- Mortality of special conservation interest species resulting from colliding with operating turbines; and
- A disturbance displacement or barrier effect to movement of commuting/ migration birds.

These potential impacts identified are associated with the construction, operational and de-commissioning phases of the proposed development. The available conservation objective specific attributes and targets will be examined in conjunction with the identified potential effects from the proposed development.

A standard source-receptor-pathway conceptual model was used to screen the initial list to determine a preliminary list of "relevant" European sites (i.e. those which could be potentially affected). This conceptual model is a standard tool in environmental assessment. In order for an effect to occur, all three elements of this mechanism must be in place. The absence or removal of one of the elements of the mechanism means there is no likelihood for the effect to occur. In the context of the proposed development, the model comprises:

- Source (s) – e.g. sediment run-off from proposed development;
- Pathway (s) – e.g. drains and streams connecting to a European site; and

- Receptor (s) – Qualifying habitats and species of European sites.

Table 3.2: Identification of European Sites and their relevance to the Proposed Development

European Site, Code, and Approx. Distance from the Proposed Development	**Qualifying Interest(s) / Special Conservation Interest(s)** **(* indicates Priority Annex I Habitats)**	**Do any potential source-receptor-pathway connections exist between the proposed development and the European site?**
Lough Ree SPA (004064) c. 2.5km west	• Little Grebe (*Tachybaptus ruficollis*) [A004] • Whooper Swan (*Cygnus cygnus*) [A038] • Wigeon (*Anas penelope*) [A050] • Teal (*Anas crecca*) [A052] • Mallard (*Anas platyrhynchos*) [A053] • Shoveler (*Anas clypeata*) [A056] • Tufted Duck (*Aythya fuligula*) [A061] • Common Scoter (*Melanitta nigra*) [A065] • Goldeneye (*Bucephala clangula*) [A067] • Coot (*Fulica atra*) [A125] • Golden Plover (*Pluvialis apricaria*) [A140] • Lapwing (*Vanellus vanellus*) [A142] • Common Tern (*Sterna hirundo*) [A193] • Wetland and Waterbirds [A999]	Yes. Located 2.5km west of the proposed development. Several of the species for which the site is designated range to distances greater than 2.5km between foraging locations. It is therefore considered that connectivity could exist between the proposed development area and this SPA.
Lough Ree SAC (000440) c. 2.5km west	• Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation [3150] • Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (*important orchid sites) [6210] • Degraded raised bogs still capable of natural regeneration [7120] • Alkaline fens [7230]	Yes. Hydrological pathways exist between the two sites.

European Site, Code, and Approx. Distance from the Proposed Development	**Qualifying Interest(s) / Special Conservation Interest(s)** **(* indicates Priority Annex I Habitats)**	**Do any potential source-receptor-pathway connections exist between the proposed development and the European site?**
	• Limestone pavements [8240] • Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0] • Bog woodland [91D0] • Otter (*Lutra lutra*) [1355]	
Fortwilliam Turlough SAC (000448) c. 4.3km east	• Turloughs [3180]	No. The groundwater levels at the proposed development (42 to 44 mOD) are below the Fortwilliam Turlough SAC level (45-47mOD). Given the turlough is up gradient of the proposed development, there is no pathway for impacts on the Fortwilliam Turlough SAC. Please see EIAR Chapter 8 for further details on bore survey work undertaking in relation to groundwater levels between the two sites.
Ballykenny-Fisherstown Bog SPA (004101) c. 4.5km north	• Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A395]	Yes. Located 4.5 km north of the proposed development. The core foraging range of Greenland White-fronted Goose is 5-8 km, as per SNH (2016). It is therefore considered that connectivity could exist between the proposed development area and this designated site.
Lough Forbes Complex SAC (001818) c. 4.7km north	• Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation [3150] • Active raised bogs [7110] • Degraded raised bogs still capable of natural regeneration [7120] • Depressions on peat substrates of the Rhynchosporion [7150] • Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0]	No. Located upstream and 4.5 km from the proposed development. No ground water pathways exist between the two sites.
Mount Jessop Bog SAC (001450) c. 3.3km east	• Degraded raised bogs still capable of natural regeneration [7120] • Bog woodland [91D0]	No. The habitats of the Mount Jessop Bog SAC are groundwater dependant. The relatively shallow and localised nature of excavation works (associated with turbine bases, internal roads, substation and borrow pits) combined with the distance from the nearest excavation (Turbine 24) of 4.8km to the boundary of the

European Site, Code, and Approx. Distance from the Proposed Development	**Qualifying Interest(s) / Special Conservation Interest(s)** **(* indicates Priority Annex I Habitats)**	**Do any potential source-receptor-pathway connections exist between the proposed development and the European site?**
		European site, and recognising that this European site and the proposed development are intercepted by the Fallan River, there is no ground water pathway between the two sites.
Brown Bog SAC (002346) c. 5.8km north	• Active raised bogs [7110] • Degraded raised bogs still capable of natural regeneration [7120] • Depressions on peat substrates of the Rhynchosporion [7150]	No. Located upstream and 5.86 km from the proposed development. No ground water pathways exist between the two sites.
Corbo Bog SAC (002349) c.7.5km west	• Active raised bogs [7110] • Degraded raised bogs still capable of natural regeneration [7120] • Depressions on peat substrates of the Rhynchosporion [7150]	No. This European site is located on the opposite (western) side of the River Shannon, i.e. in effect upstream of the proposed development, no link between this European site and the proposed development exists.
Clooneen Bog SAC (002348) c. 10.8km north	• Active raised bogs [7110] • Degraded raised bogs still capable of natural regeneration [7120] • Depressions on peat substrates of the Rhynchosporion [7150] • Bog woodland [91D0]	No. This European site is located on the eastern side of the River Shannon; however, it is upstream of the proposed development, no link between this European site and the proposed development exists.
Annaghmore Lough SAC (001626) c. 15.8km north-west	• Alkaline fens [7230] • Geyer's Whorl Snail (*Vertigo geyeri*) [1013]	No. This European site is located on the opposite (western) side of the River Shannon i.e. in effect upstream of the proposed development, no link between this European Site and the proposed development exists.
River Shannon Callows SAC (000216) c. 22.8km south	• Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410] • Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*) [6510]	Yes. Hydrological pathways exist between the two sites.

European Site, Code, and Approx. Distance from the Proposed Development	**Qualifying Interest(s) / Special Conservation Interest(s)** **(* indicates Priority Annex I Habitats)**	**Do any potential source-receptor-pathway connections exist between the proposed development and the European site?**
	• Limestone pavements [8240] • Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0] • Otter (*Lutra lutra*) [1355]	

Using the source-receptor-pathway model, eleven European sites were identified that were within the ZoI of the proposed development, due to their proximity and potential pathway to the development (e.g. hydrological links). Seven of these sites were found to have no intact source-receptor-pathway, thus potential adverse effects can be excluded (see Table 3.2). The remaining four sites were identified to have a potential source-pathway-receptor connectivity to the proposed development; Lough Ree SPA, Lough Ree SAC, Ballykenny-Fisherstown Bog SPA and River Shannon Callows SAC (Table 3.3).

Table 3.3: Relevant Designated Sites

European Sites	**Site Code**	**Approximate Distance from Proposed Development**
Lough Ree SPA	004064	2.5km West
Lough Ree SAC	000440	2.5km West
Ballykenny-Fisherstown Bog SPA	004101	4.5km North
River Shannon Callows SAC	000216	22.8km South

Potential impacts and their significance, if any, on the European sites listed above where a source-receptor-pathway has been identified, are considered in Table 3.4. Impacts are considered in light of the conservation objectives (and the associated attributes and targets) of the Annex I habitats and Annex II species, or Annex I bird species, for which the SAC or SPA is designated.

The key issues considered are the likelihood of direct and indirect effects such as collision risk, disturbance to species including sediment run-off, pollutants entering watercourses in the study area and reaching designated sites, displacement, and barrier effects. Such effects could potentially interfere with the relationships that sustain the qualifying interests/special conservation interests of the European sites.

Table 3.4: Designated Features and Potential Significant Effects

European Site, Code, and Approx. Distance from the Proposed Development	Qualifying Interest(s)(QI's) / Special Conservation Interest(s)(SCIs) (* indicates Priority Annex I Habitats)	Identification of Potential Significant Effects	Potential Significant Effect
Lough Ree SPA (004064) c. 2.5km west	• Little Grebe (*Tachybaptus ruficollis*) [A004] • Whooper Swan (*Cygnus cygnus*) [A038] • Wigeon (*Anas penelope*) [A050] • Teal (*Anas crecca*) [A052] • Mallard (*Anas platyrhynchos*) [A053] • Shoveler (*Anas clypeata*) [A056] • Tufted Duck (*Aythya fuligula*) [A061] • Common Scoter (*Melanitta nigra*) [A065] • Goldeneye (*Bucephala clangula*) [A067] • Coot (*Fulica atra*) [A125] • Golden Plover (*Pluvialis apricaria*) [A140] • Lapwing (*Vanellus vanellus*) [A142] • Common Tern (*Sterna hirundo*) [A193] • Wetland and Waterbirds [A999]	The Lough Ree SPA is designated for a number of water bird species. <u>Direct effects:</u> The potential for birds to collide with turbines is one of the main direct effects to consider in the assessment of possible effects associated with an operating wind farm. The potential for collision risk exists for the special conservation interest species of this SPA. <u>Indirect effects:</u> The habitats onsite may provide supporting habitat to the special conservation interest species of this SPA. Habitat loss may occur as a consequence of the land take from the footprint of the proposed development and through disturbance and/or displacement. A wide range of environmental factors are required to support these water bird species including high water quality and clarity, good supply of food resources and breeding sites. Potential indirect effects associated with the proposed development include; increased levels of silt and suspended solids in surface water run-off from the site during the construction stage. This could occur as a result of soil stripping, traffic, and construction works. Potential pollution risk exists from an alteration of the pH in surface water from concrete utilised onsite, alteration of soil conditions and spills/leaks. Potential exists with reference to in-combination effects due to water quality pressures in the River Shannon catchment.	Yes

European Site, Code, and Approx. Distance from the Proposed Development	Qualifying Interest(s)(QI's) / Special Conservation Interest(s)(SCIs) (* indicates Priority Annex I Habitats)	Identification of Potential Significant Effects	Potential Significant Effect
Lough Ree SAC (000440) c. 2.5km west	• Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation [3150] • Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (*important orchid sites) [6210] • Degraded raised bogs still capable of natural regeneration [7120] • Alkaline fens [7230] • Limestone pavements [8240] • Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0] • Bog woodland [91D0] • Otter (*Lutra lutra*) [1355]	The Lough Ree SAC is designated for a number of different habitat types and for Otter. At a local scale, the proposed development is located between the Ballynakill River to the east and the Lough Bannow Stream to the west. The proposed development site is situated within the River Shannon catchment and the Shannon River Basin District, upstream of the Lough Ree SAC. All watercourses in the area ultimately discharge to the River Shannon. Indirect effects: Potential indirect effects associated with the proposed development include; increased levels of silt and suspended solids in surface water run-off from the site during the construction stage. This could occur as a result of soil stripping, traffic, and construction works. Potential pollution risk exists from an alteration of the pH in surface water from concrete utilised onsite, alteration of soil conditions and spills/leaks. Potential exists with reference to in-combination effects due to water quality pressures in the River Shannon catchment. These potential effects may impact the aquatic/water dependent qualifying interest habitats, i.e. natural eutrophic lake, degraded raised bogs, alkaline fens and bog woodland. Potential exists for the site to provide supporting habitat for Otter, which are a qualifying interest of the SAC. There is potential for habitat loss associated with the land take related to the construction of the proposed development infrastructure. Old oak woods, orchid-rich calcareous grassland, and limestone pavement are terrestrial habitats which are found fringing the Lough Ree SAC. No source-pathway-receptor link from the proposed development to these habitats was identified based on the type of development, its potential impacts and the distance between the proposed development site and this SAC.	Yes
Ballykenny-Fisherstown Bog SPA (004101) c. 4.5km north	• Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A395]	The Ballykenny-Fisherstown Bog SPA is designated for Greenland White-fronted Goose. Direct effects: The distance separating this SPA and the proposed development site is within potential connectivity distance for this species. The Greenland White-fronted Goose has a maximum core foraging distance of 8km[9]. The potential for birds to collide with turbines is one of the main direct effects to consider in the assessment of possible effects associated with an operating wind farm. The potential for collision risk exists for the special conservation interest species of this SPA.	Yes
River Shannon Callows SAC (000216) c. 22.8km south	• Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410]	This SAC is located approximately 22.8km downstream of the proposed development. Surface water pathways exist; however, considering: • the distance from the proposed development (22.8km), • the nature of the proposed development (discharges indirectly into Lough Ree),	Yes

[9] SNH (2016). Assessing Connectivity with Special Protection Areas (SPAs). Scottish Natural Heritage Guidance. Version 3.

European Site, Code, and Approx. Distance from the Proposed Development	Qualifying Interest(s)(QI's) / Special Conservation Interest(s)(SCIs) (* indicates Priority Annex I Habitats)	Identification of Potential Significant Effects	Potential Significant Effect
	• Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*) [6510] • Limestone pavements [8240] • Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0] • Otter (*Lutra lutra*) [1355]	• the dilution capabilities of Lough Ree (which is upstream of the River Shannon Callows SAC), and • the qualifying interests of this SAC, a strong source-receptor-pathway is not considered to exist. Furthermore, in relation to the potential connectivity of both sites with regards Otter; range sizes for Otter vary widely according to the quality of the foraging habitat and other resources. The smallest territories are thought to occur at coastal sites, where territories may be as small as 2km. The longest territories occur in upland streams where an individual may have to range more than 20km to find sufficient food (Reid *et al.* 2013)[10]. In this case the source pathway receptor is weak and no adverse effects are likely. Notwithstanding the above, a significant adverse effect cannot be excluded without further consideration.	

[10] Reid, N., Hayden, B., Lundy, M.G., Pietravalle, S., McDonald, R.A. & Montgomery, W.I. (2013) National Otter Survey of Ireland 2010/12. Irish Wildlife Manuals No. 76. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

3.5 LIKELY SIGNIFICANT EFFECTS

Any likely direct, indirect, or secondary effects as a result of the proposed development, both alone or in-combination with other plans and projects, on European sites in light of their conservation objectives, are discussed in the following sections. Potential significant effects on European sites are assessed by virtue of the following criteria: size and scale of the European sites, land-take, distance from the proposed development, key features of the site, proposed development resource requirements (such as water abstraction), emissions (disposal to land water or air), excavation requirements, transportation requirements and duration of construction, operation and/or decommissioning.

3.5.1 Direct, In-Direct, and Secondary Effects

Lough Ree SPA

Lough Ree SPA is sufficiently close to the proposed development (2.5km west) that the site falls within the core foraging range of at least one of the SCI water bird species for which the site is designated, e.g. the core foraging distance for Whooper Swan is 5km.

Elements of the proposed development that may give rise to potential direct/indirect effects on Lough Ree SPA include:

- Habitats which are not within the boundary of the Lough Ree SPA but are within the core foraging distances for the species of interest, may provide supporting habitat to these species' populations. The construction of turbine bases, access tracks, grid connections, borrow pits and all other associated works will result in a land take which will consequently reduce the availability of local habitat for birds. Effective habitat loss through disturbance displacement can also result from the routine action of staff and machinery during the construction, operation (e.g. maintenance activities) and decommissioning phases of the proposed development. Therefore, potential indirect effects on the key avian receptors as a result of the proposed development have been considered in terms of habitat loss/ fragmentation and disturbance displacement effects.
- At the proposed development, birds which use the airspace around turbines are susceptible to collision with operating turbines or may be deterred from entering the site/ surroundings (i.e. disturbance displacement or a barrier effects). Therefore, operational direct effects on key avian receptors may result in collision related mortality and disturbance displacement or a barrier effect.

Lough Ree SAC

Lough Ree SAC is located downstream of the proposed development site; therefore, a surface water pathway between this European site and the proposed development exists.

Potential indirect effects on the qualifying interest habitats and species of the Lough Ree SAC arising from the construction phase of the proposed development include:

- Deterioration of water quality due to sediment release during the excavation of turbine foundations, hardstanding areas, borrow pits, substation, internal haul roads and amenity roads or potential contamination of water from concrete and / or fuels during construction may occur. Such potential impacts in the absence of mitigation could cause indirect adverse effects on qualifying interest habitats and species as follows:
    - Sedimentation resulting in temporary smothering of gravel beds with consequent loss of fish and spawning habitat;
    - Sediment deposition can also provide a base for growth of filamentous algae on gravel beds, leading to a build-up of sediment and loss of suitable habitat for crayfish and spawning habitat for lamprey and salmonids;
    - Sedimentation impacts in the absence of mitigation include smothering fish eggs and causing mortalities in fish of all ages, reducing abundance of food and impeding movement of fish;
    - Sedimentation impacts in the absence of mitigation also include smothering of food prey for juvenile salmonids i.e. macro invertebrates;
    - Accidental leakage / spillage of oil and fuels from construction vehicles can have indirect impacts on fish, fish food and fish habitats and other aquatic species;
    - A potential reduction in water quality (e.g. through an increase in suspended solids or the introduction of pollutants) and any associated loss of aquatic biota may indirectly effect otter through a loss of available food resources (i.e. aquatic prey); and
    - The introduction of invasive species resulting from the action of construction activities could have a prolonged adverse impact on aquatic habitats.

In the absence of mitigation, operation and decommissioning phase activities which may have a potential effect on the qualifying interests of the Lough Ree SAC include a potential risk from spills from machinery into surface or groundwater.

Significant effects on the Lough Ree SAC cannot be excluded as a surface water pathways exist, i.e. uncontrolled release of pollutants from the proposed development may effect sensitive surface water-dependant receptors downstream (e.g. river or lake habitats or aquatic species).

Ballykenny-Fisherstown Bog SPA

Ballykenny-Fisherstown Bog SPA is sufficiently close (4.5km) to the proposed development that the site falls within the core foraging range of the water bird species for which the site is designated, e.g. the core foraging distance of Greenland White-fronted Goose is 5 to 8km[9].

The following direct/Indirect potential effects on Ballykenny-Fisherstown Bog SPA may result from the proposed development:

- Habitats which are not within the boundary of the Ballykenny-Fisherstown Bog SPA but are within the core foraging distances for the species of interest, may provide supporting habitat to these species' populations. The construction of turbine bases, access tracks, grid connections, borrow pits and all other associated works will result in a land take which will consequently reduce the availability of local habitat for birds. Effective habitat loss through disturbance displacement can also result from the routine action of staff and machinery during the construction, operation (e.g. maintenance activities) and decommissioning phases of the proposed development. Therefore, indirect potential effects on the key avian receptors as a result of the proposed development have been considered in terms of habitat loss/ fragmentation and disturbance displacement effects.
- At the proposed development, birds which use the airspace around turbines are susceptible to collision with operating turbines or may be deterred from entering the site/ surroundings (i.e. disturbance displacement or a barrier effects). Therefore, operational direct effects on key avian receptors may result in collision related mortality and disturbance displacement or a barrier effect.

River Shannon Callows SAC

The River Shannon Callows SAC is located 22.8km downstream of the proposed development and therefore a surface water pathway between this European site and the proposed development exists.

Potential indirect effects on the qualifying interest habitats and species of the River Shannon Callows SAC arising from the construction phase of the proposed development are outlined below.

- Deterioration of water quality due to sediment release during the excavation of turbine foundations, hardstanding areas, borrow pits, substation, internal haul roads and amenity roads or potential contamination of water from concrete and / or fuels during construction may occur. Such potential impacts in the absence of mitigation could cause indirect adverse effects on qualifying interest habitats and species as follows:
    - Sedimentation resulting in temporary smothering of gravel beds with consequent loss of fish and spawning habitat;
    - Sediment deposition can also provide a base for growth of filamentous algae on gravel beds, leading to a build-up of sediment and loss of suitable habitat for crayfish and spawning habitat for lamprey and salmonids;
    - Sedimentation impacts in the absence of mitigation include smothering fish eggs and causing mortalities in fish of all ages, reducing abundance of food and impeding movement of fish;
    - Sedimentation impacts in the absence of mitigation also include smothering of food prey for juvenile salmonids i.e. macro invertebrates;
    - Accidental leakage / spillage of oil and fuels from construction vehicles can have indirect impacts on fish, fish food and fish habitats and other aquatic species;

- A potential reduction in water quality (e.g. through an increase in suspended solids or the introduction of pollutants) and any associated loss of aquatic biota may indirectly effect otter through a loss of available food resources (i.e. aquatic prey); and
- The introduction of invasive species resulting from the action of construction activities could have a prolonged adverse impact on aquatic habitats.

In the absence of mitigation, operation and decommissioning phase activities which may have a potential effect on the qualifying interests of the River Shannon Callows SAC include a potential risk from spills from machinery into surface or groundwater.

Significant effects on the River Shannon Callows SAC cannot be excluded as a surface water pathway exists, i.e. uncontrolled release of pollutants from the proposed development may affect sensitive surface water-dependant receptors downstream (e.g. river or lake habitats or aquatic species).

3.5.2 In-Combination Effects

In-combination effects are those effects that may arise from the proposed development in-combination with other plans and projects. Plans or projects which have impact pathways connecting them to the same European sites as those within the ZoI of the proposed development, have the potential to act in-combination with the proposed development and have significant effects on these European sites. A planning search was carried out for completed, approved but uncompleted, or proposed plans and projects within a 15km radius of the proposed development which, by their nature and location, have the potential for in-combination effects (Section 3.5.2.1 and Section 3.5.2.2).

3.5.2.1 Projects Considered as part of the In-combination Assessment

Information on the relevant projects within the vicinity of the proposed development was compiled in October 2018 and verified on January 29, 2019. The information was sourced from a search of the ABP planning database, local authorities planning registers, EPA website, planning applications, EIS documents and planning drawings which facilitated the identification of past and future projects, their activities and their potential environmental impacts. The projects considered in relation to the potential for in-combination effects and for which all relevant data was reviewed include those listed below.

<u>Derraghan Ash Disposal Facility (Longford Co Co – Ref 17/320)</u>

Development is an increase in the capacity of the operational Ash Disposal Facility to allow for the deposition of 130,000 tonnes of dry ash over and above the 550,000 tonnes permitted under Longford County Council Reg. Ref. 01/115; An Bord Pleanala Reg. Ref. PL14.125540. The ash will be disposed of within engineered cells, constructed under the existing permission, and the facility will utilise permitted site services including the existing site entrance from the R392 and other site infrastructure. The facility will exclusively accept ash from Lough Ree Power Station in Lanesborough (Lanesboro) and will operate until 31st December 2020. This planning application will be accompanied by an EIA Report (previously

known as an EIS). Lough Ree Power Station and the associated Ash Disposal Facility are licenced by the EPA under an Industrial Emissions (IE) Licence [Ref. P061002]. Permission awarded on 22/02/18.

Peat Extraction: Mountdillion Group (EPA IPC 504-01)

Development is the ongoing extraction of peat (milling, harrowing, ridging and harvesting of peat into stockpiles, transportation of peat via internal rail network) from the Mountdillon group of bogs located in Counties Longford and Roscommon.

Lough Ree Peat Fired Power Station (Longford Co Co Planning Ref 01/115)

The Development is a Peat-fired electric power generation plant, comprising of a single unit having a nominal total electric. rating of 100 megawatts at Lanesboro, and an ash disposal facility for the deposit of peat ash in a landfill to accommodate. up to 550,000 tonnes of ash. Planning permission was awarded on the 14/06/2001.

Lough Ree Power Station

Planning permission (Planning ref. 17/320) was recently granted for increasing the capacity of the Lanesborough Power Station ash disposal field at Derraghan 1.5km southwest of Lough Bannow Bog. It should also be noted that an imminent planning application is very likely to be submitted in respect of the continued use and conversion to biomass of Lanesborough Power Station, which is located within the settlement of Lanesborough on the southern bank of the River Shannon. It is considered that the any in-combination effects between the proposed Derryadd Wind Farm and either or both of these developments, which represent continuation and small-scale expansion of existing activities, will be Imperceptible. The significant energy infrastructure that exists in the local area is Lough Ree Power located to the west of Derryaroge Bog, and its associated grid infrastructure in the form of 110 kV pylons network (in particular the Lanesborough/Richmond and Lanesborough/Mullingar lines). The site on which the proposed development will be located is cutover peatland that is currently being used for peat extraction by Bord na Móna to predominantly provide fuel for the nearby Lough Ree Power Station at Lanesborough. The continued operation of the Lough Ree Power Station is dependent on an extension of its existing planning permission. Thus, there is potential that the Power Station could be removed from the Lanesborough skyline. If an extension to the existing consent is achieved, then the plant will continue to operate and as such forms part of the Do-Nothing Scenario. The predominant land use of the site and central study area is commercial scale peat extraction for the purposes of energy generation and there is a substantial peat-fired power station at the settlement of Lanesborough near the north-western periphery of the site.

Roosky Wind Farm (Roscommon Co. Co. Planning Ref 072255 and 133005)

The development comprising 2 no. turbines at Ballaghaderreen. The turbines have a stated 78m hub height and 92m blade diameter. This wind farm has been constructed.

Skrine Wind Farm (Roscommon Co. Co. Planning Ref 04/103)

Planning permission Roscommon County Council register reference 04/103 (Appeal Ref. 20.208733) – a grant of planning permission issued to Provento Ireland PLC on 19/1/2005 for a development comprising 2 no. turbines at Skrine, Athleague. The turbines have a stated 64m hub height and 70m blade diameter. An extension of time was granted to Gaelectric on this planning permission, extending it until 18/1/2010. This wind farm has been constructed.

Sliabh Bawn Windfarm (Roscommon Co. Co. Planning ref 10/507)

Planning permission Roscommon County Council register reference 10/507 (Appeal Ref. 20.239743) – a grant of planning permission issued to Coillte Teo. on 27/3/2012 for a development comprising 20 turbines at Sliabh Bawn, Strokestown, County Roscommon. The planning permission has a life of 10 years with a permission for the windfarm for a period of 25 years from the date of commissioning. The wind farm has been constructed and is operational since March 2017.

Cloon – Lanesboro 110 kV Overhead Line (Longford Co. Co. Planning Ref. 18/139)

Planning permission Longford County Council register reference 18/139 – a grant of planning for development on the 21/08/18 at a site of the existing Cloon to Lanesboro 110 kV Overhead Line is approximately 65 kilometres long. Approximately 37km of the existing circuit is located within the functional area of Galway County Council with approximately 27km located in County Roscommon and approximately 120 metres located in County Longford. The refurbishment works within County Longford will be undertaken at structure EM365, located within the Lanesboro Substation in the townland of Aghamore (Rathcline By). The development will consist of the refurbishment of the Cloon – Lanesboro 110 kV Overhead Line which will primarily include: replacement of a large proportion of existing structures, the breaking out and reconstruction of the concrete foundation and shear blocks at the majority of end/angle mast structures, painting of mast structures, replacement of insulators, crossarms, stays and/or fittings on existing structures; and the fitting of bird flight diverters and stay guards. No additional structures are proposed along the existing circuit. Any replacement structures will be constructed at, or immediately adjacent to the existing structures they will replace, and will be of a generally similar height and appearance.

Middleton House Solar Farm (Longford Co. Co. Planning Ref 18/35)

Planning permission Longford County Council register reference 18/35 – a grant of planning permission issued to Harmony Solar on 15/08/2018 for a ten year permission for a solar farm on a site of approximately 51.38 hectares consisting of the following: up to 216,000 m^2 of solar photo-voltaic panels on ground mounted steel frames to generate between 35MW to 50MW of electrical energy; substation and control room and associated hard standing; 14 no. inverter/transformer stations; underground power and communication cables & ducts; boundary security fence; CCTV cameras; upgraded internal access

tracks; new internal access tracks and associated drainage infrastructure; provision of passing areas on lands adjacent to the L-11261 local road; access will be via the L-11261 local road through the upgrade of an existing agricultural entrance and at the existing entrance to Middleton House; and temporary construction compounds and all associated site services & works at the townlands of Middleton, Ballycore, Treanboy and Newtown, near the village of Killashee, Co. Longford. Planning permission was awarded on the 15/08/18.

Fisherstown Solar farm (Longford Co. Co. Planning Ref. 18/146)

Planning permission Longford County Council register reference 18/146 – a grant of planning for development on the 26/08/18 at a site comprising lands within the property of the former Atlantic Mills factory. The development will comprise the construction of a solar farm with an export capacity of approximately 4MW comprising photovoltaic panels on ground mounted frames, with associated infrastructure including a switch gear control room (to be developed at 1 of 2 location options on site. No additional works proposed to the existing substation on site as part of this application), ducting and electrical cabling, internal access roads, fencing and all associated site development works at Fisherstown, Clondra, Co. Longford. Planning permission was awarded on the 24/08/18.

3.5.2.2 Plans Considered as part of the In-combination Assessment

The following key plans were identified as having the potential to act in-combination with the proposed development to affect the relevant European sites, as per Table 3.3.

- Longford County Development Plan 2015 – 2021;
- River Basin Management Plan 2018 – 2021 (released in April 2018); and
- Bord na Móna Draft Rehabilitation Plans. In 2013, Bord na Móna submitted draft rehabilitation plans for each of the Bord na Móna bogs, as per IPC Licence Condition 10 requirements. The plans were further updated in 2015, following rehabilitation trails.

Within the River Basin Management Plan 2018 – 2021 (RBMP; released in April 2018), extractive or anthropogenic pressures are identified as a significant pressure on a catchment scale basis. As is detailed in the RBMP, Bord Na Móna is in the process of phasing out the extraction of peat for energy production by 2030. Commercial peat extraction has decreased at the Derryaroge, Derryadd and Lough Bannow bogs since the 2000's. The surrounding peatlands will continue to be managed in accordance with the EPA IPC Licence. The proposed development includes a wide range of protective measures which are designed to minimise the potential for water quality impacts on nearby European sites, i.e. Lough Ree SAC. However, it is not appropriate, at this screening stage, to take account of the measures intended to avoid or reduce the harmful effects of a plan or project on European sites (as per clarification provided by the Court of Justice of the European Union (CJEU) in Case 323-17 People Over Wind and Peter Sweetman v Coillte). In conclusion an AA is required, as the potential for in-combination effects resulting

from uncontrolled emissions from the proposed development cannot be excluded on the basis of objective information, without the consideration of protective measures.

3.5.2.3 In-combination Impact Assessment

Lough Ree Peat Fired Power Station utilises peat extracted from the Mountdillon Group and the ash from the power station is disposed at the Derraghan Ash Disposal Facility. These activities are within the Mountdillon bog group and have the potential to act in-combination with the proposed development. Pollution and siltation of watercourse substrates and high suspended solids associated with the proposed development construction activities has potential to act as an additional and in-combination, temporary pollutant source on European sites within the ZoI of the proposed development. Additional pollution sources associated with the development and other land management practices can be considered significant, if unmitigated. There is potential for in-combination effects to result from the proposed development and existing activities in the wider area. This is considered unlikely to be significant for the qualifying interests/ special conservation interest species of the Lough Ree SPA or SAC, though a degree of uncertainty exists. In this regard any additional, albeit minor, pollutant load requires mitigation consideration and therefore cannot be conclusively excluded at the screening stage of the assessment.

Habitat loss, disturbance displacement, collision risk and barrier effects associated with the proposed development have the potential to negatively affect the local avian community in-combination with other wind farms, i.e. Skrine Wind Farm, Roosky Wind farm and Sliabh Bawn Wind Farm which are all located in Co. Roscommon. There are no existing or permitted wind farms in Co. Longford. The nearest wind farm to the proposed development is Sliabh Bawn Wind Farm. The Skrine Wind Farm is located approximately 19km to the south-west of proposed development. The Roosky Wind Farm is located approximately 14.5km to the north of the proposed development. Both of these wind farms are considered sufficiently distant and small (2 No. turbines at each site) to avoid in-combination effects with the proposed development. The Sliabh Bawn Wind Farm is located approximately 8km west of the proposed development. The Sliabh Bawn development is comprised of 20 electricity generating wind turbines, the total site area is approximately 833ha and ranges in elevation from 70m to 262m (ordnance datum). This development also contains hardstandings, a substation, permanent meteorological mast, communication mast and associated roads. This development is located approximately 5km south-east of Strokestown, Co. Roscommon[11]. The two sites are separated by lands of mixed agricultural use, lowland bog and the River Shannon. The two developments will have an effect on habitats onsite respectively however the combined impacts will be limited by the differing nature of the habitats at each development, i.e. the Sliabh Bawn site is dominated by coniferous plantation. This habitat type is rare at the Derryadd site and generally considered of low ecological value. Although an in-combination effect is considered unlikely given the 8km separation distance between the proposed development and the closed existing or permitted wind farm, they cannot be conclusively excluded at this screening stage of the assessment.

[11] www.eplanning.ie

On the 12th of November 2018 planning permission was granted for the refurbishment of the Cloon – Lanesboro 110 kV Overhead Line. Replacement structures will be constructed at, or immediately adjacent to the existing structures and will be generally of similar height and appearance. As no new significant structures will be constructed during the refurbishment of the Cloon – Lanesboro 110 kV Overhead Line, potential for collision risk from the proposed development to act in-combination with the overhead line of this development is considered unlikely but cannot be excluded at this screening stage of the assessment.

In relation to the Middleton House and Fisherstown Solar Farm the planning permission granted for these two sites include the requirement for protective measures that will ensure the protection of European sites across all identified impact sources. Furthermore, given the nature of the proposed development and the separation distances between these developments and the proposed development, in-combination effects are considered unlikely but cannot be excluded at this screening stage of the assessment.

4 CONCLUSION

Using the source-receptor-pathway model, eleven European sites were identified within the ZoI of the proposed development, due to their proximity and potential pathway to the development (e.g. hydrological links). Seven of these sites were found to have no intact source-receptor-pathway, thus potential adverse effects were excluded. The remaining four sites were found to have a potential source-pathway-receptor connectivity to the proposed development, and thus were carried forward in the screening assessment.

Following an examination, analysis and evaluation of the relevant information, including in particular, the nature of the proposed development, its potential relationship with European sites, in view of best scientific knowledge, on the basis of objective information and in light of the conservation objectives of the relevant European sites, it is the professional conclusion of the authors of this report that it is not possible to rule out the possibility of significant effects on four European sites, namely;

- Lough Ree SPA,
- Lough Ree SAC,
- Ballykenny Fisherstown Bog SPA and
- River Shannon Callows SAC.

This conclusion has been reached on the basis of the potential impact sources and pathways associated with the proposed development (as outlined in Section 3.5.1) which may put qualifying interest species or habitats/special conservation interest species at risk.

For these reasons, it is the professional opinion of the authors of this report that the application for consent for the proposed development requires an Appropriate Assessment to be undertaken, for which a NIS

will be required to assess whether the proposed development would adversely affect the integrity of any European sites.

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