OWENINNY WIND FARM

PHASE 1 & PHASE 2

NATURA IMPACT STATEMENT

15 OCTOBER 2015

Prepared for

ESB International

by

Biosphere Environmental Services

29 La Touche Park, Greystones, Co. Wicklow

Tel: 01-2875249 E-mail: maddenb@eircom.net

TABLE OF CONTENTS

1. INTRODUCTION 5
1.1 Background 5
1.2 Regulatory Context 5
1.3 Stages of the Appropriate Assessment (AA) 6
2. SCREENING FOR APPROPRIATE ASSESSMENT 7
2.1 Description of the Project 7
2.1.1 Project Overview 7
2.1.2 Need for the Development 21
2.2 Ecological Description of the Proposed Project 21
2.3 European Sites Identification 23
2.3.1 Special Areas of Conservation 24
2.3.2 Special Protection Areas 25
2.4 Identification and Assessment of Potential Impacts 25
2.5 Assessment of Significance 34
2.6 Conclusion of Screening 40
3. APPROPRIATE ASSESSMENT 42
3.1 Introduction 42
3.2 Characteristics of the Natura 2000 Sites 42
3.2.1 Bellacorick Bog Complex candidate Special Area of Conservation 42
3.2.2 Bellacorick Iron Flush candidate Special Area of Conservation 43
3.2.3 Carrowmore Lake candidate Special Area of Conservation 44
3.2.4 River Moy candidate Special Area of Conservation 45
3.3 Potential Impacts 46
3.3.1 Bellacorick Bog Complex candidate Special Area of Conservation 46
3.3.2 Bellacorick Iron Flush candidate Special Area of Conservation 46

3.3.3 Carrowmore Lake candidate Special Area of Conservation 47
3.3.4 River Moy candidate Special Area of Conservation 47
3.4 Mitigation Measures 47
3.4.1 Peat Stability 47
3.4.2 Measures to Maintain Water Quality 55
3.4.3 Measures specific for Bellacorick Iron Flush SAC 56
3.4.4 Operation Phase Mitigation 63
3.4.5 Residual Impacts after Mitigation 64
3.5 Analysis of "In-Combination" Effects 64
3.5.1 Potential Future Development of Oweninny Phase 3 65
3.5.2 Other Wind Farms 66
3.5.3 Meteorological Mast 69
3.5.4 Power Lines 70
3.5.5 Substation Project 72
3.5.6 Power Plants 73
3.5.7 Renewable Energy Strategy (RES) for County Mayo, 2011-2020 73
3.5.8 Grid 25/Grid West 74
3.5.9 Oweninny Cutaway Bog Rehabilitation Programme 84
3.5.10 Forestry 85
3.5.11 Peat Harvesting 86
3.5.12 Agriculture 86
3.5.13 Overview of In-combination Effects 87
3.6 Conclusion 89
3.7 References 89

APPENDIX 1: Site Synopses

APPENDIX 2: Oweninny Wind Farm - Peat Stability Risk Assessment. ESBI, May 2013 (refer to Appendix 4 of the EIS for full report)

APPENDIX 3: Proposed Wind Farm at Oweninny, Co. Mayo - Hydrological and Hydrogeological Characterisation and Impact Assessment Report for Bellacorick Iron Flush cSAC, including Preliminary Hydrological Review of Other Designated and Non-designated Flush Areas. Prepared by Hydro-Environmental Services, March 2013. (refer to Chapter 18 of the EIS for full report)

APPENDIX 4: Drainage and Sediment Control Plan. Prepared by ESBI. (refer to Appendix 16 of EIS for full report)

Figure 1. Proposed turbine haul route and designated sites.

Figure 2. Location of proposed Oweninny Wind Farm site

Figure 3: Distribution of European sites in relation to Oweninny Wind Farm

Figure 4: Proposed and permitted wind farm developments within 20 km of Oweninny

1. INTRODUCTION

1.1 Background

This report has been prepared by Dr. Brian Madden of BioSphere Environmental Services, in association with ESB International, to determine the potential impacts, if any, of the plan for Phase 1 and Phase 2 of the Oweninny Wind Farm on sites with European conservation designations (i.e. Natura 2000 sites). The purpose of this assessment is to determine, the appropriateness, or otherwise, of the proposed project in the context of the conservation objectives of such sites.

The report is based on desk review and extensive site surveys carried out between 2010 and 2013.

This report revises and updates the Natura Impact Statement (NIS) submitted to An Bord Pleanala as part of the Oweninny Wind Farm Planning Application (Ref 16.PA.0029). In addition, in circumstances where permission for Phase 3 of the Oweninny Wind Farm is no longer being sought due to the uncertainty regarding the Grid West connection point, this report also assesses Phase 1 & Phase 2 in relation to which planning permission is still sought. The current status of the Grid West Project is considered as far as it is currently possible to do so."

1.2 Regulatory Context

The Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna better known as “The Habitats Directive” provides the framework for legal protection for habitats and species of European importance. Articles 3 to 9 provide the legislative means to protect habitats and species of Community interest through the establishment and conservation of an EU-wide network of sites known as Natura 2000. These are Special Areas of Conservation (SACs) designated under the Habitats Directive and Special Protection Areas (SPAs) designated under the Conservation of Wild Birds Directive (79/409/EEC) (better known as “The Birds Directive”).

Article 6(3) and 6(4) of the Habitats Directive set out the decision-making tests for plans and projects likely to affect Natura 2000 sites (Annex 1.1). Article 6(3) establishes the requirement for Appropriate Assessment (now termed Natura Impact Statement – see The Guidance for Planning Authorities issued by Department of Environment, Heritage and Local Government, December 2009):

> “*Any plan or project not directly connected with or necessary to the management of the [Natura 2000] site but likely to have a significant effect*

thereon, either individually or in combination with other plans and projects, shall be subjected to appropriate assessment of its implications for the site in view of the site's conservation objectives. In light of the conclusions of the assessment of the implication 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"

The Habitats Directive promotes a hierarchy of avoidance, mitigation and compensatory measures. First the project should aim to avoid any negative impacts on European sites by identifying possible impacts early in the planning stage, and designing the project in order to avoid such impacts. Second, mitigation measures should be applied, if necessary, during the AA process to the point, where no adverse impacts on the site(s) remain. If the project is still likely to result in adverse effects, no further practicable mitigation is possible, and if no alternative solutions are identified then the project may only proceed if it is required for imperative reasons of overriding public interest (IROPI test). The criteria for this test are outlined under Article 6 (4) of the Habitats Directive. In this case, all compensation measures necessary are required for any remaining adverse effect.

1.3 Stages of the Appropriate Assessment (AA)

This Natura Impact Statement has been undertaken in accordance with the European Commission Methodological Guidance on the provision of Article 6(3) and 6(4) of the 'Habitats' Directive 92/43/EEC (EC 2001) and the European Commission Guidance 'Managing Natura 2000 Sites'. The Guidance for Planning Authorities issued by the Department of Environment, Heritage and Local Government (December 2009) is also adhered to.

There are four distinct stages to undertaking an AA as outlined in current EU and DOEHLG guidance:

1. Appropriate Assessment Screening

2. Appropriate Assessment – Natura Impact Statement

3. Assessment of Alternatives in cases where significant impact cannot be prevented

4. Where no alternatives exist, an assessment of compensatory issues in the case of projects or plans which can be considered to be necessary for imperative reasons of overriding public interest (IROPI)

2. SCREENING FOR APPROPRIATE ASSESSMENT

Screening determines whether appropriate assessment is necessary by examining:

1. Whether a plan or project can be excluded from AA requirements because it is directly connected with or necessary to the management of a Natura 2000 site.

2. Whether the project will have a potentially significant effect on a Natura 2000 site, either alone or in combination with other projects or plans, in view of the site's conservation objectives.

Screening involves the following:

i. Description of plan or project

ii. Identification of relevant Natura 2000 sites, and compilation of information on their qualifying interests and conservation objectives

iii. Assessment of likely effects – direct, indirect and cumulative – undertaken on the basis of available information as a desk study or field survey or primary research as necessary

iv. Screening Statement with conclusions

2.1 Description of the Project

2.1.1 Project Overview

Oweninny Wind Farm will be developed by Oweninny Power Ltd, a joint venture between ESB Wind Development Limited and Bord na Móna Energy Limited.

Phase 1 and Phase 2 of the wind farm will comprise 61 wind turbine generators, each of approximately 2,500 -3,500 kilowatt (kW) capacity. The rated electrical output of the wind farm will be approximately 172 Mega Watts (MW) and the electricity generated will be supplied into the deregulated electricity market on the national electricity network.

The development will also include:

- Two electrical control stations
- Underground cables from the wind turbines to the substations
- 49 kilometres of access tracks (these will be largely new with c.6km of existing access tracks being upgraded)
- One operation and maintenance building

- Two 110 kV overhead lines comprising angle masts and twin wooden pole sets connected to the existing Bellacorick substation by two underground electricity cables
- A visitors centre
- Six permanent wind measurement anemometer stations

Temporary works will include:

- A borrow pit to provide material for access track construction
- Concrete batching plant with associated materials storage
- Contractor(s) construction lay down areas and materials storage areas

The wind farm components will occupy a small part of the Bord na Móna lands at Oweninny (111 hectares or 2.2%,) and the remainder will be available for existing or other uses. The geographic spread of the new development adopts a non linear pattern to maximise energy yield from the site

Wind turbines

The turbines will have a maximum base to blade tip dimension of 176 m. This will likely comprise a tower height in the range 100 - 120 m and three blades, each with a blade rotor diameter in the range of between 90 - 120 m, i.e. turbines may be configured as comprising a tower/blade configuration within these ranges, with a maximum tip height of 176m.

The wind turbines will be selected from a range of models that have been demonstrated successfully throughout Europe and certified to the highest international standard. While the choice of make and model has not yet been finalised, the wind turbines under consideration for installation are three bladed, horizontal axis machines.

The turbine towers will be either of tubular steel design or hybrid concrete/steel tapering from about 4.5 m diameter at the base to about 3.2 m diameter at the top where the nacelle will be mounted. A three blade rotor will be attached to the nacelle. The blades will be made of fibreglass-reinforced epoxy material with each blade typically consisting of two blade shells, bonded to a supporting beam.

The nacelle will contain the generator and control unit, which will be designed for computer controlled monitoring of all major functions of the turbine. It will have effective sound insulation and smooth performance of moving parts will ensure minimal noise.

The steel tube towers with high specification, factory applied, paint finish will be fixed to concrete bases, the exact depth and structural design of which will depend on site conditions and may vary slightly from one turbine to another. An alternative tower

type which is becoming available consists of concrete/steel construction. These can offer advantages where transportation constraints are identified as concrete towers could be delivered in small precast concrete sections which could be assembled on site.

Two types of wind turbine foundation are envisaged as follows:

- For turbines located on good ground bearing stratum the turbine foundation will be either circular or hexagonal shape with diameter of approximately 22m.
- For turbines on difficult ground or within proximity of sensitive areas with high dependence on ground water, turbine foundations will be piled. Piles will be reinforced concrete of approximately 900mm diameter and with an average length of 17m.

Detailed geotechnical investigations will be undertaken at the site prior to commencement of construction to enable detailed structural design of foundations.

Access to the turbine is via a staircase located outside on the hardstand and a secure hinged door into the tower. The equipment will be protected from lightning strike by deep earthing and from corrosion by multiple coatings.

All wind turbines are located at minimum distance of 1000m from the nearest dwelling, are at least 100m from the site boundary, 200m from designated areas and 50m from major rivers and their primary tributaries, except at crossing points.

The turbine blades will rotate at about one revolution every 3 – 5 seconds, depending on wind speed. The turbines will have active pitch regulation whereby the angle of the rotor blades can be adjusted by the machine control system. This system has built-in braking, as the blades become stationary when they are fully 'feathered'.

The turbines will commence operation at a wind speed of about 4 m/s, will attain maximum output at about 15 m/s and will shut down when the wind speed reaches a 10-minute average of 25 m/s. Power will be controlled automatically as wind speed varies.

The wind turbines will be located at elevations in the approximate range 80 – 140 m OD.

An initial layout of 124 wind turbines was considered for the site and this was subsequently reduced to 112 turbines for the overall wind farm layout with all three phases, based on the constraints identified arising from the planning conditions set out by An Bord Pleanála (Ref. PL 16.131260). The layout showing 112 wind turbines formed the basis for consultation purposes with key stakeholders (Scoping exercise). The final layout of 112 turbines for all three phases was arrived at on the basis of this consultation and on the basis of hydrogeological, geotechnical, ecological and cultural heritage investigations on site. The option of the Phase 1 and Phase 2 layout is a subset of the 112 turbine layout as submitted for planning permission to An Bord Pleanála. Further detailed investigation at the time of construction may lead to minor

repositioning of a small number of individual turbines (as described in the DoEHLG Planning Guidelines).

A separate transformer will be associated with each wind turbine to step up the generation voltage of the turbines from 380 – 1000 V to a higher voltage for connection to the Electrical Substation via underground cables.

In modern wind turbines in the range of sizes under consideration, the transformer is most commonly located within the nacelle or turbine tower. However, depending on the turbine manufacturer, for safety reasons, it may be located outside of the tower close to the base. Where not accommodated within the wind turbine, it is not feasible or good practice from a safety perspective to locate the transformer underground. Rather, it will reside within a compact glass-reinforced plastic or steel enclosure measuring approximately 2.5 m x 2.5 m in plan and approximately 2.2 m high. The enclosure will also contain a ring main unit (RMU) switchgear complete with feeder circuit-breaker and close over-current / earth-fault protection.

The hermetically sealed wind turbine transformers, likely contained within the wind turbine tower, or otherwise located close by, can be considered as leak free and maintenance free. They are dispatched from the factory leak free and can only be damaged during transport or installation. Once in service, they remain closed for their lifetime.

Site entrance

Access to the site will be off the N59 Ballina to Belmullet road. There will be two site entrances as follows:

- Entrance 1: Existing Bellacorick wind farm entrance
- Entrance 2: Existing access to the western part of the site

An existing site entrance (Entrance 3 in the original application) to the Bord na Mona Workshops will not be utilised for the purpose of developing or maintaining Phase1 and Phase 2.

Access tracks

Access is required to facilitate construction of the turbine bases and erection of the turbines. Access tracks, which will be un-surfaced, will be constructed directly on the underlying firm material.

There is an extensive network of existing tracks within the site comprising an existing access track to the existing Bellacorick wind farm, access track to former farm buildings within the site and access track ways formerly used as railway beds in the peat operations which took place on site. All railway track was removed from the railway beds as part of the rehabilitation process. Where possible the existing access tracks have been incorporated into the development to the extent possible though these will need to be strengthened and widened. Peat probing along the proposed access routes to turbine locations was undertaken to identify the optimum route

along corridors of minimal peat depth and also avoiding very wet areas of the site. The tracks provide access to points relatively close to all turbine locations, each of which can be accessed without major constraints of poor ground, steep inclines or significant watercourses.

Approximately 63km of access tracks will be required in total. Tracks will be approximately 5.5m wide with passing bays provided at appropriate locations and horizontal bend radii designed and constructed to accommodate the Contractor's transport equipment. Access track depth will vary depending on the depth of peat to bearing stratum and bearing capacity of the underlying soils. Peat depths along proposed access track routes were probed to identify optimum routes across shallow peat depth areas. Resulting from this approximately 47km of access track will be constructed on shallow peat areas with a dimension 5.5m x 0.8m built on the bearing stratum. Excavated peat material will be side cast adjacent to the access tracks and dressed to blend in with surrounding landscaping and partially obscure sight of the road where feasible. The remaining 15km of road will be constructed over deeper areas of peat. These will be constructed either as floating access tracks or by excavating and backfilling. Construction of the access tracks in these areas will require excavation to an average depth to bearing stratum of 2.0m. Excavated peat will either be sidecast where feasible or removed and deposited in the peat repository area located in the centre of the site.

The access tracks will require a cambered top surface to assist the drainage of rainwater to either side of it. A site drainage plan has been developed to manage surface run off from the access tracks and cranepads, turbine locations and other structures associated with the development.

- Existing access tracks to be incorporated: 6 km
- Additional access tracks to be provided: 57 km

The layout of the additional access tracks has been developed to follow the natural contours of the site, to avoid areas of deep peat and very wet areas and to minimise their overall length and achieve acceptable gradients. The latter are expected to be a maximum of 8 ° (14%) longitudinally and 2 ° (3%) laterally.

All power and control cabling within the site will be either direct buried or contained in PVC ducts and will be laid underground. Cable trenches, which will typically be 0.5 – 1.0 m wide and 0.75 – 1.00 m deep, will generally follow the edge of the site access tracks and will be installed in conjunction with the tracks.

Crane stands

A triangular shaped cranepad comprising a hardstanding area will be provided adjacent to each wind turbine to facilitate construction. They will be retained for the lifetime of the wind farm to facilitate any large scale maintenance involving the use of a large crane that could arise during the operational phase of the wind farm. The dimensions of the cranepad will be approximately 96 m x 76 m x 130m. The crane stand will be constructed adjacent to the access trackway beside each turbine and

will comprise an area of approximately 3,600m^2. It will accommodate the main crane (1,200 ton capacity) and the assist crane which will be used to erect and dismantle the main lifting crane. It will also accommodate the tower and nacelle components prior to construction. Adjacent to the crane pad an area of 16m x 33m will be provided on either bogmats or hardstanding to support frames in the blade laydown area. The main crane will lift turbine blades from this area to the turbine nacelle.

The various turbine suppliers have differing requirements as to the arrangement and orientation of the cranepad relative to the position of the turbine. The actual orientation will be a matter to be agreed with the selected turbine supplier.

Electrical Substations

Two 110 kV Electrical Substations at the site will occupy an L shaped hard-standing area, each of approximately 2,350m^2 and will consist of a compound containing outdoor switchgear comprising a 110 kV busbar, one 110 kV line bay, two 110/33kV transformers and associated bays, house transformer and 2 Control Buildings. The substation footprint will be such as to allow for the inclusion of two additional transformer bays. These additional areas are required by EirGrid, the National Transmission Operator, to future-proof the requirements of Grid 25.

Equipment within each Control Building will include a Supervisory Control and Data Acquisition (SCADA) system, which will allow for off-site monitoring via a telephone or fibre optic connection.

Each Control Building will be designed to the standard required for the accommodation of sub-station equipment. Each will comprise a control room, relay room, switchgear rooms, battery rooms and store room. It will be single storey, approximately 25 m x 9 m in plan. The control buildings will have rough-cast walls and a pitched roof with tiles or slates. Each Control Building's appearance will be in keeping with its location. The Control Buildings will be unmanned, but will include sanitary facilities comprising a single toilet and wash hand basin.

Surface water arising from roof drainage will be allowed to percolate naturally within each Electrical Substation compound.

Each Substation within the Electrical Transformer Station will further step-up the voltage for transmission to the national electricity network. Electrical equipment will consist of a transformer, circuit breaker, over-current and other protection devices, metering equipment and other small items of switchgear.

Each Grid Transformer will be located within an impermeable bund capable of oil retention in the event of a total leakage from the transformer. The bund will have a capacity of at least 110% of the volume of oil to preclude any release of contaminants to the environment. Drainage arising from the transformer bund will be discharged following passage through an appropriate oil interceptor.

Permanent 2.6 m high palisade fencing, the colour of which will be agreed with the planning authority prior to construction, will be provided around each Electrical

Transformer Station for public safety purposes. This need arises from the presence within each compound of high-voltage electrical equipment to which public access must be prevented. Access to the site and to the turbines within it is safe for people and animals under normal conditions.

Meteorological masts

Meteorological masts with a height corresponding to that of the turbine hubs are normally included in wind farm developments in order to monitor wind speeds and validate operation of the wind turbines.

Permission was granted to Bord na Móna Energy Ltd. for the erection of 3 no. 50 metre high wind measuring masts at Corvoderry, Laghtanvack, Srahnakilly, Bellacorick, Co. Mayo (Planning Authority Ref. P12/554). These were used to capture the initial data required for wind analysis purposes.

An application to retain these structures, and an 80m high mast installed in 2011, was made in October 2012 to continue data capture. Permission for retention was granted in February 2013.

These meteorological masts will be replaced by five permanent meteorological masts on the site.

The overall separation between the outermost turbines at Oweninny is such that variation in wind speeds across the site would be expected. Thus, given the scale of the site five meteorological masts are proposed with each comprising a lattice steel tower with anemometers and wind vanes attached**.** The overall height will approximately correspond with the tower height of the turbines, i.e. a maximum of 120m. Occasionally other equipment such as noise monitoring equipment may be located near to ground level on the meteorological masts

Overhead transmission lines and underground cables

Connection of the wind farm to the National Grid will occur in phases in line with the phased development of the project. Phase 1 and Phase 2 of the project will connect to the existing 110 kV Bellacorick substation and will export power via the existing 110 kV overhead line infrastructure, which will be strengthened by EirGrid. EirGrid lodged a planning application to Mayo County Council for the proposed upgrade of the Bellacorick to Castlebar 110kV OHL (that is the Bellacorick substation to Castlebar substation) (Planning Reference P14/410). Planning permission was granted on appeal by An Bord Pleanála (Reference: PL 16. 244534).

Within the wind farm, clusters of wind turbines will be connected via underground cables to the two 110 kV substations. The route of two of these 110 kV lines from substation location 1 and substation location 2 will connect to the existing Bellacorick 110 kV substation.

To minimise the potential visual and landscape impact the overhead line from substation locations 1 and 2 will be undergrounded as it approaches the Bellacorick substation site for a distance of c. 1km. A cable interface tower will be utilised as a

transition structure to accommodate the transition from overhead line to underground cable. A cable interface tower has the same dimensions as the normal angle tower though additional hardware is added to accommodate the cable / line transition.

Cables routes from the eastern part of the site will be ducted across the Bord na Móna internal bridge across the Oweninny river which will be fitted with a new deck.

Each 110 kV overhead line will consist of three overhead conductors carried on double wood pole portal structures, whose poles are 5m apart (centre to centre) and average height of 18 metres. The pole structures will have a maximum height of up to 22 m. The average distance between structures will be approximately 180m. An earthwire consisting of two continuous wires will be clamped to each set of wood poles and steel lattice towers. Where the line changes direction, a steel lattice angle tower up to 24.5m in height and an average base area of 5m x 5m, will be utilised.

Visitor centre

The proposed development offers an ideal opportunity to relate the socio-economic and ecological history of the site and general area through a purpose built visitor centre. Both Bord na Móna and ESB have had long association with the area dating from the 1950's. Bord na Móna has been involved in peat production operations at Oweninny to fuel the ESB peat burning station at Bellacorick. This provided not only electricity but much needed employment in a traditionally economically deprived area.

With the closure of the power station in 2005 peat operations also ceased. Emerging wind energy technology was seen as a logical natural replacement for peat based energy production which could continue to give gainful employment in the area.

The site itself plays an historical role in Ireland's drive towards sustainable renewable energy with the country's first commercial wind farm established at the site in 1992. It comprises 21 wind turbines with a total installed capacity of 6.45 MW (Mega Watts), and produces enough electricity to supply approximately 3,000 households. This wind farm, if still operational, will be replaced in the final stages of the planned development.

The site also relates an interesting ecological story. In accordance with its Integrated Pollution Prevention Control licence for the site Bord na Móna has developed a bog rehabilitation programme to enhance recovery of parts of the site. The harvesting operations and rehabilitation programme have created a mosaic of differing habitats and species. The ecological history and current status of the bog can therefore be depicted through the bog remnants, bog rehabilitation areas and protected areas and the variety of habitats and species that they support.

The visitor centre will offer the unique history of the bog throughout its development showing the transition from peat harvesting to wind energy development. In parallel, the story of the changing ecology of the bog, the ongoing bog rehabilitation

programme and the diversity of species and habitats that has resulted will be told. It will provide a place not only to learn about renewable energy but to observe it first hand whilst also providing an opportunity to observe the ecology of the area.

Temporary site compound

Temporary site compounds will be established throughout the site for the duration of the construction phases. These will comprise temporary construction buildings, materials and equipment storage. The site compound will be segregated into four separate sub compounds to facilitate the likely different contractors expected on site.

In addition, areas adjacent to substation 2, an area at the western entrance (Site Entrance 2) and an area behind the existing Bord na Móna workshops have been identified as potentially suitable site compounds.

Batching plant

A temporary batching plant for concrete production will be established adjacent to electrical transformer station 2. This will comprise the following components:

- 4 x Aggregate stockpile areas each of approximately 5,000 tons capacity
- 4 x Aggregate bays
- 1 x Ramp and feed hopper
- 2 x Cement Silos
- 1 x Mixer House
- 1 x Bunded Additives Store
- 1 x Control Cabin
- 1 x Three Bay Water Recycler
- Water storage area
- Power House & Switch Room
- Mobile Plant Refuelling Area
- Bunded and covered Gas Oil Tank
- Site office
- Laboratory
- Canteen
- Welfare facilities
- Parking

The batching plant compound will be fenced with chain-link fence. Drainage control including sediment control and settlement and pH neutralization will be provided at this location. The batching plant will incorporate a three bay water recycling system

to minimise water usage and loss of suspended solids. The three bay water recycler will be cleaned regularly and any build up of settled solids will be removed to a hard standing area which drains to the recycler and the collected solids will be recycled into the concrete batching system. Water for the batching plant operation will be sourced from local ponds or tankered to the location for storage and use as required. The batching plant will be capable of producing 50m^3 of concrete per day with a requirement of 10 m^3 of water and 20 tons of aggregate and 5 tons of cement.

Wastewater treatment facilities

Sanitary facilities, such as toilets and wash hand basins, will be provided at all substation locations and the operation and maintenance building. The visitor centre will have a full café facility, toilets and other sanitary facilities. These facilities will generate foul wastewater which will be treated before discharge to groundwater. To determine the appropriate level of treatment of this wastewater discharge site suitability assessments have been carried out by a qualified assessor, BK Engineering Design, at the substation and visitor centre locations. The O&M building will share a common treatment system with substation number 2. The assessments were carried out in accordance with the EPA Wastewater Manual - Treatment systems for small communities, Business, Leisure Centres and Hotels" and the EPA "Code of Practice: Wastewater Treatment and Disposal systems". The site assessments indicated that the ground conditions satisfy all requirements specified in the EPA code of Practice and are suitable for discharge following treatment. The site assessors wastewater treatment system recommended for each location consists of a septic tank followed by a Puraflo system and polishing filter with subsequent discharge to subsoil.

Borrow pit

To reduce the requirement for import of access track construction material to the site use will be made of one borrow pit that has been assessed to contain suitable material. Its footprint is approximately 17 hectares and it will be excavated to a depth of about 2m giving an estimated 340,000m^3 of material for access track construction,. Excavated material will be stockpiled in an area adjacent to turbine 37.

Peat depths at the borrow pit location are very shallow, being only 100mm in places. This material will be scraped from the surface, stored locally and backfilled into the borrow pit following material extraction

The top metre of material will be dry extracted and below this the material from the borrow pit will be wet extracted to prevent a reduction in the water table level. That is, there will be no dewatering of the borrow pit as this could impact on the local groundwater level with potential to impact the nearby Bellacorick Iron Flush area.

Water supply

Potable water for the site will be provided either through a connection to the water supply scheme operated by Mayo County Council, to which both Bord na Móna and

ESB have existing connections, or alternatively through bored wells with subsequent treatment and storage.

A bored well, if suitably identified, and/or rainwater harvesting will also be used to supplement the water demand at the substations and proposed visitor centre.

Electricity supply

House supply for the visitor centre, substations, batching plant and O&M building will be provided through the existing overhead line crossing the site or from power generated on site.

River and stream crossings

The development of the access track network will require the upgrading of existing river crossings and the construction of new crossing locations over streams.

The existing Bord na Móna machine bridge across the Oweninny river will be upgraded to carry electricity cables. There will be no in-river modification works.

A small existing culverted crossing of the Sruffaunnamuingabatia stream will be replaced by a box culvert or clear span bridge.

Small stream crossings will occur in the headwaters of the small river flowing beneath the Ballymonnelly Bridge into the Owenmore.

Stream crossing works will be discussed with Inland Fisheries Ireland and will be carried out in accordance with the "Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites"[1] or any updates as appropriate.

Haul route

The wind farm components will be transported on public roads from Killybegs Harbour to the site access. The proposed route corridor is shown in Figure 1 and an overview is as follows:

- Loads would exit Killybegs Harbour via the main gate onto the Shore Road which becomes the R263 Donegal Road;
- Turn onto the N56 continuing east to the N56 / N15 roundabout at Donegal Town where they would continue south on the N15;
- Continue on the N15 for 64km through Ballyshannon before joining the N4 at Sligo;
- Continue on the N4 for 12km before turning west onto the N17 south of Colloney;
- Continue on the N17 for 36km through Tobercurry and Charlestown before turning onto the N5;

[1] Eastern Regional Fisheries Board, Fisheries Protection Guidelines, Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites, http://www.fisheriesireland.ie/Research/recent-publications.html

- Continue on the N5 for 10km before turning northwest onto the N26 east of Swinford;
- Continue on the N26 for 30km through Swinford and Foxford before turning west onto the N59 in Ballina; and
- Continue on the N59 for 29km through Crossmolina before turning west at the eastern site access junction.

A number of designated sites are crossed by the proposed haul route (as detailed in Figure 1). These are as follows:

Lough Eske and Ardnamona Wood SAC (site code 0163): the River Eske is crossed by the N56, while the Drummenny River is crossed by the N15.

Lough Melvin SAC (site code 0428): the Drowes River is crossed by the N15.

Cummeen Strand/Drumcliff Bay SAC (site code 0627): the extreme eastern inlet of the estuary is crossed by the N15.

Unshin River SAC (site code 01898): the Ballysadare and the Owenmore Rivers are crossed by the N4.

River Moy SAC (site code 02298): the River Moy and its tributaries is crossed at seven locations by the N17, N5, N26 and the N59.

Bellacorick Bog Complex SAC (site code 01922): the N59 passes through the SAC at two locations at Dooleeg.

Apart from the crossing over the main channel of the Moy at Cloongullaun Bridge to the northwest of Swinford, the existing roads and bridges will be adequate to accommodate the oversized loads (i.e. widening or structural works are not required) and are not considered further in this evaluation. At Cloongullaun Bridge, some works will be required and possible impacts on the qualifying interests of the River Moy SAC are considered.

Indicative project phasing

The project will be developed in 2 phases which are determined by grid access availability and construction scheduling. The following indicative phase developments will take place:

Phase 1 will comprise the construction of 70 - 90 MW of wind energy comprising construction of wind turbines in the central section of the site, associated access tracks, one electrical transformer station, substation, overhead lines and cables. The Visitor Centre and Operation and Maintenance Building will also be constructed during this phase. This phase will connect to the existing 110 kV substation at Bellacorick and the construction is expected to commence in 2016 with completion of Phase 1 by 2018.

Phase 2 will comprise the construction of 70 - 90 MW of wind energy comprising construction of wind turbines in the western part of the site, associated access tracks electrical transformer stations, substation, overhead lines and cables. This phase will also connect to the existing 110 kV substation at Bellacorick and the construction is expected to commence in 2017 with completion of Phase 2 by 2020.

Actual project phasing will be determined by the nature of any permission granted for the site, the output size of the turbine selected following a full procurement process and the availability of grid capacity.

Project lifetime

It is envisaged that the project will remain in operation for about 30 years following its commissioning, although depending on circumstances it may be viable to continue the project for another phase thereafter. The Bellacorick wind farm is in operation at the site for 21 years now and continues to perform well with high availability and turbines maintained in good condition. It is expected to have a useful operating life in excess of 25 years in the same environmental conditions and wind regime as those that can be expected for the Oweninny wind farm.

Wind farm operation

It is expected that the wind farm will have an availability of about 98%, i.e. it will be capable of operation for 98% of the time. Actual operation will be determined by the wind conditions experienced. However, on average, turbines turn and therefore produce electricity for about 80 - 85% of the time. The output of the wind turbines will depend upon the wind regime but a capacity factor of around 33% is expected. This means that over the course of a year each turbine would produce 33% of the amount it could theoretically produce if it was working at maximum output at all times throughout the year.

Wind farms are designed to operate largely unattended however given the scale of the development a technical staff of up to 10 people initially will be present for monitoring and routine maintenance operation. This number will increase as subsequent phases of the wind farm are developed. Each turbine will have its own in-built supervision and control system that will be capable of starting the turbine, monitoring its operation and shutting down the turbine in the case of fault conditions.

Supervisory operational and monitoring activities will be carried out remotely using a SCADA system, with the aid of computers connected via a fibre optic or telephone modem link.

Servicing of the wind turbines will be carried out in accordance with the manufacturer's specifications, which would be expected to entail the following:

- Six-month service - three week visit by four technicians
- Annual service - six week visit by four technicians
- Weekly visit by Developer or agents to check over the site, notices etc.

Occasional technical problems may require maintenance visits by the technical staff.

During the six-month and annual service visits, some waste lubricating and cooling oils will arise. These will be recorded, drained into designated storage containers, brought off site and delivered to a suitable independent commercial facility for treatment / re-use / disposal in accordance with applicable legislation.

Decommissioning

The available options at the projected end of the wind farm's operational life are as follows:

- Refit the turbines' key components and continue electricity production.
- Repower with the most up-to-date technology and continue electricity production.
- Decommission the development and reinstate the site.

It is not envisaged at this stage that special environmental considerations will apply during the ultimate decommissioning of the wind farm. The same principles of mitigation works as apply to the construction works will apply to decommissioning.

Decommissioning will comprise the following:

- All turbines will be dismantled by crane, and this will entail removing the turbine blades and the nacelle containing the gearbox and generator, followed by removal of the tower sections.
- Control equipment and switchgear will be removed from the Electrical Transformer Station and the Control Building will be demolished.
- The upper sections of the turbine foundations will be removed to below ground level. The remaining lower parts will be covered and the ground will be left to re-vegetate naturally.
- Underground cables will be cut back and left buried in order to avoid disturbance of the already vegetated areas.
- Tracks that are not required on an ongoing basis by the landowners will be covered over and the ground will be left to re-vegetate naturally.
- Foundations will be covered over and marked
- All demolition waste will be removed from the site.
- The Visitor Centre will either be decommissioned or remain in situ. Once the wind farm is decommissioned one of the key elements of the centre will be lost however, it could continue to provide a focal point for the local community or be redeveloped for an alternate purpose.

Grid connection

EirGrid has confirmed that Phase 1 and Phase 2 of the proposed development will connect to the existing Bellacorick 110 kV substation and the internal overhead line routes and cables to connect these two phases have been designed and are included in the planning application for the wind farm.

2.1.2 Need for the Development

Renewable wind energy has developed in response to European Union policies and directives and the road map set out by the EU towards achieving targeted reductions in greenhouse gas emissions. The requirements of the EU have in turn been integrated into national policy with clear targets set for the energy sector as to the level of penetration of renewable energy into the overall energy mix for the country to be achieved by 2020. Wind energy is recognised nationally as the option most likely to contribute maximally towards achieving these targets which are essential to meet the requirements of Ireland's national climate change strategy. The Oweninny proposed development is fully in line with national, regional and county development policies and guidelines and will be located in a priority area for wind development identified in the Mayo Renewable Energy Strategy 2011 - 2020. The development, when operational, will contribute significantly to a reduction in Ireland's greenhouse gas emissions.

2.2 Ecological Description of the Proposed Project

The Oweninny cutaway bog site is located at Bellacorick in north-west Mayo (see Figure 2). This part of County Mayo is dominated by Atlantic blanket bog – whilst large areas of bog have been cut for peat extraction, planted with coniferous forests or improved for agriculture, substantial tracts of intact or largely intact bogs remain and these are of high conservation importance in both an Irish and European context.

The Oweninny site is centred at Bellacorick and extends over a large area (c.5,000 ha) to the north of the N59 National Primary Road. A third class road leading northwards from the N59 to Sheskin Lodge and beyond skirts part of the western boundary. To the east a local road runs northwards from the N59 to the townlands of Shanvolahan and Formoyle. The site is contiguous with the Bellacorick Bog Complex SAC (which includes the Knockmoyle Nature Reserve) along parts of its western and northern boundaries and along much of the eastern boundary. Coillte forest plantations occur to the north-west and north-east of the site, while there are small areas of marginal farmland to the south-west and south-east.

The site is irregular in outline and extends in an east to west direction for some 11km and in a north south direction some 7.4km. It comprises two distinct areas divided

almost entirely by a narrow strip of private land holdings but is linked by an internal bridge over the Oweninny River. Bord na Móna was involved in industrial scale peat production operations at the site for half a century to supply the ESB Bellacorick peat burning power station. Peat production commenced in the 1950s and harvesting operations ceased in 2003 followed by the closure of the power station in 2005 and subsequent decommissioning. Internally, the site is traversed by the remains of a former Bord na Móna rail network, which is now a network of drivable access tracks. The Bellacorick wind farm, comprising 21 turbines, has been operating within the site since 1992. The site includes some 352 hectares of Coillte forest plantation comprising mainly Sitka Spruce and Lodgepole pine. This is located mainly around and to the northwest of Lough Dahybaun. The site also encompasses 192 hectares of private forest plantation land at Corvoderry.

Tributary rivers, the Inagh, Alterderg, Fiddaunfrankagh and Glenora rivers, rise on the southern slopes of the Maumkeogh Mountains and drain southwards, joining to become the Oweninny river which gives the site its name. The Oweninny River drains the central part of the site. The Oweninny river is fed by the Srahmeen river and Knockmoyle Stream from the west and by numerous small tributary streams from the east (Fiddaungal, Fiddaunnaglogh, Fiddaunnameenabane, Fiddauncam and the Fiddaunnamuinggeery) before entering the Oweninny wind farm site. The Owenniny is joined by the Sheskin Steam which drains the forested south-eastern slopes of Slieve Fyagh and also forms the site's internal boundary with the O'Boyle's Bog area in the extreme north-west sector of the site. The Oweninny and the Fiddaunnamuingeery form part of the site boundary. The Sruffaunnamuingabatia, which drains the Bellacorick Iron Flush SAC area within the site, flows westwards and joins the Oweninny river. The Oweninny is also joined by the Muing river which drains Lough Dahybaun within the site. The Owenmore drains a catchment of approximately 332 km^2 before entering the sea at Tullaghan Bay. The Oweninny flows southwards, externally to the site and effectively dividing the site in two before joining the Owenmore turning westwards after Bellacorick Bridge and paralleling the N59. The Owenmore is joined at this location by the Altanabrocky river flowing northwards from the Nephin Mountains.

The north-eastern part of the site is drained by small tributaries (Fiddaunfura) which rise in Shanvodinnaun and flow eastwards to the main easterly flowing river, also named the Owenmore. This river rises in the townlands of Cluddaun and Shanetra to the north of the site before flowing eastwards becoming the Cloonaghmore River before entering the sea at Rathfran Bay which is within Killala Bay. It is also referred to as the Palmerstown River. The Cloonaghmore River drains a catchment of approximately 132 km^2 before entering the sea at Rathfran Bay.

The south-eastern part of the site drains to tributaries of the Shanvolahan River (Fiddaunagosty, Shanvolahan and Fiddauntooghaun) before entering the Deel River which drains to Lough Conn and eventually joins the River Moy at Ballina before entering the sea at Killala Bay. The River Moy drains a catchment of approximately

1,966 km^2 before entering the sea at Killala Bay. The area of the Shavolahan catchment before it enters the Deel River is approximately 23.7 km^2.

The site lands are owned by Bord na Móna and comprise largely cutover and cutaway bog land. Peat harvesting operated under an Integrated Pollution Prevention Control License (IPPC License Number 505) issued by the Environmental Protection Agency (EPA). In accordance with the licence for the site a bog rehabilitation programme has been developed and implemented (between 2001 and 2012) to enhance rehabilitation of parts of the site. As restoration of the former Atlantic blanket bog that existed at the site was not considered possible, the priority of the rehabilitation work was to stabilise the peat and encourage peat-forming vegetation on site. The rehabilitation work was undertaken largely by blocking drains and sculpting the peat surface to re-wet the peatland area. The greater part of the work was completed between 2003 and 2005.

As expected, the site is largely flat, with altitude mostly between 80 and 100 m above sea level. A higher ridge of ground occurs at Furnought, rising to 151 m (where there is a Megalithic tomb).

In general the Oweninny site is dominated by cutover blanket bog which was harvested commercially between the 1950s and the early 2000s. In addition to the cutover bog there are a large number (no. 46) of remnant bog areas which lie scattered throughout the site. Although these remnant areas are dominated by lowland blanket bog they also contain areas of dry heath and wet heath and patches of rich fen and flush. Various lakes and ponds, some of recent origin, occur scattered through the site. In the south-eastern portion of the site there are a number of areas dominated by commercial conifer plantation on peat.

2.3 European Sites Identification

In accordance with the European Commission Methodological Guidance (EC2001), a list of European sites that can be potentially affected by the project has been compiled. Adopting the precautionary principle in identifying these sites, it has been decided to include all Natura 2000 sites within a 15km radius of the development site (see Figure 3). It would seem improbable that the project could have impacts on European sites that are more than 15 km from Oweninny as there are no such sites with any linkages (such as via watercourses) to the Oweninny area.

Sites selected for screening are as follows – outline descriptions are given in section 2.3.1, with site synopses given in Appendix 1.

2.3.1 Special Areas of Conservation

Bellacorick Iron Flush Special Area of Conservation (code 0466)

This small site is entirely surrounded by the Oweninny wind farm site. It is a small minerotrophic fen developed on glacial till overlying calcareous sandstone. The site supports several rare and protected plant species, notably Marsh Saxifrage. Part of the SAC (9 ha) is owned by An Taisce and is managed for nature conservation.

Lough Dahybaun Special Area of Conservation (code 02177)

This lake, which is partly within the Oweninny wind farm site, is a good example of an oligotrophic lake surrounded by blanket bog. It supports the rare and protected plant Slender Naiad.

Bellacorick Bog Complex Special Area of Conservation (code 01922)

This is a large blanket bog site with some of the best examples of lowland blanket bog in the country and a particularly well developed pool system. A small portion of O'Boyle's Bog (which is part of Oweninny wind farm but in which no construction will take place) is included within the SAC site.

The SAC site includes the Knockmoyle Sheskin Nature Reserve and the Owenboy Nature Reserve.

Owenduff/Nephin Complex Special Area of Conservation (code 0534)

This very large site extends from south-west of the Oweninny wind farm to include the entire Nephin Beg range. It is an excellent example of a peatland landscape, with extensive blanket bog and wet heath.

River Moy Special Area of Conservation (code 02298)

This very large site comprises almost the entire freshwater element of the Moy and its tributaries and includes both Loughs Conn and Cullen. It includes the Deel River to the west of Crossmolina.

Carrowmore Lake Special Area of Conservation (code 0476)

Carrowmore Lake is a large, shallow oligotrophic/mesotrophic lake. The SAC includes the entire lake system and an adjoining tract of blanket bog (Largan More Bog).

Broadhaven Bay Special Area of Conservation (code 0472)

This large coastal site, which includes Sruwaddacon Bay, is of importance for an excellent range of coastal and estuarine/marine habitats.

Slieve Fyagh Bog Special Area of Conservation (code 0542)

This site supports a large area of mountain blanket bog, a habitat that is uncommon in the region.

Glenamoy Bog Complex Special Area of Conservation (code 0500)

This very large site supports one of the largest areas of undisturbed blanket bog in the country, as well as a range of related habitats.

2.3.2 Special Protection Areas

Owenduff/Nephin Complex SPA (code 004098)

This very large site, which is coincident with the SAC, supports a range of typical peatland bird species. It is selected specifically for populations of Greenland White-fronted Geese, Merlin, Peregrine and Golden Plover.

Lough Conn and Lough Cullin SPA (code 004228)

These lakes are of particular ornithological importance for wintering Greenland White-fronted Geese and Tufted Duck and for nesting Common Scoter and Common Gull.

Carrowmore Lake SPA (code 004052)

The Carrowmore Lake SPA supports an important breeding colony of Common Gulls and has supported Sandwich Terns in the past. During winter, the lake is used by Greenland White-fronted Geese and various wildfowl species.

Blacksod Bay/Broadhaven SPA (code 004037)

This large site comprises all of the inner part of Broadhaven Bay, including Sruwaddacon Bay, and the various sheltered bays and inlets in Blacksod Bay. The site is of high ornithological importance for its excellent diversity of wintering waterfowl which includes nationally important populations of five species.

2.4 Identification and Assessment of Potential Impacts

Only those features of the development that have the potential to impact on features and conservation objectives of the identified Natura 2000 sites are considered. A number of factors were examined at this stage and dismissed or carried forward for appropriate assessment as relevant. The following areas were examined in relation to potential impacts from the wind farm project on SACs/SPAs within a 15 km radius of the Oweninny site:

- Loss of, or physical disturbance to, habitats
- Potential effects on peat stability
- Potential impairment of water quality due to construction works
- Potential impairment of water quality during operation phase

- Potential impacts on hydrological functioning of flush habitats
- Potential impacts on bird species

Loss of, or physical disturbance to, habitats

While two SAC sites (Lough Dahybaun and Bellacorick Bog complex) partly overlap with the Oweninny development site, and a third (Bellacorick Iron Flush) is located entirely within but is not part of the development property, there will be no direct impacts by the project on any of these SAC sites.

While the project will have a direct impact on the River Moy SAC due to works required on the proposed haul route at Cloongullaun Bridge to facilitate the delivery of turbines, the scale and nature of the works would not affect any of the qualifying Annex I habitats for which the site is selected, namely Alkaline fen, Active raised bog, Degraded raised bog, Depressions on peat substrates of the Rhynchosporian, Old sessile oak woods, and Alluvial forests. The areas within the SAC which adjoin the bridge are mostly disturbed and include a residence and garden to the southwest and an old hand ball alley to the northeast.

The project would not have any direct impacts on any of the other European sites which lie outside of the development site.

It can be concluded that the proposed project will not result in any loss of or physical disturbance to natural habitats or the habitats and species for which the the identified European sites has been designated.

Potential effects on peat stability

A Peat Stability Risk Assessment (PSRA) was carried out by ESBI (see Appendix 4 of the EIS for full report). The PSRA assessment is based on the Natural Scotland Scottish Executive "Peat Landslide Hazard and Risk Assessment: Best Practice Guide for Proposed Electricity Generation Developments" (2006) and is supplemented by the experiences of ESBI on previously developed sites. This document sets out four categories of risk and recommends various mitigation/avoidance actions for each category.

Peat stability risk is categorised as insignificant, significant, substantial or serious. Construction can take place in areas where risk categories range from insignificant to substantial with varying mitigation requirements. The insignificant and significant categories represent areas where the risk of peat instabilities are either considered negligible in a standard construction environment or considered manageable by the adoption of specific additional mitigation measures respectively. In the context of this development, the substantial risk category represents areas where more rigorous site investigation is required prior to construction at detailed design stage, more onerous mitigation measures are actioned and a higher level of site supervision is locally imposed in order to reduce the risk to lower levels.

While peat stability risk assessments are of consequence in both upland peat areas and lowland peat areas there are some distinguishing features of this lowland site that are considered more favourable than those of a typical upland site. The relatively flat topography of this site differentiates Oweninny from an upland peat site where, unlike an elevated site, the likelihood of a substantial downslope reaction to a trigger event is significantly reduced. In the main the historical extensive drainage and removal of peat across the site has also served to mitigate against the impact of a peat instability event by reducing the thickness of peat and thereby providing buffer areas where an instability of peat is most likely to lessen rather than intensify.

The following table summaries the recommended action for each risk zone.

Risk Rating	Risk Level	Action Required
0.0 - 0.18	Insignificant	Normal Site Investigations
0.19 - 0.42	Significant	Targeted Site Investigation. Design of specific mitigation measures. Part time supervision during construction.
0.43 - 0.66	Substantial	Avoid construction in the area if possible. If unavoidable, detailed SI and design of specific mitigation measures. Full time supervision during construction.
0.67 - 1.0	Serious	Avoid construction in this area.

A PSRA was carried out using information on the ground conditions, topography, hydrology, ecology, land use and other factors. The impact of a potential peat instability event was also considered. The likelihood and impact of a peat failure at different areas of the site were combined to form the risk. An assessment of the potential for peat instability was undertaken at each turbine/hardstand, substation, section of road and building to determine a risk rating for the construction works in the area. The results of the peat stability risk assessment show that the site contains areas of insignificant risk to substantial risk.

The risk rating at the site varies from insignificant to substantial. Areas of insignificant risk are identified on site based on the recommendation that where peat depths are less than 0.5m no specific peat instability risk is present. Significant or substantial risks at this site are largely driven by two factors; the distance from the nearest defined watercourse which in turn affects the quantity of material that could arise in a displacement and the depth of peat at the location under consideration. Therefore some locations are shifted into the substantial category of risk because of their distance from the nearest watercourse even though other important factors such as ground slope would be considered relatively favourable.

The following table summarises the results of the PSRA in term of construction area.

Risk Level	% Construction Area (approx.)
Insignificant	40%
Significant	40%
Substantial	20%
Serious	0%

In order to supplement the PSRA information, a computer generated analysis of the peat stability at the site has also been carried out. This analysis involves modelling the site assuming a translational slip failure. For this case a very low undrained shear strength value has been assumed in the analysis, i.e. 2.5kPa and a surcharge of 10kPa. The analysis identifies areas of varying potential of peat instability based on a quantitative analysis. This analysis is a crude and conservative (assumes a very low undrained shear strength for all of the peat across the site) assessment of the peat stability and by itself is only indicative. It is however a tool to be considered in the assessment of the risk at the site.

The outcomes of the peat stability risk assessment and the slope stability analysis broadly align in so far as the higher risk rating areas are predominantly clustered in the areas identified by the analysis as having a more likely potential of instability. The PSRA also suggests that except for the areas to the north and south of the Muing River and to the east of Furnought Hill the risk of peat instability across the majority of the remainder of the site is low.

The risk of peat instability has been minimised and mitigated by optimising the design of the wind farm. However, without additional appropriate mitigation during the construction phase, there is some risk that slippage could affect the conservation objectives of the following European sites:

- The Bellacorick Bog Complex SAC should peat slippage occur in the areas of various construction sites in the vicinity of the northernmost sector of Phase 1 area (which adjoins the SAC)..
- The Carrowmore Lake Special Area of Conservation should peat slippage occur in construction areas close to the western boundary of the site, where there is an assessed substantial risk along the roads leading to T33, T34 and T39 and a significant risk at the locations for these three turbines.

Clarification relating to the peat stability on the Oweninny site was also provided by Dr. Paul Jennings of AGEC at the oral hearing for the wind farm. As summarised in his witness statement:

- The proposed Oweninny Wind Farm development is sited within an area that has been commercially harvested on an industrial scale for over 50 years. The remaining peat on the site has been extensively removed resulting in large areas of minimal peat thickness, typically less than 0.5m in depth. The peat depth across approximately 70% of the construction area is less than 1.5m.

- The site is relatively flat in most areas with ground slopes at infrastructure locations predominantly less than 3° and in many cases less than 2°.

- Preliminary site investigation has been carried out at the site to characterise the ground conditions for the purpose of planning and design. The preliminary site investigation has been used to locate the wind farm infrastructure to avoid potential areas of relative peat instability. It is considered that the site investigation presented in the EIS is adequate and sufficient to allow an appropriate assessment of peat stability at the site.

- The peat stability risk assessment included in the EIS provides a robust method, based on worst-case parameters, of identifying potential areas of elevated peat instability. Peat stability risk is divided into 4 risk levels and for each risk level a set of specific mitigation measures is provided, with mitigation measure becoming more onerous and stringent with increase in risk level (Appendix 4, Section 5.3).

- A Geotechnical Risk Register has been produced identifying more detailed potential risks and associated mitigation measures (Appendix B of the witness statement). This register will be submitted to the Project Monitoring Committee (PMC) as a means of monitoring geotechnical risks for the development as required by Mayo County Council.

- Whilst the risk rating results from the PSRA show a proportion (20%) of the proposed development in the Substantial risk category, this is not a true reflection of the peat stability risk at the site. Detailed design using a translational slide analysis using site investigation peat strength data for turbine areas identified within the Substantial risk category shows that the global factor of safety ranges from 1.97 to greater than 10 (Appendix C of the witness statement). The accepted minimum global factor of safety is 1.3 or greater. The results show that using actual peat strength values the areas identified by the PRSA as Substantial risk would be defined as notably lower risk based on detailed design analysis.

- Notwithstanding the results of the detailed analysis, the risk level derived from the PRSA methodology will be applied together with the associated more onerous mitigation measures

Potential impairment of water quality during construction works

In the absence of appropriate mitigation, there is some risk to the conservation objectives of the Bellacorick Bog Complex SAC and the River Moy SAC as a result of water impairment during the construction works. (it is noted that the River Moy SAC might be affected only by the haul route component). These could arise as follows:

1. Pollution of watercourses with suspended solids due to runoff of soil/peat from construction areas

2. Pollution of watercourses, during construction phase, with other substances such as fuels, lubricants, waste concrete and waste water.

Potential impairment of water quality during operation phase

In the absence of appropriate mitigation, there is some risk to the conservation objectives of the Bellacorick Bog Complex SAC as a result of water impairment during the operation phase.

This could arise due to runoff to local streams of suspended solids from bare surface areas following the construction works. With time this risk will decrease as re-vegetation takes place.

Potential impacts on hydrological functioning of bog and flush habitats

The Oweninny-Bellacorick area is characterised by the presence of flush systems. The best documented of these is the Bellacorick Iron Flush SAC, which is physically located entirely within the Oweninny site but is not part of the development property. Also of note is a series of flushes on the blanket bog to the east of the site in the area of Formoyle – this area is within the Bellacorick Bog Complex SAC. However, Phase 1 and Phase 2 of the project would not have any potential to impact on the Formoyle flushes to the east of the site boundary.

As the Bellacorick Iron Flush is critically dependent on its groundwater catchment areas, a hydrological and hydrogeological assessment was commissioned to assess the potential impacts of the wind farm development on this sensitive system (refer to Chapter 18 of the EIS for full report). This study was carried out in association with the wind farm project ecologists and with input from National Parks and Wildlife Service personnel.

The study concluded that all of the proposed development areas in the vicinity of the Bellacorick Iron Flush are significantly outside the delineated groundwater and surface water catchment of the flush. As a result, there is no significant potential to impact on groundwater flows or surface water to the flush area. To ensure that no impact on groundwater level will occur turbine foundations in the vicinity of the iron

flush will be shallow excavated and piled and no dewatering of the foundation will occur.

Particular note is made to the proposed borrow pit, which is located approximately 380m to the southeast of the cSAC at its nearest point and approximately 980m at its furthest. The borrow pit, which has an area of approximately 171,200m2 (or ~17Ha), has some areas of shallow residual peat remains overlying variable glacial tills, with a coarse sandy gravel horizon extending from approximately 0.6mbgl to 2.5mbgl.

The borrow pit area drains to the southwest, with surface water flowing along the ground. It is proposed that the gravels in the borrow pit will be excavated to approximately 2m below ground level. Where the borrow pit requires excavation of gravels below the water table, it will operate as a wet pit, thereby avoiding the need for dewatering. The existing cutaway ground level in the borrow pit area lies in the range 98.0 to 100m OD, with an area at one corner at 101m OD. Hence the upper part of the borrow pit will drain from this corner to the centre. This will be similar to the present drainage system within the gravel from upstream.

Based on the available site investigation data there is a high degree of variability within the till deposits at the proposed borrow pit, ranging from (mainly) coarse GRAVELS to, sandy GRAVELS and gravelly SANDS in the central area to clayey GRAVELS on slightly higher ground to the west. With the evident variability in composition of the tills, there will also be an associative variability in permeability. While all locations have high water table, the coarse gravels have recorded high seepage rates and indicate high permeability, while where clay is noted seepage rates are recorded as minor.

The cleaner gravel dominant glacial tills recorded at the borrow pit have the potential to have higher permeability than surrounding clayey tills. The aerial photograph for the area and the digital elevation model indicate that the glacial ridge that forms the recharge area to the east of the flush bends towards the borrow pit in a south-south-easterly direction approximately 600m to the east of the flush discharge area. Given the topography (all of the borrow pit area is above the level of the discharge line within the flush at approximately 96mOD) and the variable nature of the till deposits, this area and the area of the borrow pit, could also potentially feed groundwater towards the groundwater catchment and recharge area of the iron flush.

However, there are a number of factors that indicate that this potential flow regime is not possible:

- The glacial deposits are variable within the borrow pit and around it. As indicated above there are clayey gravels, which have lower permeability, recorded on the ridge to the north-northwest of the borrow pit area;

- The drilling log for BH2A (see Figure 18 4 of the EIS)) records coarse gravels between 3-6mbgl, and this indicates that the more permeable gravels recorded in the central zone of the borrow pit area extend to the west-southwest [of

the borrow pit] and will facilitate groundwater flow in that direction, i.e. the permeable gravels do not necessarily form a north-northwest trend and therefore flow is not likely to contribute to the flush recharge area;

- Topographic contours show that ground levels fall from the borrow pit towards the west-southwest in the direction of the Sruffaunnamuingabatia Stream. This is in-line with the regional groundwater flow direction which was measured to be to the west/southwest in the area of the iron flush. Also, natural groundwater flow is more likely to flow perpendicular to the local topography, unless there are significant variations in permeability, and the available geological data indicate that this is not the case;

- In order for groundwater to flow from the borrow pit to the flush area, groundwater would have to flow parallel to the topographic contours (i.e. north-northwesterly) of the borrow pit site and also against the regional groundwater flow direction which is to the west/southwest. The available site investigation data indicate that the geological conditions would not facilitate this potential flow regime.

- The flowpath from the centre of the borrow pit to the discharge zone in the flush is 1,120m long and the maximum groundwater flow gradient is 0.002. The flowpath from the centre of the borrow pit to BH2A is 550m long and the maximum groundwater flow gradient is 0.008. The flowpath from the centre of the borrow pit to the Sruffaunnamuingabatia Stream (perpendicular to contours) is 1,420m long and the maximum groundwater flow gradient is 0.005. Given the indications that the gravels extend to the west-southwest below BH2A, and considering the higher gradients, groundwater flow from the borrow pit is occurring to the west-southwest, with discharge to the Sruffaunnamuingabatia Stream as per the regional groundwater flow model.

Therefore, based on the points outlined above the regional groundwater flow below the borrow pit area is occurring independently of the flow regimes supporting the iron flush, and it can be concluded that the construction of the borrow pit would not affect the hydrology of the iron flush.

As the Oweninny project site adjoins sections of the Bellacorick Bog Complex SAC and the Carrowmore Lake Complex SAC a hydrological assessment was carried out to determine whether the project could have any effects on the hydrology of these sites. This assessment concluded that no impacts are anticipated on any of the bog areas which adjoin the site.

Impacts on bird species

Four SPA sites occur within a 15 km radius of the Oweninny development site.

The Owenduff/Nephin Complex SPA is located adjacent to the south-west of the south-westernmost sector of the Oweninny site (Ballymonnelly Bridge area). This

large site is selected specifically for populations of Greenland White-fronted Geese, Merlin, Peregrine and Golden Plover.

The Lough Conn and Lough Cullin SPA is located to the south-east of Crossmolina and approximately 10 km from the south-easternmost sector of the Oweninny site. These lakes are of particular ornithological importance for wintering Greenland White-fronted Geese and Tufted Duck and for nesting Common Scoter and Common Gull.

The Carrowmore Lake SPA is located approximately 9 km to the west-northwest of the Oweninny site. This SPA supports an important breeding colony of Common Gulls and has supported Sandwich Terns in the past. During winter, the lake is used by Greenland White-fronted Geese and various wildfowl species.

The Blacksod Bay/Broadhaven SPA is located approximately 13 km to the northwest of the Oweninny site. This large coastal SPA site is of high ornithological importance for its excellent diversity of wintering waterfowl which includes nationally important populations of five species.

It is noted that there is no overlap between the Oweninny site and any of these four SPA sites (with three of them separated by distances of between 9 and 13 km) and hence there would be no disturbance to any bird species associated with these sites during the construction and/or operational phases of the proposed wind farm.

The baseline assessments carried out for the wind farm showed that there are no regular flight lines over the Oweninny site by any target species, especially wintering waterfowl and breeding birds of prey (merlin, peregrine etc.) (see EIS Chapter 9). Particular attention was given to Greenland White-fronted Geese as this species was formerly a winter visitor to the Bellacorick area but had abandoned the area by the 1980s. During the winter surveys in 2011/12 and 2012/13, there were only three sightings of geese on site: two birds in the Laghtanvack area during misty conditions on 16th November 2011 and a record of a flock of 23 which flew over the existing wind farm area towards Knockmoyle Bog on 31st October 2012 (reported by Denis Strong, NPWS). Ten 'grey' geese in the northernmost part of the site in late October and early November 2012 (reported by Catherine Farrell, Bord na Móna & Gabriel Walsh, local) are likely to have been part of the same group of birds. The early date of these birds would suggest that they were recent arrivals which were attracted to the Knockmoyle Bog area. These records of Greenland White-fronted Geese are considered most likely associated with the population at Carrowmore Lake. From the winter surveys, it is concluded that there are no regular flightlines between feeding and roost areas over the Oweninny site by Greenland White-fronted Geese.

While there are four SPAs within a 15 km radius of the Oweninny site, it can be concluded with a high degree of certainty that activities associated with the proposed project either during the construction and/or operation phases could not have any impacts, direct or indirect, on the conservation objectives of the SPAs.

2.5 Assessment of Significance

This section considers the list of sites identified in section 2.3. These sites have been examined (see below) and in some cases excluded from further assessment on the basis that it can be demonstrated that the proposed project, alone or in–combination with other projects, could have no adverse effects on the integrity of the site as defined by the conservation objectives.

Bellacorick Bog Complex Special Area of Conservation

The proposed Oweninny development site adjoins the Bellacorick Bog Complex SAC along substantial parts of its northern, eastern and southern boundaries. In addition, there is a small area of overlap between the two sites in the eastern part of O'Boyle's Bog but this part of the SAC would not be affected in any way as there will be no development works within O'Boyle's Bog. It is also noted that much of the drainage in the eastern part of the Oweninny site is to watercourses which flow through the SAC site.

The proposed Phase 1 of the Oweninny project site adjoins the Bellacorick Bog Complex SAC along part of the northern boundary of the wind farm, though is separated by the main channel of the Oweninny River and its tributary the Fiddaunmuinggeery River. While there would be no direct impacts on the SAC site by the construction works, consideration is given here to the possibility that the SAC could be affected indirectly by peat slippage due to construction works.

In the absence of mitigation, it is considered that some of the qualifying interests of the SAC could be affected by peat slippage due to construction works in parts of the northern sector of the Phase 1 area of the site. A substantial slip could flow along the local watercourses and spill out over the following habitats for which the site is selected: Natural dystrophic lakes and ponds, Northern Atlantic wet heaths with Erica tetralix, Blanket bog (*active only), Depressions on peat substrates of the Rhynchosporion, and Alkaline fens.

River Moy Special Area of Conservation

While the eastern sector of the Oweninny wind farm site is upstream of the Deel River, which is within the River Moy SAC, there is no hydraulic connectivity between the Phase 1 and Phase 2 development areas and the Deel River tributaries, which drain the south-east sector of the Oweninny ownership site and subsequently flow into the Moy SAC.

On this basis, it can be concluded with full scientific certainty that the proposed Phase 1 and Phase 2 elements of the Oweninny wind farm project do not have potential to impact on the River Moy SAC.

However, it is expected that works will be required on the Cloongullaun Bridge along the proposed haul route to facilitate the delivery of the turbine components. While

the works are not expected to cause disturbance to any of the habitats that the site is selected for, there is potential without mitigation for suspended solids and/or other potential pollutants to enter the water course during the construction works and possibly have adverse impacts on the Annex II aquatic species that the site is selected for, namely White-clawed Crayfish, Sea Lamprey, Brook Lamprey, Salmon and Otter.

Bellacorick Iron Flush Special Area of Conservation

While this small site is entirely surrounded by the Oweninny wind farm site, the hydrogeological assessment showed that there is no real potential to impact on groundwater flows or surface water to the flush area as all of the proposed development areas in the vicinity of the iron flush are significantly outside the delineated groundwater and surface water catchment of the flush.

Nevertheless, because of the high conservation importance of this sensitive site, it is considered that further focused mitigation is required to provide certainty that there can be no impacts on the site (and the qualifying Annex II species Marsh Saxifrage) throughout the construction period. Monitoring will also be required in the pre-construction, construction and post-construction periods.

Lough Dahybaun Special Area of Conservation

It is noted that all elements of Phase 1 and 2, including the peat repository, borrow pit and access road, are outside the Lough Dahybaun Catchment.

Hence, it can be concluded with full scientific certainty that the proposed Phase 1 and Phase 2 of the Oweninny project does not have potential to impact on the Lough Dahybaun SAC.

Carrowmore Lake Special Area of Conservation

Carrowmore Lake SAC extends from Carrowmore Lake to the road leading to Sheskin Lodge on the western boundary of the Oweninny site.

T33 is located 216m from the western site boundary, while T39 is 205m from the site boundary. A minor public road separates the Largan More Bog sector of the SAC from the Oweninny site. The peat at the locations of these turbines, which lie downslope of Largan More Bog, is just over 1 m depth. While there is an assessed substantial risk of peat slippage associated with the roads leading to these two turbines, the likelihood of a peat slippage occurring (in the absence of further mitigation) is low as historically peat slides caused by construction activities tend to start at the point of construction and "flow" downhill and generally are due to loading of the surrounding peat from sidecasting on the downslope side (the peat at these 2 locations will be excavated and not sidecast and is relatively shallow).

Despite a low risk factor, it is considered that in the absence of appropriate mitigation at the construction stage, the conservation objectives of the SAC could be affected by peat slippage.

Owenduff/Nephin Complex Special Area of Conservation

This large site extends from just south-west of the south-westernmost part of the Oweninny wind farm (distance of c.100 m between the two sites but separated by the Owenmore River) and includes the entire Nephin Beg range.

As the SAC is geographically separate from the Oweninny site, with the nearest construction works at approximately 750 m from the SAC, it is concluded with certainty that the proposed project could not have any impacts on the conservation objectives of the Owenduff/Nephin SAC site.

Broadhaven Bay Special Area of Conservation

This large coastal site, which includes Sruwaddacon Bay, is located (at its nearest point) approximately 13 km to the northwest of the Oweninny site.

As the SAC is geographically separate from the Oweninny site by a large distance, and with substantial areas of forestry between the two locations, it is concluded with certainty that the proposed project will not have any impacts on the conservation objectives of the Broadhaven Bay SAC site.

Slieve Fyagh Bog Special Area of Conservation

This large bog SAC site is located (at its nearest point) approximately 2.5 km from the north-west boundary of the Oweninny site.

As the SAC is geographically separate from the Oweninny site by a substantial distance, and with areas of forestry between the two locations, it is concluded with certainty that the proposed project will not have any impacts on the conservation objectives of the Slieve Fyagh Bog SAC site.

Glenamoy Bog Complex Special Area of Conservation

This large site is located (at its nearest point) approximately 3.0 km from the north-west boundary of the Oweninny site.

As the SAC is geographically separate from the Oweninny site by a substantial distance, and with continuous areas of forestry between the two locations, it is concluded with certainty that the proposed project will not have any impacts on the conservation objectives of the Glenamoy Bog Complex SAC site.

Owenduff/Nephin Complex SPA

This large site extends from just south-west of the south-westernmost part of the Oweninny wind farm (distance of c.100 m between the two sites but separated by the Owenmore River) and includes the entire Nephin Beg range.

As the SPA is geographically separate from the Oweninny site with the nearest construction works at approximately 750 m from the SPA, and as none of the

selected bird species of the SPA have regular flight paths over the Oweninny site, it is concluded with certainty that the proposed project will not have any impacts on the conservation objectives of the Owenduff/Nephin SPA site.

Lough Conn and Lough Cullin SPA

The Lough Conn and Lough Cullin SPA is located to the southeast of Crossmolina and approximately 10 km from the south-easternmost sector of the Oweninny site.

As the SPA is geographically separate from the Oweninny site by a large distance, and as none of the selected bird species of the SPA have regular flight paths over the Oweninny site, it is concluded with certainty that the proposed project will not have any impacts on the conservation objectives of the Lough Conn and Lough Cullin SPA site.

Carrowmore Lake SPA

The Carrowmore Lake SPA is located approximately 9 km to the west-northwest of the Oweninny site.

As the SPA is geographically separate from the Oweninny site by a large distance, and as none of the selected bird species of the SPA have regular flight paths over the Oweninny site, it is concluded with certainty that the proposed project will not have any impacts on the conservation objectives of the Carrowmore Lake SPA site.

Blacksod Bay/Broadhaven SPA

The Blacksod Bay/Broadhaven SPA is located approximately 13 km to the northwest of the Oweninny site.

As the SPA is geographically separate from the Oweninny site by a large distance, and as none of the selected bird species of the SPA have regular flight paths over the Oweninny site, it is concluded with certainty that the proposed project will not have any impacts on the conservation objectives of the Blacksod Bay/Broadhaven SPA site.

Overview

A summary of the nine Natura 2000 sites where it has been determined that the proposed Phase 1 and Phase 2 of Oweninny Wind Farm project will not impact on the qualifying interests, and hence the conservation objectives, is given in the following table (as provided in Witness Statement of Dr. Brian Madden of BES at the Oral Hearing for the wind farm). The table includes a list of the qualifying interests for each site and the reason(s) for exclusion at Screening Stage.

The generic conservation objective for the SAC sites is “to maintain or restore the favourable conservation of Annex I habitat(s) and/or Annex II species for which the SAC has been selected”.

The generic conservation objective for the SPA sites is "to maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA".

Summary of Natura 2000 sites excluded at Stage 1 of AA process

SITE	QUALIFYING INTERESTS	REASON FOR EXCLUSION AT SCREENING STAGE
cSACs		
Lough Dahybaun cSAC (002177)	Slender Naiad (Najas flexilis)	Phase 1 & Phase 2 works are not within the catchment of the lake – no potential for direct or indirect impacts
Slieve Fyagh Bog cSAC (00542)	Blanket bog (*active only) [7130]	Distance of c.2.5 km between wind farm and cSAC Two locations separated by large tracts of forestry
Owenduff/Nephin cSAC (00534)	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110] Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoeto-Nanojuncetea [3130] Natural dystrophic lakes and ponds [3160] Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260] Northern Atlantic wet heaths with Erica tetralix [4010] Alpine and Boreal heaths [4060] Juniperus communis formations on heaths or calcareous grasslands [5130] Blanket bog (*active only) [7130] Transition mires and quaking bogs [7140] Salmon (Salmo salar) [1106] Otter (Lutra lutra) [1355] Shining sickle moss (Drepanocladus vernicosus) [1393] Marsh saxifrage (Saxifraga hirculus)	Two sites are physically separated by the Owenmore River, with a distance of approximately 750 m between the cSAC and the nearest construction area at Oweninny.

	[1528]	
Broadhaven Bay cSAC (00472)	Mudflats and sandflats not covered by seawater at low tide [1140] Large shallow inlets and bays [1160] Reefs [1170] Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] Submerged or partly submerged sea caves [8330]	Distance of over 10 km between wind farm and cSAC No connectivity between two locations
Slieve Fyagh Bog cSAC (00542)	Blanket bog (*active only) [7130]	Distance of c.2.5 km between wind farm and cSAC Two locations separated by large tracts of forestry
Glenamoy Bog cSAC (00500)	Salmon (Salmo salar) [1106] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] Shining sickle moss (Drepanocladus vernicosus) [1393] Petalwort (Petalophyllum ralfsii) [1395] Marsh saxifrage (Saxifraga hirculus) [1528] Machairs [21A0] Natural dystrophic lakes and ponds [3160] Northern Atlantic wet heaths with Erica tetralix [4010] Juniperus communis formations on heaths or calcareous grasslands [5130] Blanket bog (*active only) [7130] Transition mires and quaking bogs [7140] Depressions on peat substrates of the Rhynchosporion [7150]	Distance of c.3.0 km between wind farm and cSAC Two locations separated by large tracts of forestry
SPAs		
Owenduff/Nephin SPA (004098)	Merlin (breeding) Golden Plover (breeding) Greenland White-fronted Goose	Breeding species largely confined to SPA No flightlines by wintering geese between the SPA and Oweninny
Lough Conn &	Greenland White-fronted Goose	Distance of c.10 km

Lough Cullin SPA (004228)	Tufted Duck (breeding) Common Gull (breeding) Common Scoter (breeding) Wetlands	between wind farm and SPA Breeding species largely confined to SPA No flightlines by wintering geese between the SPA and Oweninny
Carrowmore Lake SPA (004052)	Common Gull (breeding) Sandwich Tern (breeding)	Distance of c.10 km between wind farm and SPA Breeding species largely confined to SPA
Blacksod Bay/Broadhaven Bay SPA (004037)	Great Northern Diver Light-bellied Brent Goose Common Scoter Red-breasted Merganser Ringed Plover Sanderling Dunlin Bar-tailed Godwit Curlew Sandwich Tern Wetlands & Waterbirds	Distance of c.13 km between wind farm and SPA Wintering species are almost entirely coastal and would not be expected inland. Breeding terns confined to SPA and coastal strip

2.6 Conclusion of Screening

In order to determine the potential impacts of Phase 1 and Phase 2 of the proposed Oweninny Wind Farm project on nearby Natura 2000 sites, a screening process was undertaken. The proposed project is within 15 km of thirteen Natura 2000 sites.

It has been determined during the screening process that nine of these sites (Lough Dahybaun SAC, Owenduff/Nephin Complex SAC, Broadhaven Bay SAC, Slieve Fiagh Bog SAC, Glenamoy Bog Complex SAC, Owenduff/Nephin Complex SPA, Lough Conn and Lough Cullin SPA, Carrowmore Lake SPA, Blacksod Bay/Broadhaven SPA) will not be impacted in any way by Phase 1 and Phase 2 of the Oweninny project, alone or in–combination, with other projects.

However, four sites (Bellacorick Bog Complex cSAC, Bellacorick Iron Flush SAC, Carrowmore Lake SAC and River Moy SAC) could potentially be impacted upon by the project (it is noted that the River Moy SAC might be affected only by the haul

route component). On this basis, the Screening Stage concluded with the recommendation to proceed to Stage 2: Appropriate Assessment, for these four Natura 2000 sites.

3. APPROPRIATE ASSESSMENT

3.1 Introduction

In this section the four Natura 2000 sites selected for appropriate assessment are described (details are given in the site synopses in Appendix 1). The potential impacts resulting from the proposed Phase 1 and Phase 2 of the Oweninny Wind Farm Project are then discussed in relation to the conservation objectives of the Natura 2000 sites. Mitigation measures, some of which are an integral part of the design process, are then detailed.

3.2 Characteristics of the Natura 2000 Sites

3.2.1 Bellacorick Bog Complex candidate Special Area of Conservation

The Bellacorick Bog Complex is a large peatland site complex situated on a low-lying undulating plain, and consisting of two large areas separated by an area of forestry. The larger of the two areas extends from south of Bellacorick eastwards, south-eastwards and then north to Doobehy. The smaller area is situated 6 km south-east of Glenamoy and extends south to 3 km north of Bellacorick and east towards Doobehy.

The bogs are predominantly lowland blanket bog which grades into intermediate bog, with characteristics of both blanket bog and raised bogs, at Doobehy/Srahmeen and Owenboy. The bogs contain a variety of well-developed pool systems with raised and blanket bog pool types. The site also includes some excellent examples of dystrophic lakes. The areas of blanket bog vary in the quality of their habitats. Many of the bogland areas are traversed by river and stream channels with diverse associated vegetation.

Spring-fed species-rich flushes are a significant feature of this site and occur throughout the bog complex. The flushes are notable for the presence of several boreal relict mosses and liverworts. A rare species, Marsh Saxifrage (*Saxifraga hirculus*) occurs here at one of only very few known locations in Ireland. This species is listed on Annex II of the EU Habitats Directive.

The site supports a population of the rare snail, *Vertigo geyeri*, a species that is listed on Annex II of the EU Habitats Directive.

The site includes several well-documented sites of considerable conservation significance, e.g. Formoyle, Brackloon and Cloonoragh flushes and the Owenboy and Knockmoyle-Sheskin Nature Reserves. These areas are still intact and remain of unique scientific and conservation interest.

SAC Qualifying Interests

The SAC has been selected for the following Annex I habitats and Annex II species:

- *Vertigo geyeri* [1013]
- Marsh saxifrage (*Saxifraga hirculus*) [1528]
- Natural dystrophic lakes and ponds [3160]
- Northern Atlantic wet heaths with *Erica tetralix* [4010]
- Blanket bog (*active only) [7130]
- Depressions on peat substrates of the Rhynchosporion [7150]
- Alkaline fens [7230]

SAC Conservation Objectives

The general conservation objective for the site is to maintain or restore the favourable conservation of habitats (Annex I) and species (Annex II) for which the SAC has been selected. (NPWS 2011, Conservation objectives for Bellacorick Bog Complex SAC. Generic Version 3.0. Department of Arts, Heritage & the Gaeltacht).

3.2.2 Bellacorick Iron Flush candidate Special Area of Conservation

Bellacorick Iron Flush is one of only eight recorded stations for the very rare species, Marsh Saxifrage, in Ireland. All of these locations are within a 10 km radius of the Iron Flush. The habitat in which it is found is typical for the species, though the ground is drier than on other locations. This fen is surrounded by extensive areas of commercially cut peat and drains that have caused a lowering of the water table, resulting in the loss of vegetation associated with wetter areas that was described in earlier references to the site by King and Scannell (1960). Some of the typical fen species that were present are now absent or scarce (notably the rare mosses *Homalothecium nitens* and *Meesia triquetra*) and the vegetation shows trends towards drier, more acidic species. Without further studies, it is unknown if the drying out of the flush and the lack of grazing will affect the survival of the species. Despite this the flush is still considered of high conservation value for Marsh Saxifrage.

SAC Qualifying Interests

The SAC has been selected for the following Annex II species:

- Marsh saxifrage (*Saxifraga hirculus*) [1528]

SAC Conservation Objectives

The conservation objective for the site is to maintain or restore the favourable conservation of habitats (Annex I) and species (Annex II) for which the SAC has

been selected. (NPWS 2011, Conservation objectives for Bellacorick Iron Flush SAC. Generic Version 3.0. Department of Arts, Heritage & the Gaeltacht).

In addition, the NPWS Conservation Statement (2009) for the Bellacorick Iron Flush cSAC gives the conservation objectives for the site as follows:

Objective 1: To maintain the Annex II species for which the cSAC has been selected at favourable conservation status; Marsh Saxifrage

Objective 2: To maintain the extent, species richness and biodiversity of the entire site

Objective 3: To establish effective liaison and co-operation with landowners, legal users and relevant authorities.

3.2.3 Carrowmore Lake candidate Special Area of Conservation

There are two main parts to the site: Carrowmore Lake, a large, shallow oligotrophic/mesotrophic lake, and Largan More Bog, an impressive tract of blanket bog. From an altitude of 6 m at the lake, the site grades upwards in a general south-easterly direction, reaching 199 m on Largan More Bog.

Carrowmore Lake is a large (960ha), shallow lake, with a maximum depth of approximately 2.5 m and a generally stony bottom. The lake water is almost neutral in terms of acidity (i.e. pH) and generally rather nutrient-poor.

Three areas of blanket bog are incorporated into the site: Glenturk, Carrowmore (or Glencullin) and Largan More. The bog is extensive in area and largely intact, with a typical range of good quality habitats. The bog supports two rare plants, marsh saxifrage and shining sickle moss.

SAC Qualifying Interests

The SAC has been selected for the following Annex I habitat and Annex II species:

- Shining sickle moss (*Drepanocladus vernicosus*) [1393]
- Marsh saxifrage (*Saxifraga hirculus*) [1528]
- Blanket bog (*active only) [7130]
- Depressions on peat substrates of the Rhynchosporion [7150]

SAC Conservation Objectives

The general conservation objective for the site is to maintain or restore the favourable conservation of habitats (Annex I) and species (Annex II) for which the SAC has been selected. (NPWS 2011, Conservation Objectives for Carrowmore Lake SAC. Generic Version 3.0. Department of Arts, Heritage & the Gaeltacht).

3.2.4 River Moy candidate Special Area of Conservation

This site comprises almost the entire freshwater element of the Moy and its tributaries including both Loughs Conn and Cullin. The system drains a catchment area of 805 sq. km. Most of the site is in Co. Mayo though parts are in west Sligo and north Roscommon. Apart from the Moy itself, other rivers included within the site are the Deel, Bar Deela, Castlehill, Addergoole, Clydagh and Manulla on the west side and the Glenree, Yellow, Strade, Gweestion, Trimogue, Sonnagh, Mullaghanoe, Owengarve, Eighnagh and Owenaher on the east side. The underlying geology is Carboniferous Limestone for the most part. Some of the tributaries at the east, the south of Lough Conn and all Lough Cullin are underlain by granite.

The site is a candidate SAC selected for a range of Annex I habitats and Annex II species. The Moy system is one of Ireland's premier salmon waters and it also encompasses two of Ireland's best lake trout fisheries in Loughs Conn and Cullin. It is a most productive catchment in salmon terms and this can be attributed to its being a fingered system with a multiplicity of 1st to 5th order tributaries which are large enough to support salmonids < 2 years of age while at the same time being too small to support significant adult trout numbers and are therefore highly productive in salmonid nursery terms.

SAC Qualifying Interests

The SAC has been selected for the following Annex I habitat and Annex II species:

- White-clawed crayfish (*Austropotamobius pallipes*) [1092]
- Sea lamprey (*Petromyzon marinus*) [1095]
- Brook lamprey (*Lampetra planeri*) [1096]
- Salmon (*Salmo salar*) [1106]
- Otter (*Lutra lutra*) [1355]
- Alkaline fens [7230]
- Active raised bogs [7110]
- Degraded raised bogs still capable of natural regeneration [7120]
- Depressions on peat substrates of the Rhynchosporion [7150]
- Old sessile oak woods with Ilex and Blechnum in British Isles [91A0]
- Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) [91E0]

SAC Conservation Objectives

The general conservation objective for the site is to maintain or restore the favourable conservation of habitats (Annex I) and species (Annex II) for which the

SAC has been selected. (NPWS 2011, Conservation Objectives for River Moy SAC. Generic Version 3.0. Department of Arts, Heritage & the Gaeltacht).

3.3 Potential Impacts

3.3.1 Bellacorick Bog Complex candidate Special Area of Conservation

It has been established in the screening exercise that in the absence of mitigation, the conservation objectives of the SAC could be affected by peat slippage due to construction works in the northernmost part of the Phase 1 development area. While there would be no direct impacts on the SAC site by the construction works, and noting that the Oweninny project site is separated from the Bellacorick Bog Complex SAC by the main channel of the Oweninny River and its tributary the Fiddaunmuinggeery River, there is the possibility that the SAC could be affected indirectly by peat slippage due to construction works. The turbines closest to the SAC boundary are (from east to west) as follows: T10, T2, T4, T1, T3, T7, T12, T23, T41 and T45.

The Peat Stability Risk Assessment has categorised these turbines and associated roads as having a risk rating of insignificant to significant. As described in section 2.4 of this report, the insignificant and significant categories represent areas where the risk of peat instabilities are either considered negligible in a standard construction environment or considered manageable by the adoption of specific additional mitigation measures respectively.

A substantial slip could flow along the watercourses and spill out over the various bog habitats for which the site is selected. Any significant adverse impact on the potentially affected qualifying interests, namely Natural dystrophic lakes and ponds, Northern Atlantic wet heaths with *Erica tetralix*, Blanket bog (*active only), Depressions on peat substrates of the Rhynchosporion, and Alkaline fens, would be of concern.

3.3.2 Bellacorick Iron Flush candidate Special Area of Conservation

A focused hydrogeological assessment showed that there is no real potential to impact on groundwater flows or surface water to the flush area as all of the proposed development areas in the vicinity of the iron flush are significantly outside the delineated groundwater and surface water catchment of the flush.

Nevertheless, because of the sensitivity and small size of the flush site and the fact that it is surrounded entirely by the Oweninny wind farm site, it is considered that monitoring will be required in the pre-construction, construction and post-construction periods to demonstrate that there have been no impacts on the conservation

objectives of the site. Also, focused mitigation is required to provide certainty that there can be no physical impacts on the site throughout the construction period.

3.3.3 Carrowmore Lake candidate Special Area of Conservation

It has been established in the screening exercise that in the absence of appropriate mitigation at the construction stage, the conservation objectives of the SAC could be affected by peat slippage.

Any significant adverse impact on the potentially affected qualifying interests, namely Blanket bog (*active only) and Depressions on peat substrates of the Rhynchosporion, would be of concern.

3.3.4 River Moy candidate Special Area of Conservation

As noted in the screening exercise the River Moy SAC could be affected by works that will be required at Cloongullaun Bridge along the proposed haul route.

In the absence of appropriate mitigation during the construction works at the bridge, the conservation objectives of the SAC could be affected by potential impairment of water quality. Specifically, the Annex II species for which the site is selected, namely White-clawed Crayfish, Sea Lamprey, Brook Lamprey, Salmon and Otter, could be affected.

3.4 Mitigation Measures

3.4.1 Peat Stability

While the risk of peat instability has been minimised and mitigated by optimising the design of the wind farm, it is considered that without additional appropriate mitigation during the construction phase there is some risk that slippage could affect the conservation objectives of two European sites: the Bellacorick Bog Complex SAC and Carrowmore Lake SAC.

The following section outlines the proposed mitigation measures for the site based on the preliminary site investigation and the outcomes of the peat stability risk assessment.

The peat stability risk assessment demonstrates that the risk rating across the site varies from insignificant to substantial and the varying degrees of risk require varying degrees of investigation and mitigation. The mitigation measures are further developed from the detailed site investigation through the detailed design process and construction phase of the project. During the detailed design Zonal Peat Stability Risk Assessments (ZPSA) will be required for the areas of substantial risk and in specific areas of significant risk.

Clarification relating to the peat stability on the Oweninny site was also provided by Dr. Paul Jennings of AGEC at the oral hearing for the wind farm. As summarised in his witness statement:

- The proposed Oweninny Wind Farm development is sited within an area that has been commercially harvested on an industrial scale for over 50 years. The remaining peat on the site has been extensively removed resulting in large areas of minimal peat thickness, typically less than 0.5m in depth. The peat depth across approximately 70% of the construction area is less than 1.5m.

- The site is relatively flat in most areas with ground slopes at infrastructure locations predominantly less than 3° and in many cases less than 2°.

- Preliminary site investigation has been carried out at the site to characterise the ground conditions for the purpose of planning and design. The preliminary site investigation has been used to locate the wind farm infrastructure to avoid potential areas of relative peat instability. It is considered that the site investigation presented in the EIS is adequate and sufficient to allow an appropriate assessment of peat stability at the site.

- The peat stability risk assessment included in the EIS provides a robust method, based on worst-case parameters, of identifying potential areas of elevated peat instability. Peat stability risk is divided into 4 risk levels and for each risk level a set of specific mitigation measures is provided, with mitigation measure becoming more onerous and stringent with increase in risk level (Appendix 4, Section 5.3).

- A Geotechnical Risk Register has been produced identifying more detailed potential risks and associated mitigation measures (Appendix B of the witness statement). This register will be submitted to the Project Monitoring Committee (PMC) as a means of monitoring geotechnical risks for the development as required by Mayo County Council.

- Whilst the risk rating results from the PSRA show a proportion (20%) of the proposed development in the Substantial risk category, this is not a true reflection of the peat stability risk at the site. Detailed design using a translational slide analysis using site investigation peat strength data for turbine areas identified within the Substantial risk category shows that the global factor of safety ranges from 1.97 to greater than 10 (Appendix C of the witness statement). The accepted minimum global factor of safety is 1.3 or greater. The results show that using actual peat strength values the areas identified by the PRSA as Substantial risk would be defined as notably lower risk based on detailed design analysis.

- Notwithstanding the results of the detailed analysis, the risk level derived from the PRSA methodology will be applied together with the associated more onerous mitigation measures

3.4.1.1 Insignificant Risk Mitigation Measures

In accordance with the Natural Scotland Scottish Executive "Peat Landslide Hazard and Risk Assessment: Best Practice Guide for Proposed Electricity Generation Developments" (2006) areas of insignificant risk are considered to only require standard site investigation, detailed design and construction procedures.

- In these areas peat depths are less than 500mm and excavated material can be side cast upslope of roads.
- All roads are to be solid in these areas
- The quantity of excavated material will be accurately calculated and a detailed materials management plan written following detailed design. Consideration will be given to the quantity of the mineral soils which will be excavated.
- These areas are suitable for the side casting of peat from areas of the site at higher risk in accordance with the Geotechnical Engineer/Site Geotechnical Supervisor recommendations.

3.4.1.2 Significant Risk Mitigation Measures

Design mitigation measures

The risk assessment of the wind farm site suggests that the risk of peat instability at the site can be classified as significant in areas. As the project proceeds into the design stage, detailed site investigations may identify new risks. The following mitigation measures are recommended during the design stage:

- A targeted detailed site investigation will be undertaken prior to site works commencing as necessary. Peat depths down slope of the works will be considered where necessary as part of this work.
- The site layout will be optimised following the detailed site investigations to avoid or minimise new risks if identified within the parameters of the planning permission if granted.
- A Geotechnical Risk Register will be developed for the site inclusive of a targeted Zonal Peat Stability Assessment as identified in the detailed site investigation.
- A method statement will be developed for the construction of the roads, turbines and substations. This will include but not be limited to the recommendations made below in the Construction Mitigation Measures.
- All roads to be solid in areas of significant risk unless approved by the geotechnical engineer.
- The quantity of excavated material will be accurately calculated and a detailed materials management plan written following detailed design. Consideration will be given to the quantity of the mineral soils to be excavated as part of the work.

- Side casting of materials in areas of significant risk will generally take place upslope of roads or as approved by the Site Geotechnical Supervisor.
- Consideration will be given to sequencing of the works. Where deemed necessary by the Zonal Peat Stability Risk Assessment, peat excavations are not to be left unsupported for extended periods and will be backfilled with compacted material in a sequenced manner.

Construction mitigation measures

Documentation/quality assurance

Construction works in areas of significant risk, where required by the ZPSA, will be strictly controlled by the Client's Site Geotechnical Supervisor and other site supervisory staff. The following Quality Assurance procedures are proposed:

- Contractor to be supplied with a Geotechnical Risk Register (GRR) detailing peat stability risks.
- Construction methods will be directed by Client's Geotechnical Engineer/Site Geotechnical Supervisor and strictly adhered to by the Contractor.
- Contractor to produce individual Method Statements for work in peat taking due account of the peat related risks and other geotechnical risks detailed in the GRR.
- Client's Geotechnical Engineer to approve the Contractor's Method Statement by the issuing of a certificate.
- No work in peat will take place without a Geotechnical Approval Certificate.
- A toolbox talk is required for the Contractor's operatives prior to commencing work in the peat area.
- Excavation in peat areas is subject to part time supervision by the Site Geotechnical Supervisor at this site depending on the outcome of the GRR and the Zonal Peat Stability Assessment.
- A daily record of peat excavations will be completed by the Site Geotechnical Supervisor. Any new risks that come to light will be communicated to the Geotechnical Engineer.

Construction control measures

The following control measures will be enforced during construction works in general:

- Side casting of materials in areas of significant risk will generally take place upslope of roads or as approved by the Site Geotechnical Supervisor.
- No stockpiling of materials or parking plant on peat.
- Minimise tracking machinery on peat.
- Where required by the ZPSA the length of unsupported excavations in peat is

to be miniised by backfilling excavations in a sequenced manner.

- No work is to be carried out down slope of a peat excavation at any time
- Water build up in excavations is to be avoided
- Peat excavations are not to be left unsupported for extended periods or overnight
- The use of vibrating rollers not permitted (dead weight permitted)
- Stringlines with posts at 10m centres downslope of access tracks. They will be installed prior to commencement of construction and remain in place for the duration of the works.
- Upslope cut-off drains will be installed in advance of construction
- The existing drainage patterns in the peat will be maintained as far as is practicable
- There will be no uncontrolled discharges of water onto peat
- If there is any deviation from the agreed work methodology, or if work practices are unsafe, the Site Geotechnical Supervisor will give instructions to the Contractor's Supervisor or directly to the Site Operatives.
- The Site Geotechnical Supervisor will suspend work if work practices or weather conditions are unsafe.

3.4.1.3 Substantial Risk Mitigation Measures

Design mitigation measures

The risk assessment of the wind farm site suggests that the risk to peat instability at the site can be classified as substantial in areas. As the project proceeds into the design stage, detailed site investigations may identify new risks. The following mitigation measures are recommended during the design stage:

- A detailed site investigation will be undertaken prior to site works commencing. It is prudent to consider peat depths, peat strengths and peat base slopes down slope of the works.
- The site layout will be optimised following the detailed site investigations to avoid or minimise new risks if identified.
- A Geotechnical Risk Register will be developed for the site inclusive of a Zonal Peat Stability Assessment for each turbine/hardstand, length of access track and other infrastructure on the site in areas which have been identified as having substantial risk. This is a more focussed assessment of peat stability carried out following the detailed site investigation. The input of geotechnical, hydrology and other experts is recommended.

- A method statement will be developed for the construction of the roads, turbines and all other structures in these areas. This will include but not be limited to the recommendations made below in the Construction Mitigation Measures.
- All roads to be solid in areas of substantial risk unless approved by the geotechnical engineer.
- The quantity of excavated material will be accurately calculated and a detailed materials management plan written following detailed design. Consideration will be given to the quality of the mineral soils to be excavated as part of the work.
- Peat excavated in these areas should be removed to areas of insignificant risk and stored upslope of a suitably designed retention structure such as a solid road or embankment to a maximum height of 1 m unless otherwise approved by the Site Geotechnical Supervisor.
- Consideration will be given to sequencing of the works. Peat excavations are not to be left unsupported for extended periods and will be backfilled with compacted material in a sequenced manner.

Construction mitigation measures

Documentation/quality assurance

Construction works in areas of substantial risk will be strictly controlled by the Client's Engineer and other site supervisory staff. The following Quality Assurance procedures are proposed:

- Contractor to be supplied with a Geotechnical Risk Register (GRR) detailing peat stability risks.
- Construction methods will be directed by Client's Geotechnical Engineer/Site Geotechnical Supervisor and strictly adhered to by the Contractor.
- Contractor to produce individual Method Statements for work in peat taking due account of the peat related risks and other geotechnical risks detailed in the GRR.
- Client's Geotechnical Engineer to approve the Contractor's Method Statement by the issuing of a certificate.
- No work in peat will take place without a Geotechnical Approval Certificate.
- A toolbox talk is required for the Contractor's operatives prior to commencing work in the peat area.
- Excavation in peat areas is subject to full time supervision by the Site Geotechnical Supervisor at this site depending on the outcome of the GRR and the Zonal Peat Stability Assessment.
- A daily record of peat excavations will be completed by the Site Geotechnical

Supervisor. Any new risks that come to light will be communicated to the Geotechnical Engineer.

Construction control measures

The following control measures will be enforced during construction works in general:

- Peat excavated in these areas should be removed to areas of insignificant risk or stored upslope of a suitably designed retention structures such as a solid road or embankment to a maximum height of 1m unless otherwise approved by the Site Geotechnical Supervisor.
- No stockpiling of materials or parking plant on peat.
- Minimise tracking machinery on peat.
- Minimise length of unsupported excavations in peat by backfilling excavations in a sequenced manner.
- No work is to be carried out down slope of a peat excavation at any time
- Water build up in excavations is to be avoided
- Peat excavations are not to be left unsupported for extended periods or overnight
- Finished Road/Hardstand level to be within 1.0 m of upslope peat surface
- The use of vibrating rollers not permitted (dead weight permitted)
- Stringlines with posts at 10m centres downslope of access tracks. They will be installed prior to commencement of construction and remain in place for the duration of the works.
- Upslope cut-off drains will be installed in advance of construction
- The existing drainage patterns in the peat will be maintained as far as is practicable
- There will be no uncontrolled discharges of water onto peat
- If there is any deviation from the agreed work methodology, or if work practices are unsafe, the Site Geotechnical Supervisors will give instructions to the Contractor's Supervisor or directly to the Site Operatives.
- The Site Geotechnical Supervisor will suspend work if work practices or weather conditions are unsafe.

3.4.1.4 Conclusions and recommendations

The preliminary site investigations and peat stability risk assessments have shown that there is an insignificant to substantial risk of peat instability on the Oweninny Wind Farm Site in the absence of mitigation measures. This risk will be minimised and mitigated by optimising the design of the wind farm by choosing a safe and

controlled construction methodology, by having a rigorous documentation and quality control system during construction and by controlling construction activities carefully. Further site investigations, which will take place at the detailed design stage, will inform the construction methodology.

In the preliminary Peat Stability Risk Assessment report, the following recommendations are made:

- A detailed site investigation will be carried out prior to detailed design.
- The design of the windfarm will be optimised with a view to minimising peat risks following the detailed site investigation.
- In areas of significant risk material will be stored upslope of solid roads or berms unless otherwise approved by the site geotechnical engineer.
- In areas of substantial risk excavated material will be removed to areas of insignificant risk or upslope of a suitably designed retention structure such as a road or embankment to a maximum height of 1m unless otherwise approved by the site geotechnical supervisor.
- A GRR inclusive of ZPSA will be developed at detailed design stage and incorporated in to the Method Statements for the works for specific areas of significant risk and substantial risk.
- A material's management plan will be written for the site, estimating the volumes of excavated material and specifying how and where material is to be disposed.
- A documentation and quality assurance system for construction in peat will be put in place.
- The construction methodology chosen will minimise the risk of peat instability. Construction control measures will be strictly enforced on site.
- This site is considered as having insignificant to substantial risk of peat instability based on the preliminary PSRA. Approximately 80% of the construction area is classified as having insignificant or significant risk. The risk at these areas will be mitigated with good design and construction practices and part geotechnical supervision. The remaining 20% of the construction area is categorised as having substantial risk of peat instability, however, in these cases the level of risk is on the lower end of the substantial (i.e. close to the significant risk category) and is suitable for construction with suitable site investigation, good design and construction practices and geotechnical supervision during the works in peat. No areas are categorised as serious.

From the above, it is concluded that the measures which are proposed to mitigate for peat slippage will ensure that there is no significant risk from peat stability to the conservation objectives of any of the two identified European sites.

3.4.2 Measures to Maintain Water Quality

Risks of significant amounts of potential pollutants from construction activities reaching local watercourses are considered minimal due to the strict pollution control measures which will be taken. A Drainage and Sediment Control Plan has been prepared and will be implemented during construction of the site (see EIS Appendix 16). A Construction and Environmental Management Plan (CEMP) will be prepared which will include the following best practice measures for works in the vicinity of watercourses:

- Good construction practice will be implemented at all construction areas throughout the site.
- Work method statements will be developed and implemented by construction crews for the construction activities.
- The drainage and sediment control plan will be implemented. The drainage system and settlement ponds will be constructed as a first step before major site clearance activities occur. Existing drainage will be identified and surface water diverted from the construction site to the extent possible.
- Excavated materials from construction works will be deposited in pre-arranged locations where there is no danger of run-off into local watercourses. Excavated material will be side cast in areas as approved by the Site Geotechnical Supervisor so that there is no peat stability risk. In deeper peat areas excavated material will be removed to the central peat repository area of the site. In addition, all run-off water from side cast areas and repository location shall be captured and discharged to appropriate receiving water after being clarified through the drainage settlement system provided.
- Where excavated materials are used to form embankments the drainage collection system will be installed first to collect any runoff and direct it to the settlement ponds.
- Re-fuelling of vehicles will take place in a secure bunded area well away from any watercourse.
- Care will be taken that no oils or hydraulic fluids are allowed to leak from machinery during construction.
- An oil spill response plan will be developed for the construction works and appropriate containment equipment will be available at work locations in the event of a spillage.
- Raw or uncured waste concrete or similar will be disposed of by removal to approved/licensed disposal site. It is noted that there will be a concrete truck wash out at the batching plant area. This washout will be directed to the three bay water recycler provided at this location.

- Construction materials such as hydrocarbon, cement and grout will be stored in bunded areas or silos which will be regularly inspected.
- Check dams, such as rock with geotextile membrane, will be placed in the existing drainage network prior to the establishment of the settlement ponds. These will be inspected and cleaned regularly and a log will be maintained by the contractor
- General construction practices will adhere to the requirements for the protection of fisheries habitat during construction and development works at river sites published by the Eastern Regional Fisheries Board (Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites http://www.fishingireland.net/environment/constructionanddevelopment.htm).
  In particular, instream works, if required, to accommodate the works at Cloongullaun Bridge along the proposed haul route would be planned in advance after consultation with Inland Fisheries Ireland and NPWS and all conditions from IFI and NPWS, such as seasonal restrictions, would be adhered to strictly.
- Discharge of settled water from the settlement ponds will be directed to the wetland area and not discharge directly to the stream.
- Weather conditions will be taken into account when planning construction activities to minimise risk of extreme run off from site.

3.4.3 Measures specific for Bellacorick Iron Flush SAC

While no impacts are expected on the conservation objectives of the Bellacorick Iron Flush SAC as a result of the construction works for the wind farm, hydrological and vegetation monitoring is recommended due to the sensitivity of the site. Also, measures are required to ensure that there is no access to the site by construction staff for the duration of the project.

At the Oweninny Oral Hearing National Parks and Wild Life Service raised through submission the issue of potential impact of concrete dust on the Bellacorick Iron Flush cSAC

> *"The batching plant lies directly south-west of the of the Bellacorick iron flush in line with prevailing winds. This plant in operation will be using 25 tons aggregate/cement combined to produce 50mJ of concrete per day. The potential risk of cement dust being wind borne and reaching the flush cannot be ignored. Cement can be considered lethal to any ecological site and the probability of some dust reaching the flush is deemed to be extremely serious. It is strongly recommended that the batching plant be placed somewhere else off the site entirely."*

> Section 3.4.4 of the EIS (Emissions and emission control) recognises the potential for impacts that can arise from the operation of a concrete batching plant. The main potential for emissions from the batching plant site will occur during the operational phase (of the batching plant) and will be very intermittent in nature. For example for turbine foundation pour the batching plant would produce concrete on 30 days, 31 days and 51 days during each of the indicative development phases.

The EIS does acknowledge that with respect to dust emissions, these can arise from materials delivery and fugitive emissions from silos, conveyor belt system and batching plant operation.

The most effective means of reducing dust emissions at batching plants is to hard-surface roadways and any other areas where there is a regular movement of vehicles. The batching plant area itself within the site will consist of a concrete apron which will be cleaned on a regular basis to remove any spilled materials.

Suppression of dust emissions from unsealed yards and roadways, will be achieved by hard coring the stockpile areas and access tracks to these and regular light watering when required

Dust emissions due to vehicles will be minimised by provision of a hard surfaced access road within the batching plant site to the batching plant area.

Wheelwash facilities will be provided at the Oweninny site main exits.

The batching plant site will be operated in accordance with best practice with good maintenance practices, including regular sweeping to prevent dust build-up.

As stated in the EIS Section 3.4.4 to ensure that dust emissions are minimised the following additional actions will be implemented:

- Aggregate material will be delivered in a damp condition, and water sprays will be applied to reduce dust emissions. Given the distance of the batching plant site to the nearest occupied dwelling it is proposed to store aggregate on hard core rather than in contained areas.
- Aggregate will be stored on site in stockpiles.
- The Conveyor will be designed and constructed to prevent fugitive dust emissions. This may include covering the conveyor with a roof, installing side protection barriers and equipping the conveyor with spill trays, which direct material to a collection point. Belt cleaning devices at the conveyor head may also be used to reduce spillage.
- Before loading into a concrete truck, materials will either be premixed in a totally enclosed concrete mixer or if the batching plant is the dry mixer type loaded into trucks for subsequent mixing.

- The mixer loading area will be enclosed and water sprays and a robust curtain of suitable design, or an effective air extraction and filtration system will be installed to suppress dust generated during mixer truck loading.
- Concrete trucks will be loaded in a way that minimises airborne dust emissions
- Weigh bins and hoppers will be enclosed.
- Any raw material spills will be removed promptly by dry sweeping. Water will not be used in the process of cleaning up spills except where the area drains to a wastewater collection point where washing down would be preferable to generating dust by sweeping. Where dry materials are recovered they will be recycled into the concrete batching process.
- Cement storage silos will have an approved fabric filter incorporating a fabric-cleaning device installed on each cement storage silo. The fabric filters will be serviced and maintained in accordance with the manufacturer's recommendations. Regular inspection and maintenance will be undertaken.
- To prevent overfill and subsequent filter damage, storage silos should be fitted with high-level audible and visual alarms in addition to an automatic delivery shut-down.
- If visible emissions are observed their source will be identified and corrective action taken immediately.
- All filter systems will be inspected on a daily basis to identify when cleaning/replacement is necessary. The inspection will include for checks for tears or leaks in fabric/cartridge filter systems.

The batching plant will be operated to the highest standards and will include automatic control systems to ensure that no system failures would occur during cement loading from cement tankers to the cement silos.

Such control systems typically comprise interlocked systems linking pressure drop or particle emission from the bag filters or other containment areas to the control system that will instantaneously shut down the cement filling process in the event of a pressure drop or dust detection. These control systems typically respond in milliseconds. Hence if a rupture of the bag filter occurred the filling process would stop immediately and minimal release from the bag filter would occur.

An estimate of the impact of a cement dust release from the batching plant on the Bellacorick Iron Flush was provided at the oral hearing in the expert witness statement of Dr. Paddy Kavanagh ESBI. Farner[2] published a review of the effects of dust on vegetation. This included sensitive plant species including Sphagnum species (under less tolerant taxa of mosses, the species Messia triquetra and Tomenthypnum nitens are listed. The former is now assumed extinct at Bellacorick

[2] Farner A. M.., , The Effects of Dust on Vegetation A Review, Environmental Pollution ,79 (1993) 63 – 75

with the latter, being one of the current rare species). In the review paper, it is noted that the lowest rates of application of cement/lime dust deposition observed to cause an effect were 0.6 and 0.5 g /m^2/day.

The estimated dust deposition on the iron flush arising from a one second release of cement dust from the proposed batching plant is 0.014g/m^2 which is over 40 times lower than the value of 0.6 g/m^2 as identified by Farner and which is the lowest rate of deposition which can cause impact on the sensitive plant species in the iron flush.

The proposed cement batching plant is located a distance of 2.43 km from the Bellacorick Iron Flush. Filling of the cement silos from sealed cement transport vehicles is a strictly controlled operation incorporating interlocking control mechanisms to prevent cement dust release. Any drop in pressure associated with a loss of integrity of the dust control filter system will lead to an automatic shutdown in milliseconds preventing an escape of cement dust.

In the extremely rare event of an emission occurring from the batching plant the automatic system would shut down the transfer system in milliseconds.

This indicates that no significant impact on the vegetation of the iron flush will occur.

Foundation construction

Foundations in the vicinity of the flush area will be constructed using concrete piles to avoid deep excavation for foundations and the need for dewatering of these to ensure no lowering of the water table in the vicinity of the flush.

In its submission to An Bord Pleanála the Department of Arts Heritage and the Gaeltacht (NPWS) stated that in order to be “extra cautious” with regard to the iron flush’s protection, it is recommended that turbines T13, T14, T24, T29 and T30 be removed or relocated further away from the Bellacorick Iron flush. The Department submits that this would help ensure that the water table is not interfered with.

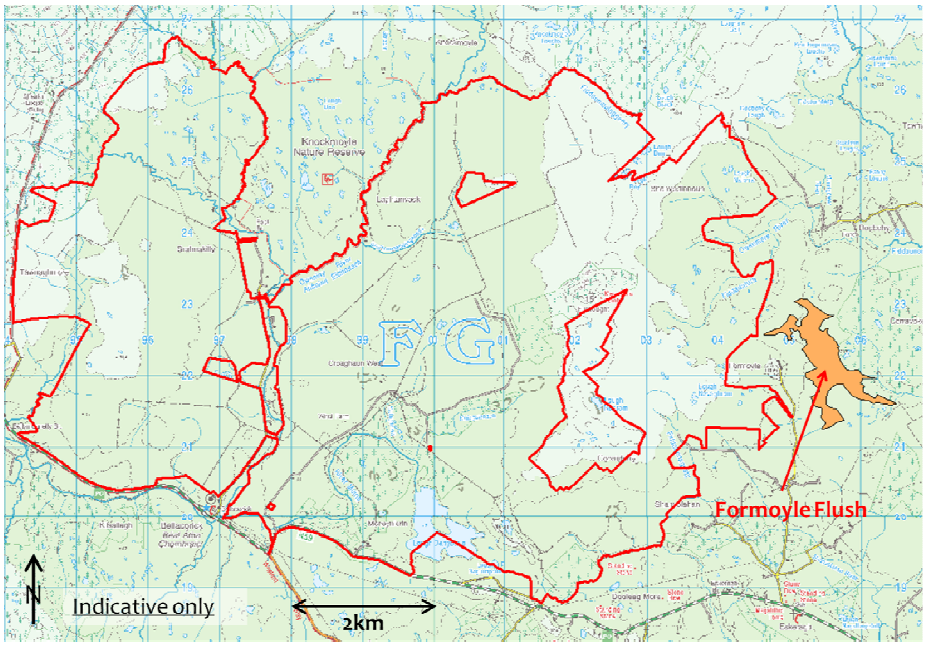
These issues were clearly addressed in the Witness Statement of Michael Gill of Hydro-environmental Services Ltd., which demonstrated that the construction of the five turbines closest to Bellacorick iron flush (i.e. proposed turbines T13, T14, T24, T29 and T30) will have no impact on its hydrology because:

- Turbines T13, T24 and T29 are located significantly down-gradient of the flush and its recharge area, and are also located to the west of the Sruffaunnamuingabatia Stream which is a significant hydrological boundary between these turbines and the iron flush;
- Turbines 14 and 30 are not located either up-gradient or down-gradient of the flush or its recharge and, therefore, their presence cannot alter groundwater flows or water levels within the iron flush area; and,

- The use of piled foundations will ensure that dewatering of deep excavations will be avoided, thereby removing the potential for alteration of groundwater levels away from the excavation area towards the iron flush.

In its submission to An Bord Pleanála the Department also indicated that further scientific evidence was required to demonstrate that adverse effects on the integrity of the cSAC [the Formoyle flush within the Bellacorick Bog Complex cSAC] are not likely to arise. The Department also requested that the location and extent of the flush be shown on an adequately scaled drawing, and that the groundwater surface water catchments to the flush were also presented on adequately scale drawings.

Formoyle flush is located on the eastern edge of the proposed wind farm boundary. Its location is shown on Figure B [Slide 37]. Formoyle flush is part of the Bellacorick Bog Complex cSAC.



Location of Formoyle Flush – from Figure B [Slide 37] of Witness Statement of Mr Michael Gill.

In response to the submission further confirmatory site investigation was carried out to accurately determine the groundwater and surface water catchments of the Formoyle flush. The analysis of the additional site data was provided in the expert Witness Statement of Michael Gill, Hydro-environmental Services Ltd, and clearly indicated that there is no proposed wind farm development within the updated groundwater catchment to the Formoyle flush area. As a result of this information, it has been scientifically demonstrated that there are no risks or pathways by which the proposed wind farm development and particularly Phase 1 and Phase 2 can impact on the surface water or groundwater regime feeding the Formoyle flush. Impacts simply cannot occur due to physical and hydrogeological separation.

In summary:

- the Phase 1 and Phase 2 Oweninny development area is not located in the same surface water sub-catchment as the Formoyle flush. The proposed turbine locations drain to the Fiddaunfura Stream and not the Formoyle flush area;
- the Phase 1 and Phase 2 development area is not located in the groundwater catchment to the Formoyle flush. Groundwater in the area of the turbine locations discharge to the Fiddaunfura Stream and not the Formoyle flush area.
- the Phase 1 and Phase 2 wind farm drainage control measures (which includes buffered release of surface water runoff from hardstanding areas onto the natural ground surface) will mean that there will be no net loss of potential groundwater recharge within any surface water catchment as result of the wind farm development;
- there is no potential for either direct or indirect impacts on the Formoyle flush from the wind farm development.

Borrow pit construction

The proposed borrow pit is approximately 17 hectares in area and will be excavated to a depth of about 2m. Excavated material will be stockpiled in an area adjacent to turbine 37.

Peat depths at the borrow pit location are very shallow, being only 100mm in places. This material will be scraped from the surface, stored locally and backfilled into the borrow pit following material extraction

The top metre of material will be dry extracted and below this the material from the borrow pit will be wet extracted to prevent a reduction in the water table level. That is, there will be no dewatering of the borrow pit as this could impact on the local groundwater level with potential to impact the iron flush area.

In its submission to An Bord Pleanála, prior to the oral hearing, NPWS outlined concerns suggesting that the proposed excavation of the borrow pit at the location specified poses a hydrological risk to the functioning of the flush in the Bellacorick Iron Flush and further stated that, from the evidence available [in the EIS], the Department submits that this risk remains a significant possibility until clarified to the contrary. The Department's submission also inferred that the EIS states that much of the flush rests on relatively permeable sands and gravels.

These issues were clearly addressed in the Witness Statement of Michael Gill of Hydro-environmental Services Ltd., which following extensive clarification investigations in the field to address these issues, demonstrated that:

(i) while part of the proposed borrow pit area is topographically higher than the flush emergences, there is no groundwater flow pathway or potential gradient

from the borrow pit towards the flush, and there is no potential for groundwater flow from the area of the proposed borrow pit towards the groundwater recharge area of the flush, or to the flush itself;

(ii) the area directly between the borrow pit and flush has been assessed by additional drilling investigations, and while there is variability in the local glacial geology, the lenses of sands and gravels which occur at the borrow pit do not extend towards the flush. As a result there is no potential permeable groundwater flow pathway that will facilitate the local movement of groundwater in directions significantly different to the regional direction. Additionally, there is no evidence to suggest there is any impediment to flow towards the Sruffaunnamuingabatia stream, as there is a continuous bed of permeable sand and gravels recorded between the borrow pit and the stream; and,

(iii) the elevated ground to the east of the flush is a source of shallow groundwater recharge to the flush. This recharge area was defined in the EIS at Section 18.5.9. This recharge area is not hydrogeologicaly connected to the proposed borrow pit area.

Access restrictions

While the Bellacorick Iron Flush is located entirely within the development site, it is not part of the development site. During the construction works, access to the flush will not be permitted under any circumstances and this will be highlighted to construction staff by the implementation of an exclusion zone of a recommended 50m around the flush boundary. The project ecologist will carry out regular inspections of the area during the construction phase to ensure that all is in order.

Hydrological monitoring

While no hydrological impacts on the flush are anticipated, the hydrological assessment has recommended as a precautionary measure that monitoring of groundwater levels should be undertaken prior to, during and for a period after the operation of the borrow pit.

Vegetation monitoring

The project will fund a vegetation monitoring programme for the life time of the project. The objective of this will be to detect any changes in vegetation that could be attributed to possible hydrological changes as a result of the project. This programme will include both the flush and the adjoining blanket bog.

The programme is likely to comprise establishing a number of permanent quadrats (probably no. 20-30) arranged along transects running across the flush and the bog. The quadrats will be set up during the summer before construction commences and will be monitored annually thereafter.

As this work will be within an SAC (owned by NPWS and An Taisce), it is anticipated that a working group will be set up between the stakeholders (i.e. Oweninny Power

Ltd., NPWS & An Taisce) to approve the programme and review as necessary. The appropriate permits will be obtained from the Minister for Arts, Heritage and the Gaeltacht to undertake this monitoring work.

3.4.4 Operation Phase Mitigation

The principal potential impact by the operational Phase 1 and Phase 2 of the wind farm project on designated sites will be run off of peat particles from bare surfaces to local watercourses which may enter the following sites and affect the relevant conservation objectives of the Bellacorick Bog Complex SAC. This run off will continue to be directed to the drainage system comprising settlement ponds and overland flow which will be left in-situ. As the bare surfaces stabilise and become re-vegetated, this potential impact will lessen further.

The project includes post-construction rehabilitation which will commence once the main infrastructure and drainage networks have been established. This will minimise bare surfaces by encouraging re-vegetation and creating further wetland habitats. A post-construction assessment by Bord na Móna ecologists/external ecologists will be carried out with the objective of drawing up a programme of rehabilitation works. Works identified will be completed by contractors on site.

The following will be part of post-construction rehabilitation:

- Further drain blocking once turbine and road drainage network has been completed to increase wet areas to promote Sphagnum growth and establishment within the site.
- Targeted drain blocking on deep peat areas and adjacent bog remnants to enhance rewetting of deep peat areas and re-vegetation by typical peatland species
- Rehabilitation of the peat repository area (37 ha). As the stored peat will be shallow (0.5 m – 1.0m), it is expected that colonisation by peatland species will be fairly rapid.

With this programme, which includes monitoring the rate of re-vegetation, it is expected that surfaces will stabilise fairly quickly with growth of rush dominated vegetation within the first two years after construction. However, should significant bare surfaces be identified in sensitive locations in relation to the two relevant SAC sites, more focused measures may be needed to avert run-off of soil particles. Measures could include the placement of turving material containing root and seed stock to encourage quicker re-vegetation. Alternatively, the surface of such areas could be seeded with suitable native plant seed to encourage re-growth of a vegetative surface layer.

From the above, it is concluded that the measures which are proposed to mitigate run-off from bare surfaces will ensure that there is no significant risk from water pollution to the conservation objectives of any SAC site.

3.4.5 Residual Impacts after Mitigation

From this assessment it is considered that the sensitive design of the Phase 1 and Phase 2 stages of the project, and the use of appropriate mitigation as necessary but especially to maintain peat stability and to avoid water pollution events, will ensure there are no significant residual impacts affecting the conservation objectives of the Bellacorick Bog Complex SAC, the Bellacorick Iron Flush SAC, the Carrowmore Lake SAC and the River Moy SAC.

3.5 Analysis of "In-Combination" Effects

The Habitats Directive requires competent authorities to make an appropriate assessment of any plan or project which is likely to have a significant effect alone or in-combination with other plans and projects.

The assessment of potential impacts on Natura sites within a 15 km radius of the project area has shown that three sites conceivably could be affected by the proposed Phase 1 and Phase 2 stages of the wind farm project. The analysis of in-combination effects considers projects and land uses affecting or potentially affecting these sites and whether the Oweninny wind farm development is likely to add to an overall effect on their conservation objectives.

The following projects or land uses are considered in the context of possible in-combination effects:

- Potential Future Development of Oweninny Phase 3
- Other Wind Farms
- Meteorological Mast
- Power Lines
- Substation Project
- Power Plants
- Renewable Energy Strategy (RES) for County Mayo, 2011-2020
- Grid 25/Grid West
- Oweninny Cutaway Bog Rehabilitation Programme
- Forestry
- Peat Harvesting

- Agriculture

3.5.1 Potential Future Development of Oweninny Phase 3

The potential impact of all three phases of Oweninny acting in combination formed the basis for assessment of the original wind farm application made to An Bord Pleanála in 2013. The application was accompanied by an Appropriate Assessment Screening and Natura Impact Statement for the proposed development of Phase 1, 2 and 3.

The inclusion of the Phase 3 component required evaluation of the following potential impacts which are not affected by the Phase 1 & 2 components alone:

Lough Dahybaun cSAC

While there will be no construction works within the immediate vicinity of the lake, there will be some works within the lake catchment associated with one turbine in Phase 3 and approximately 1.1 km of associated track. In the absence of mitigation, it was considered that the qualifying interest of the SAC, the Annex II species Slender Naiad, could be affected by peat slippage and the input of pollutants (in run-off) to the lake

Bellacorick Bog cSAC

The Phase 3 component adjoins the Bellacorick Bog Complex SAC along much of its external boundary and the drainage in Phase 3 is predominantly to watercourses which flow through the SAC site.

In the absence of mitigation, it was considered that some of the qualifying interests of the SAC could be affected by peat slippage due to construction works within Phase 3. A substantial slip could flow along the watercourses and spill out over the following habitats for which the site is selected: Natural dystrophic lakes and ponds, Northern Atlantic wet heaths with Erica tetralix, Blanket bog (*active only), Depressions on peat substrates of the Rhynchosporion, and Alkaline fens. The presence of well developed flush habitat at Fermoyle (within SAC), which provides habitat for the rare plant Marsh Saxifrage, was highlighted.

River Moy Special Area of Conservation

The Phase 3 component of the development site is upstream of the Deel River which is within the River Moy SAC. A tributary of the Deel, the Shanvolahan River, drains the south-east sector of the Oweninny site, though the Shanvolahan is not within the SAC.

In the absence of mitigation, it was noted that some of the qualifying interests of the SAC could be affected by the following:

- Peat slippage due to construction works in parts of the south-eastern sector of the Oweninny site
- Water pollution due to construction works in parts of the south-eastern sector of

the site

- Water pollution due to runoff to local streams of suspended solids from bare surface areas following the construction works.

It was considered that the following Annex II species for which the site is selected could be affected by the above: White-clawed crayfish, Sea lamprey, Brook lamprey, Salmon and Otter. In addition, the River Deel as far as the confluence point with the Shanvolahan River supports an important population of the Freshwater Pearl Mussel (*Margaritifera margaritifera*) though the SAC site is not selected for this species.

Overview

The Phase 3 component would require a point of connection to the national grid. Once this point of connection has been confirmed, it will then be possible for the Oweninny Phase 3 grid connection to be fully and completely assessed in accordance with the Environmental Impact Assessment Directive.

The NIS for all three phases of the Oweninny project (as submitted to ABP in 2013) concluded that the sensitive design of the project along with the rigorous mitigation measures proposed will ensure that the project, either alone or in-combination with other projects, will have no significant adverse impacts on the conservation objectives of any European site. It can be concluded that when the Phase 1 & 2 only Oweninny wind farm project is considered with the Phase 3 component which may be developed in the future, the overall combined project would not have a significant in-combination impact on any Natura 2000 site.

3.5.2 Other Wind Farms

The proposed and permitted wind farm developments in the general region and those within 20 km of Oweninny (as shown in Figure 4) are as follows:

- Corvoderry Wind Farm Development comprising ten wind turbines with 100m overall height (Planning reference 11/838). This consented (15/10/2012) wind farm is located within the Oweninny site and there is a right of way to the site along the existing Bellacorick wind farm road.
- Planning permission 09/259 for a wind farm development at Dooleeg, Bellacorick (one 2MW wind turbine) granted on appeal to ABP (PL16.236402).
- Planning application 00/2822 for a wind farm development at Dooleeg granted to erect two 1MW turbines on the 14/03/2002 for the same site as above.
- Bellacorick Wind Farm - this 21 turbine wind farm has been operational since 1992 with an installed capacity of 6.45 MW. It is located within the Oweninny project site. If it is still operating at the time, this existing wind farm will be decommissioned and new turbines forming part of the final phase of the Oweninny Wind Farm project will be installed near where the existing turbines are located.

- Oweninny Wind Farm comprising 180 wind turbines was granted permission in December 2003 by ABP (Planning reference PL 16.131260). This project occupies the same site as the present project and would not be built should the present project be granted permission.
- Tawnanasool Wind Farm comprising 8 wind turbines is currently in the planning process (Planning reference P14/666). Notification of refusal was issued by Mayo County Council on the 14th August 2015. The applicant appealed the decision to An Bord Pleanála on the 20/08/2015 with case listed to be decided by the 23/12/2015. This proposed project is located between the N59 and Tullaghan Bay and is approximately 10 km to the west-southwest of the Oweninny project site.

Should all the above projects be eventually built, there will be a total of 81 turbines in the area (allowing for the decommissioning of the existing Bellacorick wind farm and the rescinding of the existing Oweninny planning for 180 turbines). There follows a review of possible impacts of the Corvoderry, Dooleeg and Tawnanasool projects on nearby Natura sites.

Corvoderry Wind Farm Development

The Natura Impact Statement for the development identified potential (in absence of mitigation) for adverse impacts on Lough Dahybaun SAC as a result of possible changes in water quality entering the lake during the construction and operation phases. There is a distance of 1.13 km between the Corvoderry site and Lough Dahybaun but there are no direct linkages via watercourses. A mitigation package for the Corvoderry project has been recommended in the NIS to minimise or eliminate the risk.

As Phase 1 and Phase 2 of the Oweninny wind farm is entirely outside of the hydrological catchment of Lough Dahybaun, there is no potential for the Oweninny project to impact upon the SAC and hence the Phase 1 and Phase 2 of the Owenniny project will not contribute to impacts which may arise during the construction phase of the Corvoderry project.

The Corvoderry NIS (Jennings O'Donovan & Partners, 2011) did not identify risks, such as from forest clearing, to any other Natura site in the vicinity.

It is understood that there is a right of way along the existing Bellacorick wind farm road to the Corvoderry site. This is not expected to increase the risk to any Natura site relevant to Phase 1 and Phase 2 of the Oweninny development.

Dooleeg, Bellacorick Wind Farm

This wind farm has permission to construct a single one 2 MW turbine at Dooleeg, Bellacorick (it appears same site had previous permission for two turbines). The location is a few hundred metres south of the Oweninny site. The site had formerly

been within the Bellacorick Bog Complex SAC but was excluded by NPWS on appeal by the landowner.

The planning application concluded that the project would have no adverse impacts on any designated site.

Tawnanasool Wind Farm

The Screening for AA assessment (dated December 2014) identified six Natura 2000 sites where there was potential for adverse impacts in absence of mitigation as a result of the wind farm project. These sites, which were brought forward for Stage 2 AA Assessment, were: Owenduff/Nephin Complex SAC, Owenduff/Nephin Complex SPA, Owenduff Catchment Ramsar Site, Blacksod Bay/Broad Haven Bay SPA, Blacksod Bay/Broad Haven Bay Ramsar Site & Carrowmore Lake SPA.

The main potential negative impacts identified relate to the pollution of waterways downstream of the drains/streams within the proposed wind farm site. The NIS concluded as follows: "*No adverse impact is expected to arise to Natura 2000 sites as a result of the proposed development provided the mitigation outlined is implemented in a full and proper manner*."

A request for further information had been issued by Mayo County Council to the developer (dated 1 July 2015) which includes the following in respect of the NIS:

> "A particular concern is that the European sites, and their special conservation interests (SPAs) or qualifying interests (SACs), that are considered to be at risk from the proposed development are not identified clearly in the NIS. The assessments and analyses are not then carried out with specific reference to the implications for the conservation objectives, and the conclusions of the NIS lack clarity and precision regarding whether or not there will be adverse effects on the integrity of a European site."

Further information was provided on the 21st July 2015 by the developer, however, a notification of refusal was issued by the Planning Authority on the 14th August on the grounds of impact on visual amenity and natural character of the landscape and also due to the creation of a traffic hazard at the access point to the windfarm on the N59. In respect of Appropriate Assessment, the Planning Report and Recommendations (dated 12/08/15) noted the following:

> "Mayo County Council carried out an Appropriate Assessment of the proposed development and having regard to the nature and scale of the proposed works, the nature of the receiving environment and the mitigation measures set out in the course of the planning application, Mayo County Council is satisfied that the proposed development, on its own or in-combination with other plans and projects, would not adversely affect the integrity of an European site."

Cumulative effect of wind farms on birds

The present assessment has shown the proposed Oweninny Phase 1 & 2 Wind Farm Project would not have any adverse impacts on the bird species associated with the various SPAs and SACs in the vicinity of the site.

The conclusion from the screening assessment for the Corvoderry wind farm is that there are no likely potential impacts resulting from the proposal on the Owenduff/Nephin Complex SPA or on bird species associated with any SAC.

The assessment carried out for the Dooleeg wind farm concludes that their project would not have any adverse impacts on any bird species within or around the site.

While the Tawnanasool Wind Farm project was refused permission by Mayo County Council on 14th August 2015, as already noted Mayo County Council was satisfied that the proposed development, on its own or in-combination with other plans and projects, would not adversely affect the integrity of an European site.

From the above (but pending a final planning decision from ABP in respect of Tawnanasool Wind Farm), it can be concluded that the three other wind farm projects will not have any adverse impact on bird species associated with any Natura site in the wider area (c.10 km radius of each development site). Hence, it can be concluded that the Oweninny wind farm project would not add to any cumulative impact by wind farm projects on birds.

From the above (but pending a planning decision from ABP in respect of Tawnanasool Wind Farm), it can be concluded that the three other wind farm projects will not have any adverse impact on bird species associated with any Natura site in the wider area (c.10 km radius of each development site). Hence, it can be concluded that the Oweninny Phase 1 & 2 Wind Farm Project would not add to any cumulative impact by wind farm projects on birds.

Conclusion on in-combination effects with wind farm projects

In addition to the proposed Phase 1 and Phase 2 of the Oweninny development of 61 turbines, there are 19 further turbines associated with three sites (consented or in planning) within a 20 km radius of Oweninny. There is no evidence to show that any of these developments (pending a final planning decision on the Tawnanasool Wind Farm) would have adverse impacts on Natura 2000 sites or Annex I bird species. Hence, it can be concluded that the proposed Oweninny development would not contribute to a in-combination effect.

3.5.3 Meteorological Mast

ABO Wind Ireland Limited have applied (22nd July 2015) for permission to install a temporary (3 yrs) meteorological mast at Sheskin Townland, Bellacorick, Co Mayo. The mast comprises a 100 m high steel lattice tower, supported by cable stays. The site for the proposed mast is within conifer forest plantation.

A Statement for Screening for Appropriate Assessment was carried out. This concluded there will be no adverse effects on any Natura 2000 site as a result of the

installation and operation of the meteorological mast. The site is not ecologically or hydrologically connected to any Natura 2000 sites and the proposed project is compatible with the Conservation Objectives for all the qualifying criteria of those designated sites.

As the Screening for Appropriate Assessment report for the mast project did not identify potential for adverse impacts on any site designated for nature conservation, it can be assumed that there would be no in-combination effect when Phase 1 and Phase 2 of the Oweninny Wind Farm development is considered with the proposed meteorological mast project.

3.5.4 Power Lines

Planning permission has been granted for the following overhead power line projects in the Bellacorick area:

Uprate of the Existing Bellacorick to Castlebar 110 kV Overhead Line (planning reference P14/410) – granted to Eirgrid plc by An Bord Pleanála on 11th August 2015.

This project comprises the uprating of approximately 37 km of power line between Bellacorick and Castlebar. Substantial reinforcements are required to the existing transmission network in order to accommodate increasing levels of renewable generation (primarily wind generation) in the region. In 2013, Part 1 of the uprate was undertaken, comprising approximately 17km extending out of Castlebar substation. The project which is the subject of planning reference no. P14/410 refers to the remaining uprate works on the existing line between Bellacorick and Castlebar, approximately 19.5km extending from Bellacorick substation. As a significant portion of the circuit is situated within the Bellacorick Bog Complex SAC Screening for Appropriate Assessment (Stage 1 AA) was carried out by EirGrid. The Screening concluded that the potential for significant impacts could not be ruled out and hence a Natura Impact Statement and a planning application was required for Part 2 of the line uprate project.

A detailed ecological evaluation of the project corridor was carried out and this formed the basis for the NIS. The NIS concluded that the proposed project would not have any significant impacts on the integrity of the Natura 2000 sites in the area, namely the Bellacorick Bog Complex SAC, River Moy SAC and Newport Rover SAC. Further information on a variety of environmental matters was submitted by the developer to Mayo County Council in December 2014 following a Request for Further Information (dated 1st October 2014). Permission was granted by Mayo County Council on 25th February 2015 subject to 16 conditions. A planning appeal against the decision was lodged and the matter was considered by An Bord Pleanála. In the Inspector's report, the conclusion in reference to the Appropriate Assessment (section 11.88) is as follows:

> "I consider it reasonable to conclude on the basis of the information on the file, which I consider adequate in order to carry out a Stage 2 Appropriate Assessment, that the proposed development, individually or in combination with

other plans or projects would not adversely affect the integrity of the European site No 001922, Bellacorick Bog Complex, the European site No 002298, River Moy, and the European site No 002144, Newport River; or any other European site, in view of the site's Conservation Objectives."

The Board granted permission for the project on 11th August 2015 subject to 11 conditions.

Uprate of the Existing Bellacorick to Moy 110 kV Overhead Line (planning reference P15/45) – granted to Eirgrid plc by Mayo County Council on 4th August 2015.

This project comprises the uprating of approximately 27 km of power line between Bellacorick and Gorteen.

The NIS submitted with the application identified potential impacts, without mitigation, on two Natura sites, namely Bellacorick Bog Complex SAC and the River Moy SAC. However, with mitigation in place the conclusion of the NIS was that the impacts were not considered to be likely to have a significant effect on the structure and function or overall integrity of the Bellacorick Bog Complex SAC.

Following receipt of further information on various issues within the NIS (following a request from Mayo County Council, dated 24/03/2015), the Council was satisfied that the proposed project would not adversely affect the natural heritage of the area.

Uprate Refurbishment of the Bellacorick to Bangor Erris 38 kV Overhead Line (planning reference P15/611) – application by ESB Networks to Mayo County Council, 23rd September 2015.

This project comprises the refurbishment/uprate of the existing Bellacorick to Bangor Erris 38kv overhead line.

The length of line is 12.3 km and works will involve the replacing of the majority of the existing 79 wood pole structures and fittings with similar structures, inserting a number of extra wood pole sets where spans are too long or route is slightly altered, replacing the only steel mast out on the line with a wood pole structure, reinforcing if necessary foundations on existing end masts in Bellacorick and Bangor Erris stations and replacing the existing overhead conductor. Height of pole sets will range from 9.7 m to 15.7 m aboveground. The majority of new pole sets will be erected at existing pole locations while others will be moved backwards or forward along the line route. The route of the line will be slightly altered at two locations, one of which is for environmental considerations.

The NIS submitted with the application identified that temporary significant impacts without mitigation could occur on Active Blanket Bog [7130], which is a qualifying interest of Carrowmore Lake Complex SAC.

However, with mitigation in place the conclusion of the NIS was that, provided the mitigation measures described in the NIS document were fully implemented, no significant adverse impacts are expected on the qualifying interests and hence the conservation objectives of the Carrowmore Lake Complex SAC through which the

line passes, or on the conservation objectives of the Owenduff/Nephin Complex SPA or Bellacorick Bog Complex SAC which are in close proximity to the proposed project, or on the interests of any other European site. .

Conclusion on in-combination effects with power line projects

While both of the approved power line projects commence at Bellacorick and traverse the Bellacorick Bog Complex SAC and have potential to impact upon the River Moy SAC, it has been shown that the projects with appropriate mitigation would not adversely affect the integrity of these SAC sites or any other European site.

While the Bellacorick to Bangor Erris overhead line project is still in planning, the NIS concluded that with appropriate mitigation there would be no significant adverse impacts on the interests of the Carrowmore Bog Complex SAC or on any other Natura 2000 site in the area.

As it has been shown that Phase 1 and Phase 2 of the Oweninny Wind Farm Project will not have significant adverse impacts (with mitigation implemented) on the interests of the Bellacorick Bog Complex SAC or the Carrowmore Bog Complex SAC, and that there is no potential for the project to have impacts on the River Moy SAC, it follows therefore the there is no potential for in-combination effects on any Natura 2000 site when Phase 1 and Phase 2 of the Oweninny Wind Farm project is considered with the three power line projects in the wider area.

3.5.5 Substation Project

Eirgrid have made a planning application to Mayo County Council (22/07/2015, Planning Reference 15/456) for a minor modification of the existing Bellacorick 110kV Substation. The works, all within the existing substation, comprise construction of an extension (approx 60sqm and 3.2m high) to the south western elevation of the existing 110kv control room, installation of 1 no. new 110kv cable bay with equipment and apparatus comprising busbar disconnect, circuit breaker, combined current/voltage transformer, line/earth disconnect, surge arrestor and cable sealing end and all associated site development works.

A Stage 1 Screening Report for Appropriate Assessment was prepared by EirGrid. The report noted that given the location of the proposed works (within the confines of Bellacorick Substation) and the limited nature of the works, the only European site where a possible connection exists is Bellacorick Bog Complex SAC. However, following an objective evaluation, the AA Screening Report concludes that the proposed works pose no potential for significant effects on the conservation objectives of Bellacorick Bog Complex SAC, alone or in combination, with other projects or plans.

As the planning documentation for the above substation project did not identify potential for adverse impacts on any site designated for nature conservation, it can

be assumed that there would be no in-combination effect when the Oweninny Wind Farm development is considered with this substation project.

3.5.6 Power Plants

Planning permission has been granted for the following power plants:

- 68 MW gas turbine peaking plant at Bellacorick – Bellacorick Power Plant (Planning reference 01/1250).
- Conventional 200 MW natural gas fired peaking plant along the Srahnakilla road (Planning permission 09/286 granted to Constant Energy on 16/11/2001). Site located between the eastern and western parts of the Oweninny site.

As the planning documentation for the above projects did not identify significant adverse impacts on any site designated for nature conservation, it can be assumed that there would be no in-combination effect when Phase 1 and Phase 2 of the Oweninny Wind Farm project is considered with these power plant projects.

3.5.7 Renewable Energy Strategy (RES) for County Mayo, 2011-2020

The Renewable Energy Strategy (RES) for County Mayo, 2011-2020 was adopted by Mayo County Council (MCC) on 9th May 2011. This Strategy was prepared by MCC in the context of EU and national renewable energy targets, and is underpinned by Strategic Environmental Assessment (SEA) and Habitats Directive Assessment (HDA) of that plan. The primary purpose of the RES is the identification of suitable locations for renewable developments.

The SEA has evaluated five potential strategy options and their effects on the environment and designated sites, including Natura 2000 sites, and provides the justification for this Strategy.

The HDA assessed the effect the Strategy would have on the conservation objectives of any Natura sites in the County and within 15 km of the County boundary.

In the RES, Map 1 Wind Energy classifies potential areas for on-shore wind energy development. There are 4 classifications identified:

- Priority Areas
- Tier 1 – Preferred (Large Wind Farms)
- Tier 1 – Preferred (Cluster of Turbines)
- Tier 2 – Open for consideration

The proposed Phase 1 and Phase 2 of the Oweninny Wind Farm project is within a Priority Area for wind energy developments (i.e. areas which have secured planning permission and where on shore wind farms can be developed immediately). A large area to the north-northeast is classified as 'Tier 1 – Preferred (Large Wind Farms)',

while much of the remainder of the lands around the Oweninny site (apart from Natura 2000 sites) are classified as 'Tier 2 – Open for consideration'

In conclusion, the proposed Oweninny wind farm is within an area that is classified as a Priority Area for wind farm development according to the Renewable Energy Strategy for County Mayo, and the project has been subject to the requirements set out in the RES (including EIS and Habitats Directive Assessment).

3.5.8 Grid 25/Grid West

Background

The strategy for the development of Ireland's Electricity Grid for a Sustainable and Competitive future is set out in Eirgrid's Grid 25 Programme. Mayo forms part of the North West Region in Grid 25. The Renewable Energy Strategy (RES) for Co. Mayo noted the following:

> '*it is reasonable to state that a 400 kV line will be required to harness the County's natural resources and to achieve the policies and objectives of this Strategy. The corridor for a 400 kV transmission line is to be assessed in accordance with best international practice following a detailed analysis of routing options incorporating technical and environmental considerations. Building one 400 kV circuit avoids the need for building a multiplicity of 220 kV lines and so has less long-term impact on the environment and local communities'*.

As part of the route selection programme, EirGrid published details of underground and overhead options for the Grid West project in July 2015 (http://www.eirgridprojects.com/projects/gridwest/iep/). This report, which was prepared by the Government-appointed Independent Expert Panel (IEP), sets out, in detail, the technical, environmental and cost aspects of three technology options:

- a fully underground direct current cable;
- a 400kV overhead line and;
- a 220kV overhead line with partial use of underground cable

The project will include a substation/converter station in north Mayo and a substation/converter station near Flagford, Co. Roscommon. Converter stations, to convert the direct current to alternating current would be required if a direct current underground cable is provided

Earlier in the selection programme a detailed Constraints Report, informed by a desktop assessment, consultations and selected field studies, had been prepared (Tobin, August 2012). In the ecology chapter, under section 7.4 'Conclusions', the following was noted:

'*At this stage avoidance should be prioritised, where possible, of all designated sites in particular Natura 2000 sites (SAC/SPA) Ballycroy National Park,*

NHA sites, designated freshwater pearl mussel catchments (in rivers protected as SACs) and lakes. It is also recommended that other features of ecological significance detailed in this report be avoided as much as possible at the corridor selection stage or, if this is not possible, be fully considered at a more localised scale at later stages in the project, i.e. Stage 2 Corridor Evaluation, based on more detailed studies.'

As part of the Stage 2 Corridor Evaluation for the report prepared for the IEP, further ecological assessments were carried out in 2013 and 2014.

The environmental assessment of the UGC and OHL routes and the converter station sites/zones was completed as part of the UGC and OHL reports and a further appraisal based on public feedback and consultation as well as specialist studies.

The following extracts are from section 5.6 'Environmental Analysis' of the main report for the IEP, where it is noted that the route selection is based on minimising the overall impact, taking a balanced view of all constraints.

> The impact and effect of each parameter is classified in terms of significance and ranges from "more significant" to "less significant" depending on the level of significance of each parameter along the route of the UGC (or OHL). Ease of mitigation of the identified impacts and effects for each parameter is classified as a range from "difficult to mitigate" to "possible to mitigate". The possibility for residual effect, following implementation of the mitigation measures, is presented as a range from "more likely" to "less likely".
>
> As the project progresses and a preferred option is selected, the specific design and routing/location of this option will form the basis for preparation of an Environmental Impact Statement (EIS) for submission to An Bord Pleanála as part of an overall planning application. As part of this process, additional detailed studies will be undertaken, including those needed to inform an Environmental Impact Assessment (EIA) and an Appropriate Assessment (AA) as required under the Habitats Directive.
>
> In this context, it is reiterated that the environmental appraisal undertaken for the purpose of this IEP report should not be considered as equivalent to the significantly more detailed environmental assessment that will be undertaken for the purposes of preparing a project-specific EIS.
>
> At this stage it is only possible to provide a high level assessment of possible mitigation measures for the UGC, based on desktop studies and fieldwork completed to date. Potential mitigation measures are set out below for each of the impacts considered.
>
> The mitigation measures that can be identified at this stage of the project are generally related to standard best practice for infrastructure projects and are not unusual. As such, the costs associated with the mitigation measures described are included in the construction costs estimates for the UGC option. Once a circuit is in operation, fault repair activities may be required, which will necessitate access to the circuits. For underground cable options, in the event of

a fault, sections of cable may need to be repaired, which may require isolated road closures or traffic management schemes for a period of weeks. It is not expected that the costs of mitigating the environmental impacts of such repairs will have a significant bearing on the overall cost of this option.

Regardless of which option emerges as the preferred solution for Grid West, a Construction Management Plan (CMP) will be prepared. The CMP will be a live document that will be continuously reviewed, improved and updated throughout construction as a result of project monitoring. Revisions will also include any changes and improvements made during the works from an environmental perspective.

The principal controls for environmental management will be identified and controlled primarily through the CMP and method statements for the construction phase of the project.

HVDC Underground Cable Option (Chapter 5 of IEP report)

The HVDC UGC option runs from north Mayo to Flagmount over a distance of approximately 113 km.

The route commences at a location for a Converter Station to the northwest of Moygownagh. It runs in a southeast direction east of Crossmolina and east of Foxford (and the Lough Conn system). It then turns in an easterly direction running to the north of Swinford and Charlestown. The route again turns to a southeast direction keeping just north of Ballaghaderreen. The final stretch is eastwards towards the Flagford substation, passing north of Frenchpark and south of Boyle.

The route corridor is located primarily in the catchment of the **River Moy SAC** and the UGC crosses 4 river channels within the SAC designation. The 4 channels are as follows:

- The River Moy main channel north of Foxford (Tonybaun/Carrowkeribly);
- The Yellow River (main tributary of the River Moy);
- River Moy main channel at Ballanacurra; and
- Mullaghanoe River and tributaries.

For the crossing associated with the River Lung Valley (Ballaghaderreen area), the route runs along the edge of **Tullaghanrock Bog SAC** (Site Code 002354) for 260m.

The potential impacts and effects of the final design on European designated sites will be considered in the Appropriate Assessment process as required under Article 6(3) of the EU Habitats Directive.

The UGC route also crosses through the Moy-Deel *Margaritifera* Sensitive Area between Moygownagh and Ballina. While not a qualifying interest of the River Moy SAC, freshwater pearl mussel are an Annex II species protected under the Habitats Directive and the population in the River Deel is of international importance.

The UGC route generally avoids areas identified as locally important for breeding birds. The route passes through one regular wintering Whooper Swan site.

Sensitive sites for wintering birds requiring consideration include the River Moy valley, River Lung south of Ballaghadereen and the boglands around Frenchpark.

Protected fauna species requiring particular consideration in relation to the UGC include otter and bat species.

In section 5.6.15 'Summary of the Environmental Analysis of the HVDC UGC Route' of the IEP report, the summary of the environmental analysis of the UGC option highlights the fact that the assessment of this option is influenced by the intention for the cable route to be primarily located along existing public roads but that significant construction works will be required along the route. Permanent surface structures will include converter stations at each end of the route.

Overall, the anticipated environmental impacts and effects of the UGC option are considered at this stage to be most significant for Biodiversity, Flora and Fauna, Water and Traffic and Noise (during the construction phase). However, the residual effect on the environment following implementation of mitigation measures is anticipated to be low.

400kV HVAC Overhead Line Option (Chapter 6 of IEP report)

The HVAC OHL option runs from north Mayo to Flagmount over a distance of approximately 103 km.

The route commences at a location for a Converter Station to the northwest of Moygownagh. It runs in a south-southeast direction east of Crossmolina and east of Foxford (and the Lough Conn system). It then turns in a south-easterly direction running to the north of Swinford and to the south of Charlestown and then Ballaghaderreen. The final stretch is eastwards towards the Flagford substation, passing just south of Frenchpark.

The report notes that 8km to 10km of 400kV HVAC UGC in the Flagford region is not feasible. Hence, on the outskirts of Flagford, an existing 220kV line will be undergrounded for a distance of approximately 8km, largely along local roads, from its intersection with the Grid West line to the Flagford substation.

The route of the OHL is located predominantly within the catchment of the **River Moy SAC**. The OHL route passes through the River Moy SAC at locations where direct impacts and effects on qualifying interests will be avoided. Indirect impacts and effects such as disturbance of sensitive species and construction-related sediment or pollutant run-off to watercourses, which may have a negative effect on the population of sensitive species, will be a key consideration.

Four specific locations within the SAC are detailed in the report where direct and indirect impacts and effects to qualifying habitats and species may arise. These are: (i) River Moy c.5 km north of Foxford in the Curragh Bog area, (ii) Yellow River (between Ballina and Swinford), (iiii) River Moy at Loobnamuck, (iv) Sonnagh River.

The OHL route passes close to **Cloonshanville Bog SAC** (site code 614) approximately 0.5 km to the east of Frenchpark.

The OHL route also crosses through the Moy-Deel Margaritifera Sensitive Area between Moygownagh and Ballina.

Potential impacts to bird species are a key consideration in the development of any overhead transmission line. The OHL route passes through several areas with populations of wintering bird species known to be sensitive to OHL developments. It also passes close to or through areas with breeding bird species of high conservation concern potentially sensitive to the development. Species identified during surveys (2012 – 2014 inclusive) as potentially sensitive to the effects of the development in the area include; Hen Harrier (wintering), Whooper Swan (wintering), Greenland White Fronted Geese (wintering), Curlew (breeding), Lapwing (breeding), Woodcock (wintering and possibly breeding) and wintering duck species (Wigeon, Tufted Duck and Teal).

The key observations from the Winter Bird Surveys to date, as relevant to a OHL option, are as follows (see Table 6-3 in IEP Main Report):

- River Moy crossing (north of Foxford): The OHL route crosses the Moy valley at a location with relatively low winter bird activity. Whooper Swans use areas north and south of here. It is likely that flightlines cross the corridor at least occasionally. Whooper Swan, Mute Swan and Cormorant are at risk.
- Cuilmore Lough (area): A flock of Whooper Swans were observed using this area within 1 km west of the OHL route. No flights were observed or are likely across the corridor though further survey is advised. Whooper Swan is at risk.
- The Lung River (south of Ballaghadeereen): A small flock of Whooper Swans (max. 15) regularly use fields beside the Lung River. A flightline was confirmed across the corridor in 2013/2014. Whooper Swan is at risk.
- Frenchpark Bogs (located to east of the bogs): These extensive bogs are former roost and foraging areas for Greenland White-fronted Geese. It is evident from surveys that small flocks still occasionally use at least one of these bogs. It is recommended that focused surveys be conducted in 2014/2015 winter for this species of high conservation concern. The geese may be linked to the population at Lough Gara SPA. Potential disturbance during construction to winter roost sites for Hen Harriers. Whooper Swan and Hen Harrier are at risk.

In section 6.4.2.4 of the report, it is noted that markers/bird flight diverters will be placed on overhead lines located at observed sensitive bird flight lines.

In section 6.4.15 'Summary of the Environmental Analysis of the HVAC OHL Route' of the IEP report, it is shown that the summary of the environmental analysis of the UGC option highlights the fact that the assessment of this option is primarily influenced by the need for multiple permanent above-ground structures along the route, including overhead lines, towers, sealing-end compounds and substations.

Overall, the impacts and effects of the OHL option on biodiversity, flora and fauna will be moderate/low as the potential impacts/effects on these parameters will be primarily temporary in nature during the construction phase of the development, with localised permanent impacts and effects. The residual effect on biodiversity, flora and fauna following implementation of mitigation measures will be moderate to low.

220KV HVAC Overhead Line and Partial Underground Cable Option (Chapter 7 of IEP report)

EirGrid considered a 220kV HVAC OHL option and a 220kV HVAC PUG option that uses the maximum amount of HVAC UGC possible.

The indicative 220kV HVAC OHL follows the same routing principles as the 400kV HVAC OHL option and consequently the environmental analysis, as outlined in Chapter 6 of the IEP report, equally applies.

The 220kV HVAC PUG option incorporates an additional 2km section of UGC at north Mayo and up to an additional 20km UGC mid-section.

The impact and effect on fauna, particularly birds, from the overhead section of the 220kV option is identified, as well as the impact and effect on receiving waters and downstream habitats from an underground section(s) of the 220kV option. This is particularly relevant where works are required in the vicinity of surface waters and where horizontal directional drilling occurs under water features, such as the River Moy or River Lung.

The indicative 220kV HVAC OHL follows the same routing principles as the 400kV HVAC OHL option and consequently the same environmental analysis and the mitigation measures apply.

With regard to the 220kV HVAC PUG option, it can be taken that the mitigation measures outlined in the IEP report for the UGC (Section 5.6) equally apply.

Grid West: The Next Steps

On receipt of the Grid West Report, the IEP responded to the Minister for Communications, Energy and Natural Resources with a positive opinion and assessed that the report was complete and fair. EirGrid will be consulting with the public later in 2015 on all options for the Grid West Project. A decision on the preferred option and public consultation on a specific route will follow.

Review of in-combination effects of Oweninny Wind Farm and Grid West project

While a preferred route has not yet been selected by EirGrid for Grid West, the specific corridors for the underground cable and the overhead line options are identified in the report prepared for the Independent Expert Panel. A preliminary assessment can therefore be made of possible in-combination effects on Natura 2000 sites and Annex I bird species between the proposed Phase 1 and Phase 2 of the Oweninny Wind Farm Project and the Grid West Project.

It is noted that the location for the new 110 kV GIS substation in the Moygownagh area (i.e. western limit of Grid West project) is approximately 6 km distance from the northeast boundary of the Oweninny wind farm property.

The proposed options for Grid West extend from Moygownagh to the 220 kV Flagford substation, near Carrick-on-Shannon in County Roscommon. The approximate distances for the underground cable option and the overhead line option are 113 km and 103 km respectively. The possibility for impacts by a project (alone or in-combination) on Natura 2000 sites that are more than 15 km is low though sites at further distances may need to be considered in some cases. In the AA Guidance for Planning Authorities prepared by the Department of Environment, Heritage and Local Government (December 2009), the following is written under points 2 and 3 of section 3.2.3 'Natura 2000 Sites' in reference to the inclusion of sites in an assessment:

> 2. Any Natura 2000 sites within the likely zone of impact of the plan or project. A distance of 15 km is currently recommended in the case of plans, and derives from UK guidance (Scott Wilson et al. 2006). For projects, the distance could be much less than 15 km, and some cases less than 100 m, but this must be evaluated on a case-by-case basis with reference to the nature, size and location of the project, and the sensitivities of the ecological receptors, and the potential for in-combination effects.
>
> 3. Natura 2000 sites that are more than 15 km from the plan or project area depending on the likely impacts of the plan or project, and the sensitivities of the ecological receptors, bearing in mind the precautionary principle. In the case of sites with water dependent habitats or species, and a plan or project that could affect water quality or quantity, for example, it may be necessary to consider the full extent of the upstream and/or downstream catchment.

In-combination effects of proposed Oweninny Wind Farm with Grid West UGC option

The Grid West UGC option has potential to impact on two Natura 2000 sites – the River Moy SAC and the Tullaghanrock Bog SAC. The report for the IEP noted specifically that the project would not have any effects on the Lough Conn and Lough Cullin SPA. The potential impacts and effects of the final design on European designated sites will be considered in detail in the Appropriate Assessment process as required under Article 6(3) of the E.U. Habitats Directive.

River Moy SAC

The report for the IEP notes there are 4 river crossings within the River Moy SAC, as well as a further 44 identifiable surface water features (rivers and streams) which are crossed by the UGC, the majority of which are in the catchment of the River Moy SAC. In Table 5-3 of the report it is noted that the entire UGC route requires detailed consideration of route design, works areas, construction methods and pollution controls, in particular throughout the River Moy catchment. However,

following implementation of mitigation measures it is expected that the residual effect on the River Moy SAC will be low.

The EIS and NIS for Phase 1 and Phase 2 of the Oweninny Wind Farm Project noted that the south-eastern part of the development site is upstream of the Deel River, which is within the River Moy SAC. However, no part of the construction works for the proposed Phase 1 and Phase 2 of the wind farm project is within the Deel catchment. As Phase 1 and Phase 2 of the wind farm project could not have any impacts on the River Moy SAC, it follows the Phase 1 and Phase 2 of the Oweninny project would not contribute to an in-combination effect with the Grid West project on the River Moy SAC.

Tullaghanrock Bog SAC

As the Tullaghanrock Bog SAC is located near Ballaghaderreen in County Roscommon, a distance of approximately 60 km from the Oweninny site, and with no hydraulic connectivity between the two locations, it can be stated with full certainty that the Oweninny Wind Farm project has no potential to contribute to an in-combination effect with the Grid West project on this SAC.

Bird species

The Grid West UGC route does not impact on any SPA site. The report for the IEP notes also that the route generally avoids areas identified as locally important for breeding birds.

The UCG route passes through one regular wintering Whooper Swan site. Sensitive sites for wintering birds requiring consideration include the River Moy valley (Whooper Swan), River Lung south of Ballaghaderreen (Whooper Swan) and the boglands around Frenchpark (Greenland White-fronted Geese, Hen Harrier).

These three sites are at considerable distances from the Oweninny site and there is no evidence to indicate that the birds associated with these sites commute north-westwards towards Bellacorick. The following details are noted:

The Whooper Swan flock within the River Moy valley frequents the grassland areas along the river between Foxford and Ballina. This location is at a minimum straight-line distance of 20 km from the Oweninny site. The Moy valley provides excellent feeding and roosting habitat for this flock and there are various local lakes, including the Lough Conn/Cullin system, where the birds could take refuge at if necessary.

The Whooper Swan flock at the River Lung is a relatively small flock (maximum = 15) which feeds regularly on grassland along the river. As this location is at an approximate distance of 60 km from the Oweninny site, it is inconceivable that the Oweninny wind farm development could contribute to a cumulative impact on this population.

The bogs near Frenchpark are used by small numbers of Greenland White-fronted Geese and wintering Hen Harriers. The geese are probably part of the Lough Gara SAP population and would not be associated with the northwest Mayo Greenland White-fronted Goose population. It is noted that these bogs are at a distance of over

80 km from the Oweninny site. On sheer distance alone, it considered inconceivable that the Oweninny wind farm development could contribute to a cumulative impact on this goose population and similarly the wintering Hen Harrier population.

Overview of in-combination effects between proposed Oweninny Wind Farm and Grid West UGC option

The present evaluation has shown that there is no potential for in-combination effects on Natura 2000 sites between Phase 1 and Phase 2 of the Oweninny Wind Farm and the Grid West Project.

It has also been shown that while there are three identified sensitive sites for wintering birds along the Grid West UGC route, there are no known regular movements or flightlines between these site locations and the Oweninny project area nor would such be expected due to the substantial distances between the areas.

From the evaluation carried out, it can be concluded that there is no potential for the Oweninny wind farm project to contribute to an in-combination effect with the Grid West UGC option project on Natura 2000 sites or populations of Annex I listed bird species.

In-combination effects of proposed Oweninny Wind Farm with Grid West OHL option

The Grid West OHL option has potential to impact on two Natura 2000 sites – the River Moy SAC and the Cloonshanville Bog Bog SAC. The report for the IEP noted specifically that the project would not have any effects on the Lough Conn and Lough Cullin SPA. The potential impacts and effects of the final design on European designated sites will be considered in detail in the Appropriate Assessment process as required under Article 6(3) of the E.U. Habitats Directive.

River Moy SAC

The report for the IEP notes there are 4 river crossings within the River Moy SAC, as well as a further 31 identifiable surface water features (rivers and streams) which are crossed by the OHL, which are in the catchment of the River Moy SAC.

While direct impacts to qualifying Annex I habitats and Annex II species are not anticipated, the report for the IEP notes that the indirect impacts of potential water pollution and associated potential adverse effects may have implications for the conservation status of qualifying habitats/species and the overall integrity of the River Moy SAC.

In Table 5-3 of the report, it is noted that the entire OHL route requires detailed consideration of route design, works areas, construction methods and pollution controls, in particular throughout the River Moy catchment. However, following implementation of mitigation measures it is expected that the residual effect on the River Moy SAC will be moderate/low as the potential impacts will be primarily temporary in nature during the construction phase.

The EIS and NIS for Phase 1 and Phase 2 of the Oweninny Wind Farm Project noted that the south-eastern part of the development site is upstream of the Deel River, which is within the River Moy SAC. However, no part of the construction works for the proposed Phase 1 and Phase 2 of the wind farm project is within the Deel catchment. As Phase 1 and Phase 2 of the wind farm project could not have any impacts on the River Moy SAC, it follows the Phase 1 and Phase 2 of the Oweninny project would not contribute to an in-combination effect with the Grid West project on the River Moy SAC.

Cloonshanville Bog SAC

As the Cloonshanville Bog SAC is located near Frenchpark in County Roscommon, a distance of over 80 km from the Oweninny site, and with no hydraulic connectivity between the two locations, it can be stated with full certainty that the Oweninny Wind Farm project has no potential to contribute to an in-combination effect with the Grid West project on this SAC.

Bird species

The Grid West OHL route option does not impact on any SPA site.

The report for the IEP notes that the OHL route passes close to or through areas with breeding bird species of high conservation concern potentially sensitive to the development. These include one site for breeding Curlew (northeast of Swinford) and several for Lapwing. As all of the breeding sites are substantial distances from the Oweninny development area, and as breeding birds remain close to the nesting location through the nesting season, there is no potential that the Owenniny wind farm development could contribute to an in-combination effect on breeding birds when considered with the Grid West project.

Key locations identified from the winter bird surveys, as relevant to a OHL route option, are as follows: River Moy crossing north of Foxford (Whooper Swan), Cuilmore Lough (Whooper Swan), River Lung south of Ballaghaderreen (Whooper Swan), and the boglands around Frenchpark (Greenland White-fronted Geese, Hen Harrier).

These locations are at considerable distances from the Oweninny site and there is no evidence to indicate that the birds associated with these sites commute north-westwards towards Bellacorick (i.e. these populations are separate from the populations which occur in the wider Bellacorick/northwest Mayo area). The following details are noted:

The Whooper Swan flock within the River Moy valley frequents the grassland areas along the river between Foxford and Ballina. This location is at a minimum straight-line distance of 20 km from the Oweninny site. The Moy valley provides excellent feeding and roosting habitat for this flock and there are various local lakes, including the Lough Conn/Cullin system, where the birds could take refuge at if necessary.

The Whooper Swan flock at the River Lung is a relatively small flock (maximum = 15) which feeds regularly on grassland along the river. As this location is at an

approximate distance of 60 km from the Oweninny site, it is inconceivable that the Oweninny wind farm development could contribute to a cumulative impact on this population.

The bogs near Frenchpark are used by small numbers of Greenland White-fronted Geese and wintering Hen Harriers. The geese are probably part of the Lough Gara population and would not be associated with the northwest Mayo goose population. It is noted that these bogs are at a distance of over 80 km from the Oweninny site. On sheer distance alone, it considered inconceivable that the Oweninny wind farm development could contribute to a cumulative impact on this goose population and similarly the Hen Harrier population.

Overview of in-combination effects between proposed Oweninny Wind Farm and Grid West OHL option

The present evaluation has shown that there is no potential for in-combination effects on Natura 2000 sites between Phase 1 and Phase 2 of the Oweninny Wind Farm and the Grid West Project.

It has also been shown that while there are three identified sensitive sites for wintering birds along the Grid West OHL route, these are at such distances from Bellacorick that the Oweninny project could not contribute to a possible adverse in-combination effect on these bird populations. Further, the Grid West report for the IEP notes that markers/bird flight diverters will be placed on overhead lines located at observed sensitive bird flight lines so as to minimise risk of collision.

From the evaluation carried out, it can be concluded that there is no potential for the Oweninny wind farm project to contribute to an in-combination effect with the Grid West OHL option project on Natura 2000 sites or populations of Annex I listed bird species.

3.5.9 Oweninny Cutaway Bog Rehabilitation Programme

The work for the Bord na Móna Bog Rehabilitation Programme, which covers the entire Oweninny site, was completed in 2012. The objectives of the programme were:

- Stabilisation of the peat production areas (as required under Condition 10 of IPPC Licence Reg No. P0505-01)
- Mitigation of silt run-off into watercourses
- Re-establishment of peat-forming communities where possible (identified as occurring spontaneously on the cutaway where drains were blocked and former peat production fields were rewetted).

The success of the Programme can be seen by the decline in the area of bare peat between 2001 and 2011 – from 53% to 11% respectively.

The developer considered the work of the Rehabilitation Programme during the Phase 1 and Phase 2 wind farm design and avoided sensitive areas, including the bog remnants on site (other than slight impacts on remnant #9 – see section 9.4.2 of EIS) and developing wetlands.

Accordingly, the impact of the wind farm on the existing vegetation on site, which has developed partly as a result of the Rehabilitation Programme, has been considered in the EIS. Apart from the immediate area of the development, the remainder of the site will continue to develop in the context of the Rehabilitation Programme. Further, when the wind farm construction works are complete, as indicated in section 9.5.9.1 of the EIS, there will be potential to create further wet areas adjacent to the structures by using the same techniques as used during the Rehabilitation Programme.

As there are no adverse impacts associated with the Rehabilitation Programme, and as the present wind farm proposal has taken the objectives of the plan into account and will not have any significant adverse impacts on the objectives, it can be concluded that there will not be any in-combination effects as a result of the proposed wind farm development.

3.5.10 Forestry

Forestry operations are widespread in the vicinity of the Oweninny development site. Forestry is identified as an ongoing threat to the following designated sites: Lough Dahybaun SAC, Bellacorick Bog SAC and the River Moy SAC (source NPWS).

As well as direct loss of habitat within the designated areas, forestry activities can affect water quality and associated aquatic interests in a number of ways, as follows:

- Leaching of fertilisers, especially phosphorus, to local watercourses
- Disturbance of soils during clearfelling operations and subsequent runoff of nutrients and suspended solids to local watercourses
- Decomposition of brash after clearfelling and subsequent runoff of nutrients to local watercourses

Sedimentation and acidification of waters is a particular threat to the conservation objectives of the River Moy SAC. Sedimentation can cover the gravel beds resulting in a loss of suitable spawning grounds for important species such as Atlantic salmon.

While Phase 1 and Phase 2 of the Oweninny project will require the removal of 1.05 ha of commercial forest, this is not within the catchment of any Natura site and hence the project will not contribute to a cumulative effect that forestry has had, and potentially will have, on three identified SAC sites in the vicinity of Oweninny.

3.5.11 Peat Harvesting

Industrial peat operations ceased on the Oweninny site in 2005. Peat harvesting operated under an Integrated Pollution Prevention Control License (IPPC License Number 505) issued to Bord na Móna by the Environmental Protection Agency (EPA). In accordance with the licence conditions for the site a bog rehabilitation programme has been developed and implemented to enhance recovery of parts of the site and reduce run-off from bare surfaces. The proposed wind farm development will be integrated into the bog rehabilitation already completed and the project will continue with management to encourage surface re-vegetation.

There is currently private peat cutting (non-industrial) at a few locations on the Oweninny site. This is small scale and occurs through local arrangements. This level of cutting is expected to continue when the wind farm is in operation.

Peat cutting is widespread on bogs in the surrounding areas, including the Bellacorick Bog Complex SAC and Carrowmore Lake Complex SAC. Peat cutting has both direct impacts (by habitat loss) and potential indirect impacts (by changes to hydrology and water pollution) on the conservation objectives of these SAC sites.

While industrial scale peat extraction had formerly occurred on the Oweninny site, nowadays there is only very limited localised cutting on site. The proposed wind farm project will not result in an increase in peat cutting on site and hence will not contribute to a cumulative effect that peat cutting outside the site is having on several SAC sites in the vicinity of Oweninny.

3.5.12 Agriculture

Agriculture, mostly sheep and cattle grazing, is practised widely in the vicinity of the Oweninny site. Within the wind farm site, low level sheep grazing is allowed within the Coillte plantations and this is expected to continue when the wind farm is in operation.

The NPWS site synopsis notes that overgrazing is a problem within parts of the Bellacorick Bog Complex SAC, while the spreading of slurry and fertiliser poses a threat to the water quality of the rivers and lakes within the River Moy SAC. Within the Bellacorick Iron Flush SAC, undergrazing is considered a problem leading to loss of plant diversity.

It can be concluded that farming operations pose threats to the conservation objectives of the Bellacorick Bog Complex SAC and the River Moy SAC. As the level of farming within the Oweninny site is not significant and is not expected to change as a result of wind farm project, the farming operations within the site will not contribute to a cumulative effect.

3.5.13 Overview of In-combination Effects

This review has shown that in addition to wind farm projects, including the potential future development of Oweninny Phase 3, there is a range of projects and existing landuse activities within and around the Oweninny site that have affected, or have the potential to affect, the conservation objectives of several Natura 2000 sites.

Without appropriate mitigation, the consented Corvoderry wind farm project has potential to cause water pollution which could affect the Lough Dahybaun SAC. As Phase 1 and Phase 2 of the Oweninny wind farm is entirely outside of the hydrological catchment of Lough Dahybaun, there is no potential for the Oweninny project to impact upon the SAC and hence Phase 1 and Phase 2 of the Owenniny project will not contribute to impacts which may arise during the construction phase of the Corvoderry project. The main potential negative impacts identified for the Tawnanasool wind farm project (in planning) relate to the pollution of waterways downstream of the drains/streams within the proposed wind farm site. There is no potential for the Oweninny project to contribute to an in-combination effect on Natura 2000 sites in the vicinity of this wind farm site.

A proposal by ABO Wind Ireland to install a meteorological mast at Sheskin (Bellacorick) is currently in planning. As it has been shown that this project poses no potential for significant effects on any European site, there would be no in-combination effect between the Oweninny wind farm project and the meteorological mast project.

Consideration has been given to possible in-combination effects between Phase 1 and Phase 2 of the Oweninny Wind Farm project and two approved power line projects (Bellacorick-Castlebar 110kV Line Uprate and Bellacorick-Moy 110kV Line Uprate), which commence at Bellacorick and traverse the Bellacorick Bog Complex SAC and have potential to impact upon the River Moy SAC. Consideration has also been given to possible in-combination effects with a further power line project that is still in planning, the Bellacorick to Banger-Erris 38 kV Overhead Line Refurbishment, which has potential to impact on the Carrowmore Lake Complex SAC.

As it has been shown that the power line projects with appropriate mitigation would not adversely affect the integrity of these SAC sites, and that there is no potential for Phase 1 and Phase 2 of the Oweninny project to have adverse impacts on these sites, it can be concluded that there is no potential for in-combination effects on these Natura sites when the Oweninny Wind Farm project is considered with the power line projects.

A proposal by EirGrid to carry out works to the Bellacorick 110kV substation is currently in planning. However, as it has been shown that this project, which is entirely within the confines of the existing substation, poses no potential for significant effects on any European site, there would be no in-combination effect between the Oweninny wind farm project and the substation project.

Planning permission has been granted for two power plant projects at Bellacorick. However, as the planning documentation for these projects did not identify significant adverse impacts on any site designated for nature conservation, it can be assumed that there would be no in-combination effects on any Natura site when the Oweninny Wind Farm development is considered with these power plant projects.

A thorough evaluation has been made of potential in-combination effects between the Oweninny project and the underground and overhead options for the Grid West project as published by EirGrid in July 2015. While a preferred Grid West option has yet to be selected (which would be subject to AA assessment), environmental evaluations have been made for the identified underground and overhead corridors. The Moy River SAC is the principal site which could potentially be affected by Grid West project. However, from the evaluations carried out, it can be concluded that there is no potential for Phase 1 and Phase 2 of the Oweninny wind farm project to contribute to an in-combination effect with the Grid West project on any Natura 2000 site or on populations of Annex I listed bird species (especially Whooper Swan and Greenland White-fronted Goose).

Work for the Bord na Móna Bog Rehabilitation Programme, which covers the entire Oweninny Wind Farm site, was completed in 2012. The design of the wind farm considered the work of the Rehabilitation Programme and avoided sensitive areas and especially Annex I listed blanket bog. As there are no adverse impacts associated with the Rehabilitation Programme, and as the present wind farm proposal has taken the objectives of the plan into account and will not have any significant adverse impacts on the objectives, it can be concluded that there will not be any in-combination effects as a result of the proposed wind farm development.

Forestry, peat cutting and agriculture are identified as main threats to the conservation objectives of the Bellacorick Bog Complex SAC, the River Moy SAC and the Carrowmore Lake Complex SAC. While the Oweninny project will require the felling of 1.05 ha of commercial forestry, this will not affect the SAC sites as the area is outside the relevant catchments. Peat cutting and agriculture occur at low levels of intensity within the Oweninny site and the proposed wind farm project will not lead to an increase in these activities within the site. Hence the wind farm project will not contribute to in-combination effects relating to these activities.

An objective assessment of the proposed Phase 1 and Phase 2 of the Oweninny wind farm project has shown that the sensitive design of the project, and appropriate mitigation where required, which includes effective measures for maintenance of peat stability and control of water quality during the construction phase, will ensure that there will be no significant impacts on the conservation objectives of any Natura site. Taking this into account, and considering the other projects and the various landuse activities carried out in the wider area, it can be concluded that there will not be any significant in-combination contribution by the Oweninny project to possible existing or potential future adverse impacts on any Natura site or Annex I bird species.

3.6 Conclusion

Whilst the proposed Phase 1 and Phase 2 of the Oweninny Wind Farm Project could potentially have impacts on four European sites (the Bellacorick Bog Complex SAC, the Bellacorick Iron Flush SAC, Carrowmore Lake SAC, River Moy SAC), it is considered that the sensitive design of the project along with the rigorous mitigation measures proposed will ensure that the project, either alone or in-combination with other projects, will have no significant adverse impacts on the conservation objectives of these European sites.

3.7 References

Department of Environment, Heritage and Local Government (2009). Appropriate Assessment of Plans and Projects in Ireland. Guidance for Planning Authorities. See www.npws.ie

Department of the Arts, Heritage & the Gaeltacht (2015). Protected sites in County Mayo - listings and maps. See www.npws.ie

European Commission (1996). *Interpretation Manual of European Union Habitats*. Version Eur 15. European Commission, DG XI.

Moorkens, E. and Killeen, I. (2009) Mapping of the Distribution of Margaritifera margaritifera in the River Deel (Moy Catchment), Co. Mayo. A report for Department of the Environment, Heritage & Local Government.

APPENDIX 1

SITE SYNOPSES

Site Name: Bellacorick Iron Flush SAC

Site Code: 000466

The Bellacorick Iron Flush is situated about 7 km north-east of Bellacorick Co. Mayo, on the headwaters of the Sruffaunnamuingabatia, a tributary of the Oweniny River. The site contains a small minerotrophic fen developed on glacial till overlying calcareous sandstone. The entire site is surrounded by drains and extensive areas of mechanically-cut peat. 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):

[1528] Marsh Saxifrage (Saxifraga hirculus)

The Marsh Saxifrage (Saxifraga hirculus), a species protected under the Flora (Protection) Order, 1999, and listed on Annex II of the E.U. Habitats Directive, occurs in the site. The rare mosses Homalothecium nitens and Meesia triquetra have also been recorded from this site, although recent studies suggest that Meesia triquetra, at its only recorded station in Britain and Ireland, appears to have become extinct. The cause is thought to be the loss of suitable wet habitats through drainage.

Extensive areas of the site are now dominated by Purple Moor-grass (Molinia caerulea), with Wild Angelica (Angelica sylvestris), Marsh Cinquefoil (Potentilla palustris), Red Fescue (Festuca rubra), Yorkshire-fog (Holcus lanatus) and Marsh Willowherb (Epilobium palustre) occurring. The Common Reed (Phragmites australis) is found in wetter areas. Typical blanket bog vegetation occurs in the non-flushed areas of the site, i.e. with Purple Moor-grass, Black Bog-rush (Schoenus nigricans) and Hare's-tail Cottongrass (Eriophorum vaginatum). Rusty Willow (Salix cinerea subsp. oleifolia) occurs throughout the site and in places supports a diverse community of lichens.

The continued survival of this habitat, and the species which occur there, is threatened by the lack of grazing, the drainage and peat-cutting activities occurring around the site, and the resultant development towards rank grassland and scrub. Bellacorick Iron Flush is, nevertheless, of considerable interest, both in terms of the rich-flush habitat, which is uncommon outside of the north Mayo region in Ireland, and because of the presence of rare plant species.

Version date: 26.08.2013 1 of 1 000466_Rev13.Doc

Site Name: Bellacorick Bog Complex SAC

Site Code: 001922

Bellacorick Bog Complex is a large peatland site in Co. Mayo, situated on a low-lying undulating plain and consisting of two large areas separated by an area of forestry. The larger of the two areas extends from south of Bellacorick eastwards, southeastwards and then north to Doobehy. The smaller area is situated 6 km south-east of Glenamoy and extends south to 3

km north of Bellacorick and east towards Doobehy. 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):

[3160] Dystrophic Lakes

[4010] Wet Heath

[7130] Blanket Bogs (Active)*

[7150] Rhynchosporion Vegetation

[7230] Alkaline Fens

[1013] Geyer's Whorl Snail (Vertigo geyeri)

[1528] Marsh Saxifrage (Saxifraga hirculus)

This site contains some of the most extensive areas of lowland blanket bog remaining in Ireland, with outstanding pool development. As well as typical lowland blanket bog vegetation, areas with intermediate bog characteristics are particularly well represented. These areas are typified by domes with raised bog species such as the bog mosses Sphagnum imbricatum, S. magellanicum and S. fuscum, and without Purple Moor-grass (Molinia caerulea). Excellent examples of transitions to minerotrophic flushes and fens are also a feature of the site. The site includes some excellent examples of dystrophic lakes. Included here are the numerous sizeable lakes and large inter-connecting pool systems which characterise the blanket bog plateaux. This habitat type is particularly well represented at this site, with some the finest remaining examples in the country. They are typically species-poor, and many are completely devoid of macrophyte vegetation. Those with vegetation contain species such as Bog-sedge (Carex limosa), Bogbean, Many-stalked Spike-rush (Eleocharis multicaulis) and bladderworts (Utricularia spp.). Pool size and pattern is diverse, ranging from concentric strings of pools to large, irregularly shaped lakes with eroding peaty margins. Many contain vegetated and ungrazed islands.

Rhynchosporion vegetation is a feature of many of the pool areas at the site and also of areas of wet, quaking peat where White Beak-sedge (Rhynchospora alba) is typically dominant. In such areas there is often a luxuriant growth of the bog mosses Sphagnum cuspidatum and/or S. auriculatum. Other characteristic species of the pools and moss lawns include Bogbean (Menyanthes trifoliata), Common Cottongrass (Eriophorum angustifolium) and sundews (Drosera anglica and D. intermedia).

Spring-fed species-rich flushes are a significant feature of this site and occur throughout the bog complex. Many of these flushes are very large. Some of these are iron- flushed, notably those at Brackloon Lough on the eastern margin of the site. The vegetation supported by these flushes include poor fen, rich fen and swamp carr communities. The site contains the largest assemblage of intact fen vegetation in Ireland. Some of the flushes are dominated by sedges (Carex spp.), with Common Reed (Phragmites australis) and Great Fen-sedge (Cladium mariscus) or Soft Rush (Juncus effusus) with a thick Sphagnum layer underneath. Black Bog-rush (Schoenus nigricans) and Purple Moor-grass have been recorded from the iron-rich flushes. Occasional clumps of willow (Salix spp.) also occur. The flushes are also notable for the presence of several boreal relict mosses and liverworts, particularly Homalothecium nitens, Leicolea rutheana and Paludella squarrosa. The moss Sphagnum warnstorfii has been reported from a fen south-west of Brackloon Lough.

A rare vascular plant species, Marsh Saxifrage (Saxifraga hirculus), occurs here at one of only very few known locations in Ireland. This species is listed on Annex II of the E.U. Habitats Directive, as well as on the Flora (Protection) Order, 1999.

Many of the bogland areas are traversed by river and stream channels with diverse associated vegetation. An extensive collapsed swallow-hole system is found at Shralahy with mature Rusty Willow (Salix cinerea subsp. oleifolia) and Rowan (Sorbus aucuparia) occurring.

The site also contains rushy fields, cut-away bog and small areas of scrub and wet woodland. Good examples of wet heath vegetation occur occasionally on sloping ground and on elevated mounds of mineral soil that are scattered throughout the lowland blanket bog-covered plains. These are particularly evident in the Owenboy Nature Reserve and along some of the steeper stream valley sides. These areas are typically dominated by Heather (Calluna vulgaris), with Cross-leaved Heath (Erica tetralix) and the bog moss Sphagnum capillifolium also present.

The site supports a population of the rare snail, Vertigo geyeri, a species that is listed on Annex II of the E.U. Habitats Directive.

The main threats to the integrity of the site are turf- cutting and afforestation. Overgrazing has impacted negatively on the quality of the site in some places. The site includes several well-documented sites of considerable conservation significance, e.g. Formoyle, Brackloon and Cloonoragh flushes and the Owenboy and Knockmoyle-Sheskin Nature Reserves. These areas are still intact and remain of unique scientific and conservation interest. The site complex also includes important peatland sites: Tawnaghs Bog, Eskeragh Bog, Sranacally Bog, Derry Upper Bog, Derry Lower Bog, Bellacorick Bog and Dooleeg Beg Bog. Some recent afforestation has occurred on Eskeragh and Sranacally Bogs. In general, these bogs have a good range of blanket bog habitats and occasional rare plant species.

The site is one of the largest tracts of lowland blanket bog in the country, with the finest examples of intact pool systems. It is considered to be of international importance due to the extent of the individual areas of bog and the wide variety of habitats present and because of the presence of a number of rare and threatened plant and animal species.

Site Name: Lough Dahybaun SAC

Site Code: 002177

Lough Dahybaun is located just north of the N59 and approximately 14 km west of Crossmolina in Co. Mayo. It is situated within an extensive area of blanket bog and is one of the largest of the many small lakes which dot the bog surface. 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):

[1833] Slender Naiad (Najas flexilis)

Lough Dahybaun is an oligotrophic lake surrounded by blanket bog, much of which has been cut or planted with coniferous trees. The main conservation interest of the site is the occurrence of the plant Slender Naiad (Najas flexilis). This rare aquatic species is legally protected under the Flora (Protection) Order, 1999 and is listed on Annex II of the E.U. Habitats Directive.

Slender Naiad occurs in association with a range of other aquatic and emergent species, including Common Club-rush (Scirpus lacustris), Bristle Club-rush (S. setaceus), Bulbous Rush (Juncus bulbous), Horned Pondweed (Zannichellia palustris), Bottle Sedge (Carex rostrata), Bulrush (Typha latifolia), Yellow Water-lily (Nuphar lutea), Curled Pondweed (Potamogeton crispus), Water Horsetail (Equisetum fluviatile) and species of stonewort (Chara spp.).

Much of the blanket bog surrounding the lake has been severely damaged by peat cutting and afforestation, although some relatively intact bog still exists, mostly at the south-eastern side of the lake.

In 1995 it was noted that milled peat had been dumped on the north-eastern shore of the lake and peat dust had washed into the lake. Because of these damaging activities, the general environmental quality of the site is considered low.

In summary, this site is of scientific interest due to the presence of the rare Slender Naiad. However, the long-term survival of the plant in the lake may be dependent on suitable management and restoration programmes.

Version date: 3.01.2014 1 of 1 002177_Rev13.Doc

Site Name: River Moy SAC

Site Code: 002298

This site comprises almost the entire freshwater element of the River Moy and its tributaries including both Loughs Conn and Cullin. The system drains a catchment area of 805 sq. km. Most of the site is in Co. Mayo, though parts are in west Sligo and north Roscommon. Apart from the Moy itself, other rivers included within the site are the Deel, Bar Deela, Castlehill, Addergoole, Clydagh and Manulla on the west side, and the Glenree, Yellow, Strade, Gweestion, Trimogue, Sonnagh, Mullaghanoe, Owengarve, Eighnagh and Owenaher on the east side. The underlying geology is Carboniferous Limestone for the most part, though Carboniferous Sandstone is present at the extreme west of the site, with Dalradian Quartzites and schists at the south-west. Some of the tributaries at the east, the south of Lough Conn and all of Lough Cullin are underlain by granite. There are many towns adjacent to but not within the site. These include Ballina, Crossmolina, Foxford, Swinford, Kiltimagh and Charlestown.

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):

[7110] Raised Bog (Active)*

[7120] Degraded Raised Bog

[7150] Rhynchosporion Vegetation

[7230] Alkaline Fens

[91A0] Old Oak Woodlands

[91E0] Alluvial Forests*

[1092] White-clawed Crayfish (Austropotamobius pallipes)

[1095] Sea Lamprey (Petromyzon marinus)

[1096] Brook Lamprey (Lampetra planeri)

[1106] Atlantic Salmon (Salmo salar)

[1355] Otter (Lutra lutra)

On the slopes and rising ground around the southern shores of Loughs Conn and Cullin, oak woodlands are found. Sessile Oak (Quercus petraea) is the dominant tree species, with an

understorey of Holly (Ilex aquifolium), Hazel (Corylus avellana) and Downy Birch (Betula pubescens), with some Ash (Fraxinus excelsior). Additional species are associated with the lakeshore such as Rock Whitebeam (Sorbus rupicola), Aspen (Populus tremula), Silver Birch (B. pendula) and the shrubs Guelder-rose (Viburnum opulus), Buckthorn (Rhamnus catharticus) and Spindle (Euonymus europaeus). The ground flora is usually composed of Bilberry (Vaccinium myrtillus), Great Wood-rush (Luzula sylvatica), Wood-sorrel (Oxalis acetosella), buckler-ferns (Dryopteris aemula and D. dilatata), Hard Fern (Blechnum spicant), Common Cowwheat (Melampyrum pratense) and Bracken (Pteridium aquilinum). The rare Narrowleaved Helleborine (Cephalanthera longifolia), protected under the Flora (Protection) Order, 1999, occurs in association with the woodlands. Also found in these woodlands is the snail Spermodea lamellata, a species associated with old natural woodlands.

Alluvial woodland occurs at several locations along the shores of the lakes but is particularly well developed along the river at Coryosla Bridge. Principal tree species are willows (including Salix cinerea subsp. oleifolia) and Alder (Alnus glutinosa). Herbaceous species include Royal Fern (Osmunda regalis), Meadowsweet (Filipendula ulmaria) and Reed Canary-grass (Phalaris arundinacea). The woods are flooded by seasonal fluctuations in lake level. On higher ground adjacent to the woodlands is blanket bog with scattered shrubs and trees on the drier areas. The rocky knolls often bear Juniper (Juniperus communis) or Gorse (Ulex europaeus), with some unusual rare herb species such as Intermediate Wintergreen (Pyrola media) and Lesser Twayblade (Listera cordata).

Within the site are a number of raised bogs including those at Kilgarriff, Gowlaun, Derrynabrock, Tawnaghbeg and Cloongoonagh. These are examples of raised bogs at the north-western edge of the spectrum and possess many of the species typical of such in Ireland, including an abundance of Bog Asphodel (Narthecium ossifragum), Carnation Sedge (Carex panicea) and the moss Campylopus atrovirens. Some of the bogs include significant areas of active raised bog habitat. Well developed pool and hummock systems with quaking mats of bog mosses (Sphagnum spp.), Bog Asphodel and White Beaked-sedge (Rhynchospora alba) are present. Many of the pools contain a diversity of plant species, including Bogbean (Menyanthes trifoliata), the bog moss Sphagnum cuspidatum, Campylopus atrovirens, Common Cottongrass (Eriophorum angustifolium), Great Sundew (Drosera anglica) and occasional Lesser Bladderwort (Utricularia minor). Several of the hummock-forming mosses (Sphagnum fuscum and S. imbricatum) which occur here are quite rare in this region and add to the scientific interest of the bogs within the overall site. Depressions on the bogs, pool edges and erosion channels, where the vegetation is dominated by White Beaked-sedge comprise the habitat 'Rhynchosporion vegetation'. Associated species in this habitat at the site include Bog Asphodel, sundews, Deergrass (Scirpus cespitosus) and Carnation Sedge.

Degraded raised bog is present where the hydrology of the uncut bogs has been affected by peat cutting and other land use activities in the surrounding area, such as afforestation and associated drainage, and also the Moy arterial drainage. Species typical of the active raised bog habitat may still be present but the relative abundances differ. A typical example of the degraded habitat, where drying has occurred at the edge of the high bog, contains an abundance and more uniform cover of Heather (Calluna vulgaris), Carnation Sedge, Deergrass and sometimes Bog-myrtle (Myrica gale). Occurring in association with the uncut high bog are areas of wet regenerating cutover bog with species such as Common Cottongrass, bog mosses and sundew, while on the drier areas, the vegetation is mostly dominated by Purple Moor-grass (Molinia caerulea). Natural regeneration with peat-forming capability will be possible over time with some restorative measures.

Alkaline fen is considered to be well developed within the site. An extensive stand occurs as part of a wetland complex at Mannin and Island Lakes on the Glore River. Key diagnostic species of the Schoenus association characteristic of rich fens include the bryophytes

Campylium stellatum, Aneura pinguis and Scorpidium scorpioides, and the herbaceous species Long-stalked Yellow-sedge (Carex lepidocarpa), Grass-ofparnassus (Parnassia palustris) and Common Butterwort (Pinguicula vulgaris). Other fen species include Black Bog-rush (Schoenus nigricans), Purple Moor-grass, Marsh Helleborine (Epipactis palustris), Meadow Thistle (Cirsium dissectum) and Bluntflowered Rush (Juncus subnodulosus). The rare moss Bryum uliginosum occurs on exposed marl at a ditch to the east of Island Lake.

The open water of Loughs Conn and Cullin is moderately hard with relatively low colour and good transparency. The phytpoplankton of the lake is dominated by diatoms and blue-green algae and there is evidence that the latter group is more common now than in former years. This indicates that nutrient inflow is occurring. The changes in Lough Conn appear to represent an early phase in the eutrophication process. Stoneworts still present include Chara aspera, C. delicatula and Nitella cf. opaca. Other plants found in the shallower portions include pondweed species (Potamogeton spp.). Where there is a peat influence Intermediate Bladderwort (Utricularia intermedia) is characteristic, while Water Lobelia (Lobelia dortmanna) often grows in sand. Narrow reedbeds and patches of Yellow Water-lily (Nuphar lutea) occur in some of the bays. Drainage of the Moy in the 1960s lowered the level of the lakes, exposing wide areas of stony shoreline and wet grassland, which are liable to flooding in winter. This increased the habitat diversity of the shoreline and created a number of marginal wetlands, including fens and marshes. Plant species of note in the lake-margin include Heath Cudweed (Omalotheca sylvatica), Great Burnet (Sanguisorba officinalis) and Irish Lady's-tresses (Spiranthes romanzoffiana). These three species are listed on the Irish Red Data list and are protected under the Flora (Protection) Order, 1999.

Other habitats present within the site include wet grassland dominated by rushes (Juncus spp.) grading into species-rich marsh in which sedges are common. Among the other species found in this habitat are Yellow Iris (Iris pseudacorus), Water Mint (Mentha aquatica), Purple Loosestrife (Lythrum salicaria) and Soft Rush (Juncus effusus). Rusty Willow (Salix cinerea subsp. oleifolia) scrub and pockets of wet woodland dominated by Alder (Alnus glutinosa) have become established in places throughout the site. Ash (Fraxinus excelsior) and Downy Birch (Betula pubescens) are common in the latter and the ground flora is typical of wet woodland with Meadowsweet (Filipendula ulmaria), Wild Angelica (Angelica sylvestris), Yellow Iris, horsetails (Equisetum spp.) and occasional tussocks of Greater Tussock-sedge (Carex paniculata). Small pockets of conifer plantation, close to the lakes and along the strip both sides of the rivers, are included in the site.

The Moy system is one of Ireland's premier salmon waters and it also encompasses two of Ireland's best lake trout fisheries in Loughs Conn and Cullin. Although the Atlantic Salmon (Salmo salar) is still fished commercially in Ireland, it is considered to be endangered or locally threatened elsewhere in Europe and is listed on Annex II of the E.U. Habitats Directive. The Moy is a most productive catchment in salmon terms and this can be attributed to its being a fingered system with a multiplicity of 1st to 5th order tributaries which are large enough to support salmonids < 2 years of age while at the same time being too small to support significant adult trout numbers and are therefore highly productive in salmonid nursery terms. Salmon run the Moy every month of the year. Both multi-sea-winter fish and grilse are present. The salmon fishing season is 1st February to 30th September. The peak of the spring fishing is in April and the grilse begin running in early May. The average weight of the spring fish is 9 lb and the grilse range from about 3-7 lb. In general spring fish are found more frequently in the rivers at the western extent of the Moy system. The Arctic Char (Salvelinus alpinus), an interesting relict species from the last ice age, which is listed as threatened in the Irish Red Data Book has been recorded from Lough Conn and in only a few other lakes in Ireland. The latest reports suggest that it may now have disappeared from the site.

The site is also important for the presence of four other species listed on Annex II of the E.U. Habitats Directive, namely Sea Lamprey, Brook Lamprey, Otter and Whiteclawed Crayfish. The Sea Lamprey is regularly encountered in the lower stretches of the river around Ballina, while the Otter and White-clawed Crayfish are widespread throughout the system. In addition, the site also supports many of the mammal species occurring in Ireland. Those which are listed in the Irish Red Data Book include Pine Marten, Badger, Irish Hare and Daubenton's Bat. Common Frog, another Red Data Book species, also occurs within the site.

Loughs Conn and Cullin support important concentrations of wintering waterfowl and both are designated Special Protection Areas (SPAs). A nationally important population of the Annex I species Greenland White-fronted Goose (average 113 over 6 winters 1994/95 to 1999/00) is centred on Lough Conn. Whooper Swans also occur (numbers range between 25 to 50), along with nationally important populations of Tufted Duck 635, Goldeneye 189 and Coot 464. A range of other species occur on the lakes in regionally important concentrations, notably Wigeon 303, Teal 154, Mallard 225, Pochard 182, Lapwing >1,000 and Curlew 464. Golden Plover also frequent the lakes, with numbers ranging between 700 and 1,000.

Loughs Conn and Cullin are one of the few breeding sites for Common Scoter in Ireland. Breeding has occurred on Lough Conn since about the 1940s when about 20- 30 pairs were known. A census in 1983 recorded 29 pairs. Breeding was first proved on Lough Cullin in 1983 when 24 pairs were recorded. In 1995, 24-26 pairs were recorded at Lough Conn and 5 pairs at Lough Cullin. The latest survey in 1999 gives a total of 30 birds for both lakes, comprising only 5 pairs, 18 unpaired males and 2 unpaired females. The reason for the decline is not known but may be due to predation by mink, possible changes in food supply and/or redistribution to other sites. The Common Scoter is a Red Listed species.

Agriculture, with particular emphasis on grazing, is the main land use along the Moy. Much of the grassland is unimproved but improved grassland and silage fields are also present. The spreading of slurry and fertiliser poses a threat to the water quality of this salmonid river and to the large lakes. Fishing is the main tourist attraction on the Moy and there are a large number of Angler Associations, some with a number of beats. Fishing stands and styles have been erected in places. The North Western Regional Fishery Board have erected fencing along selected stretches of the river as part of their salmonid enhancement programme. Other aspects of tourism are concentrated around Loughs Conn and Cullin. Afforestation has occurred in the past around the shores of Loughs Conn and Cullin. The coniferous trees are due for harvesting shortly. It is proposed to replant with native tree species in this area. Forestry is also present along many of the tributaries and in particular along the headwaters of the Deel. Forestry poses a threat in that sedimentation and acidification can occur. Sedimentation can cover the gravel beds resulting in a loss of suitable spawning grounds. The Moy was arterially dredged in the 1960s. Water levels have been reduced since that time. This is particularly evident along the shores of Loughs Conn and Cullin and in the canal-like appearance of some river stretches. Ongoing maintenance dredging is carried out along stretches of the river system where the gradient is low. This is extremely destructive to salmonid habitat in the area.

The site supports populations of several species listed on Annex II of the E.U. Habitats Directive, and habitats listed on Annex I of this Directive, as well as examples of other important habitats. The presence of a fine example of broadleaved woodland in this part of the country increases the overall habitat diversity and adds to the ecological value of the site, as does the presence of the range of nationally rare and Red Data Book plant and animal species.

Site Name: Carrowmore Lake Complex SAC

Site Code: 000476

This site is located north and east of Bangor Erris, in Co. Mayo. There are two main parts to the site: Carrowmore Lake, a large, shallow oligotrophic/mesotrophic lake, and Largan More Bog, an impressive tract of blanket bog. From an altitude of 6 m at the lake, the site grades upwards in a general south-easterly direction, reaching 199 m on Largan More Bog.

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):

[7130] Blanket Bogs (Active)*

[7150] Rhynchosporion Vegetation

[1393] Slender Green Feather-moss (Drepanocladus vernicosus)

[1528] Marsh Saxifrage (Saxifraga hirculus)

Three areas of blanket bog are incorporated into the site: Glenturk, Carrowmore (or Glencullin) and Largan More. Glenturk Bog has relatively uniform vegetation and Carrowmore Bog is more diverse, with quaking lawns formed by bog mosses (Sphagnum spp.), hummocks (including some formed by Sphagnum fuscum), bog pools and an inter-connecting pool system. Largan More is the most extensive and interesting, with a fine inter-connecting pool system and large areas of typical, intact blanket bog vegetation. Bog pools are a feature of the bog surface, and these are colonised by a range of mosses and higher plants including Lesser Bladderwort (Utricularia minor), White Water-lily (Nymphaea alba), Water Lobelia (Lobelia dortmanna) and Pipewort (Eriocaulon aquaticum). Rhynchosporion vegetation is well-represented along the margins of pools and in the wet, quaking flats between pool areas. Typically the vegetation is dominated by the bog mosses Sphagnum cuspidatum and S. auriculatum, with vascular species such as Bogbean (Menyanthes trifoliata), White Beak-sedge (Rhynchospora alba), Common Cottongrass (Eriophorum angustifolium) and Great Sundew (Drosera anglica) also present. Species-rich flush communities occur on streamsides and stream-heads. Sedges (including Carex limosa, C. rostrata and C. lepidocarpa) are abundant in flushes, with a rich variety of calcicole herbs and mosses. Cranberry (Vaccinium oxycoccos) occurs in some flushes - this species is uncommon outside the centre of Ireland.

Carrowmore Lake is a large (960 ha), shallow lake, with a maximum depth of approximately 2.5 m and a generally stony bottom. The lake water is almost neutral in terms of acidity (i.e. pH) and generally rather nutrient-poor. The shallow waters support species such as Common Spike-rush (Eleocharis palustris), Shoreweed (Littorella uniflora), Bulbous Rush (Juncus bulbosus), Marsh Pennywort (Hydrocotyle vulgaris) and Perfoliate Pondweed (Potamogeton perfoliatus). The shoreline is dominated by Soft Rush (Juncus effusus), Yellow Iris (Iris pseudacorus) and stands of Common Club-rush (Scirpus lacustris) or Common Reed (Phragmites australis). This emergent vegetation grades landward into freshwater marsh and acid wet grassland, backed by blanket bog. Along this transition zone, bushes of Irish Heath (Erica erigena) are prominent. This species is frequent in parts of west Mayo, but rare in west Galway and unknown elsewhere in Ireland.

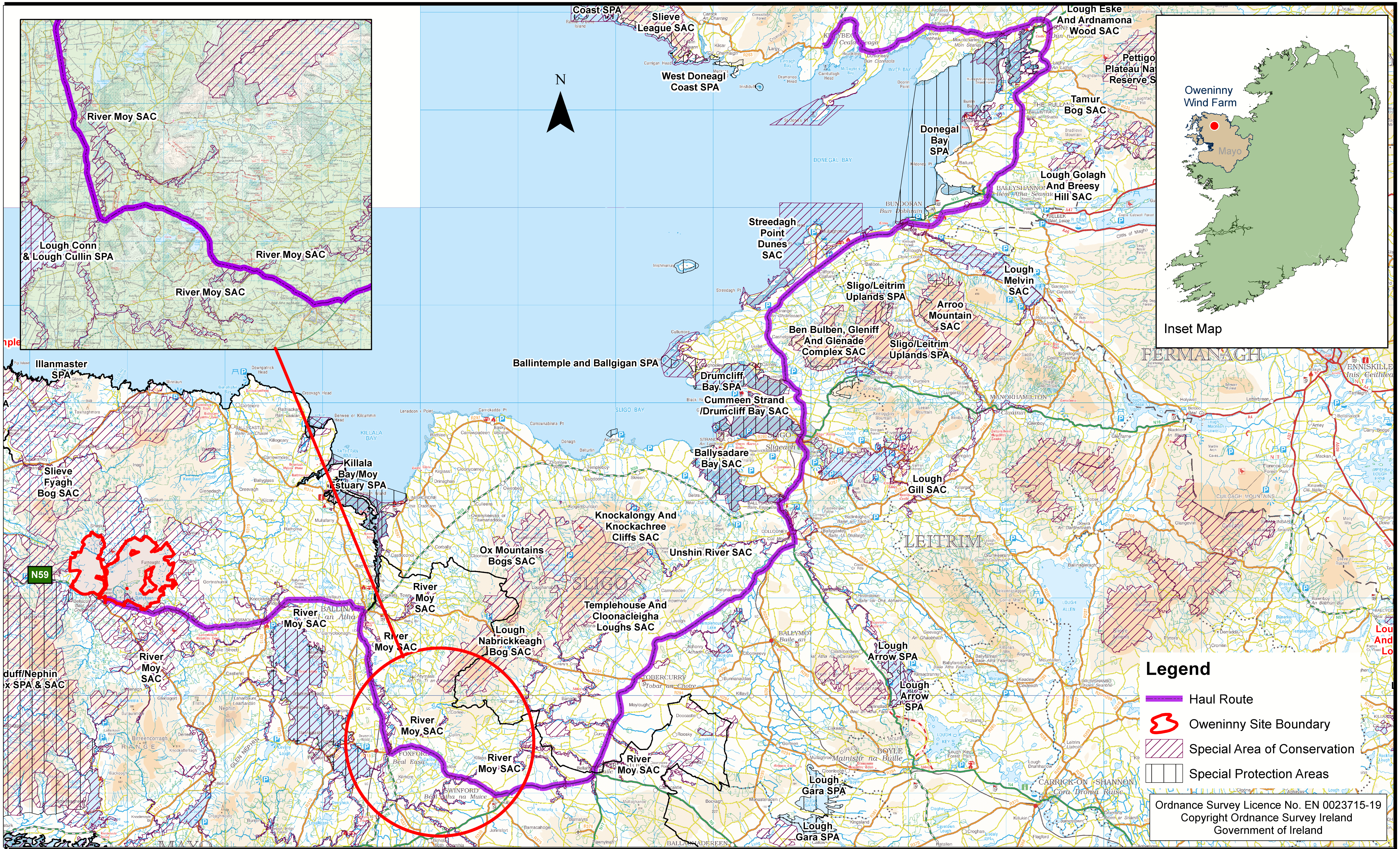
The rare Marsh Saxifrage (Saxifraga hirculus) occurs at the site. This species is protected under the Flora (Protection) Order, 1999, and is listed under Annex II of the E.U. Habitats Directive. It is confined in its distribution to north-west Co. Mayo. Recently, a population of the

rare moss Drepanocladus vernicous was discovered in a flushed lawn within the extensive blanket bog complex. This species is also legally protected and is listed on Annex II of the Habitats Directive.

The site supports a number of bird species which are of international conservation significance and which are listed on Annex I of the E.U. Birds Directive. In winter, Greenland White-fronted Goose arrive to feed around the lake and in some nearby fields. These birds are a sub-flock of the nationally important Bog of Erris flock. In summer, Merlin and Golden Plover breed on the boglands within the site. An Irish Tern Survey (1984) revealed that Sandwich Tern (164 pairs) and Arctic Tern (18 pairs) formerly bred within the site, and although the terns have not bred in recent years, Derreen's Island still supports a large and important colony of Common Gulls (600 individuals, 1993). A variety of wildfowl also occur, including Tufted Duck, Pochard and Wigeon. Goosander, a very rare species in Ireland, has been recorded here.

Blanket bog in the site is used for grazing cattle and sheep and for turf-cutting, which is largely done by machine. Angling and water abstraction are the main land uses at Carrowmore Lake.

This site is of considerable ecological value, primarily for its extensive, intact blanket bog, which has a typical range of good-quality habitats, but also as a site for the very rare Marsh Saxifrage and the moss Drepanocladus vernicous. The north-western part of the site supports a number of Greenland White-fronted Goose, while other important bird species which occur are Golden Plover, Merlin, Sandwich Tern and Arctic Tern.


N
River Moy SAC
Lough Conn
& Lough Cullin SPA
River Moy SAC
River Moy SAC
Coast SPA
Slieve League SAC
West Donegal Coast SPA
Lough Eske And Ardnamona Wood SAC
Pettigo Plateau Na Reserve S
Tamur Bog SAC
Donegal Bay SPA
Lough Golagh And Breesy Hill SAC
Streedagh Point Dunes SAC
Lough Melvin SAC
Sligo/Leitrim Uplands SPA
Arroo Mountain SAC
Ben Bulben, Gleniff And Glenade Complex SAC
Sligo/Leitrim Uplands SPA
Ballintemple and Ballgigan SPA
Drumcliff Bay SPA
Cummeen Strand /Drumcliff Bay SAC
Ballysadare Bay SAC
Lough Gill SAC
Illanmaster SPA
Killala Bay/Moy Estuary SPA
Slieve Fyagh Bog SAC
Knockalongy And Knockachree Cliffs SAC
Ox Mountains Bogs SAC
Unshin River SAC
N59
River Moy SAC
River Moy SAC
River Moy SAC
Templehouse And Cloonacleigha Loughs SAC
Lough Nabrickkeagh Bog SAC
River Moy SAC
duff/Nephin x SPA & SAC
Lough Arrow SPA
Lough Arrow SPA
River Moy SAC
River Moy SAC
River Moy SAC
Lough Gara SPA
Lough Gara SPA
FERMANAGH
LEITRIM
SLIGO
Oweninny Wind Farm
Mayo
Inset Map
Legend
Haul Route
Oweninny Site Boundary
Special Area of Conservation
Special Protection Areas
Ordnance Survey Licence No. EN 0023715-19
Copyright Ordnance Survey Ireland
Government of Ireland

Oweninny Power Ltd.

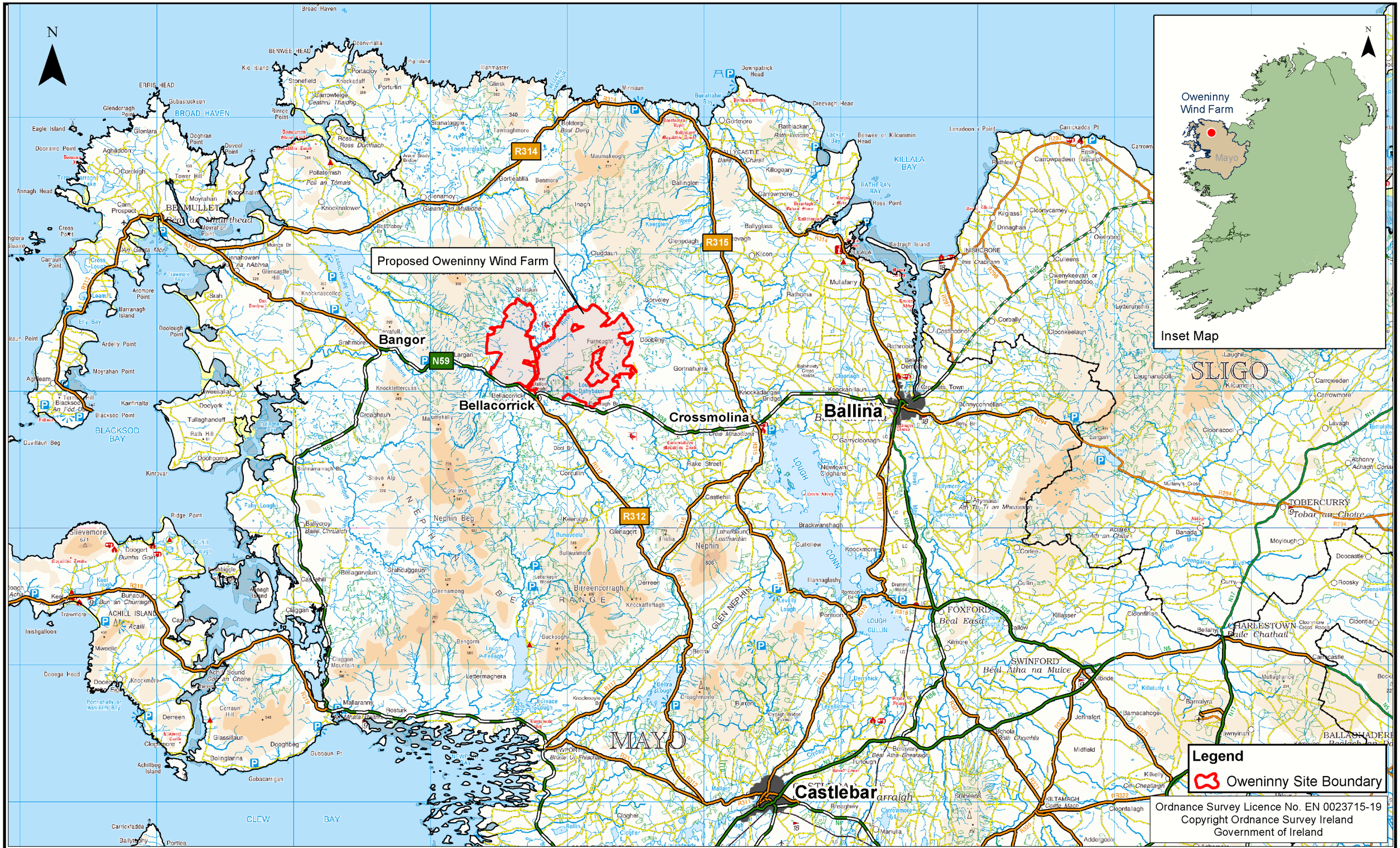
Client	Oweninny Power Ltd.
Title	Proposed Turbine Haul Route and Designated Sites
Project	Wind Farm Project at Oweninny, Bellacorick, Co. Mayo
Production Unit	Civil, Building & Environment Group

DRAWN BY	PRODUCED BY	VERIFIED BY	APPROVED BY	APPROVED DATE
EO'S	C.F	P.K	N.Q	15/10/2015

CLIENT REF.	NO. OF SHEETS	SHEET SIZE	SCALE
00-00	1/1	A3	1:350,000

MAP REFERENCE

FIGURE 1



Legend

Oweninny Site Boundary

Oweninny Power Ltd.

Client
Oweninny Power Ltd.

Project
Wind Farm Project at Oweninny, Bellacorick, Co. Mayo

Title
Location of Proposed Oweninny Wind Farm Site

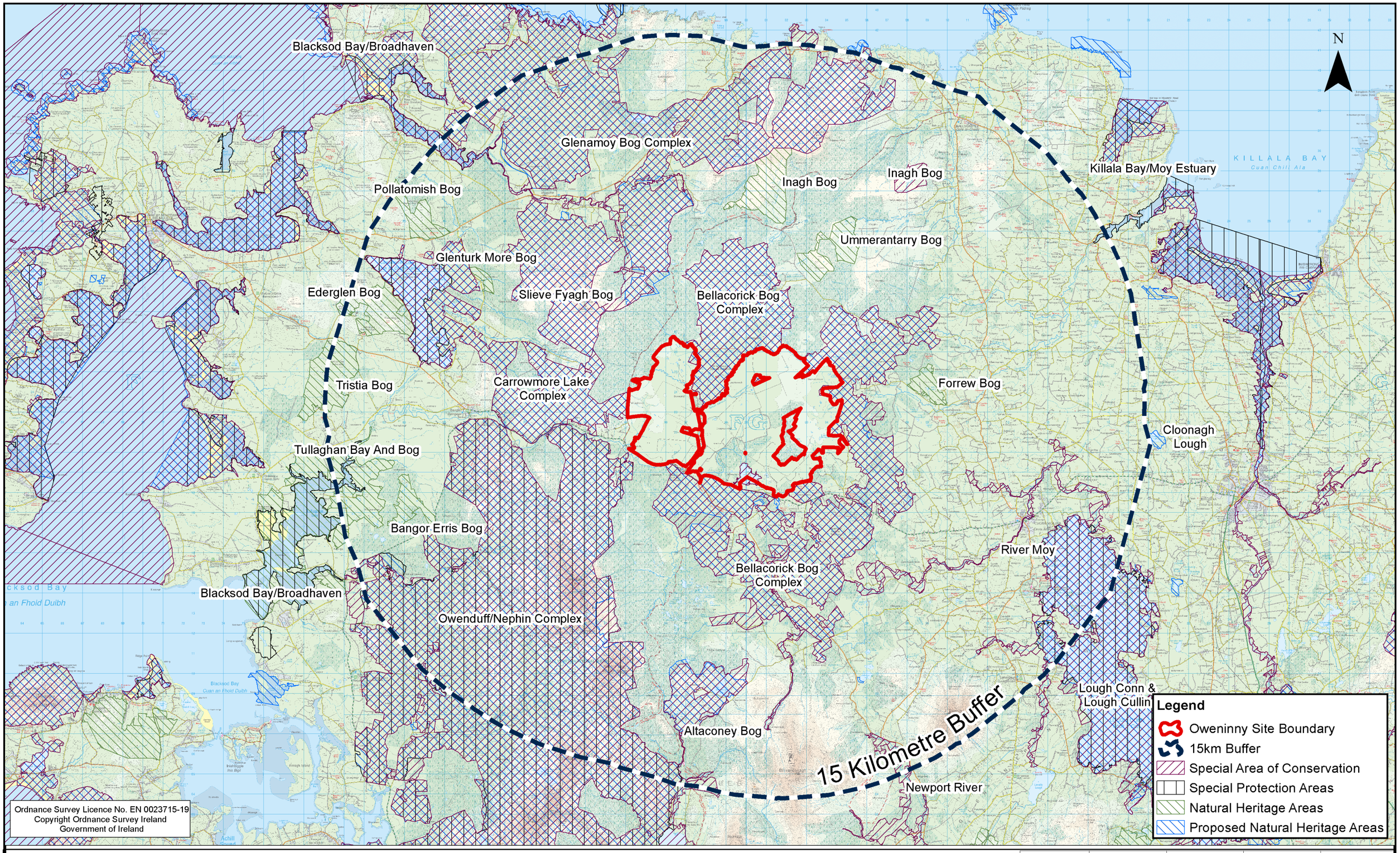
Production Unit
Civil, Building & Environment Group

DRAWN BY	PRODUCED BY	VERIFIED BY	APPROVED BY	APPROVED DATE
EO'S	C.F	P.K	N.Q	15/10/2015

CLIENT REF.	NO. OF SHEETS	SHEET SIZE	SCALE
00-00	1/1	A3	1:250,000

MAP REFERENCE

FIGURE 2



Oweninny Power Ltd.

Client
Oweninny Power Ltd.

Project
Wind Farm Project at Oweninny, Bellacorick, Co. Mayo

Title
Distribution of SACs, SPAs & NHAs within 15 km radius of Oweninny site

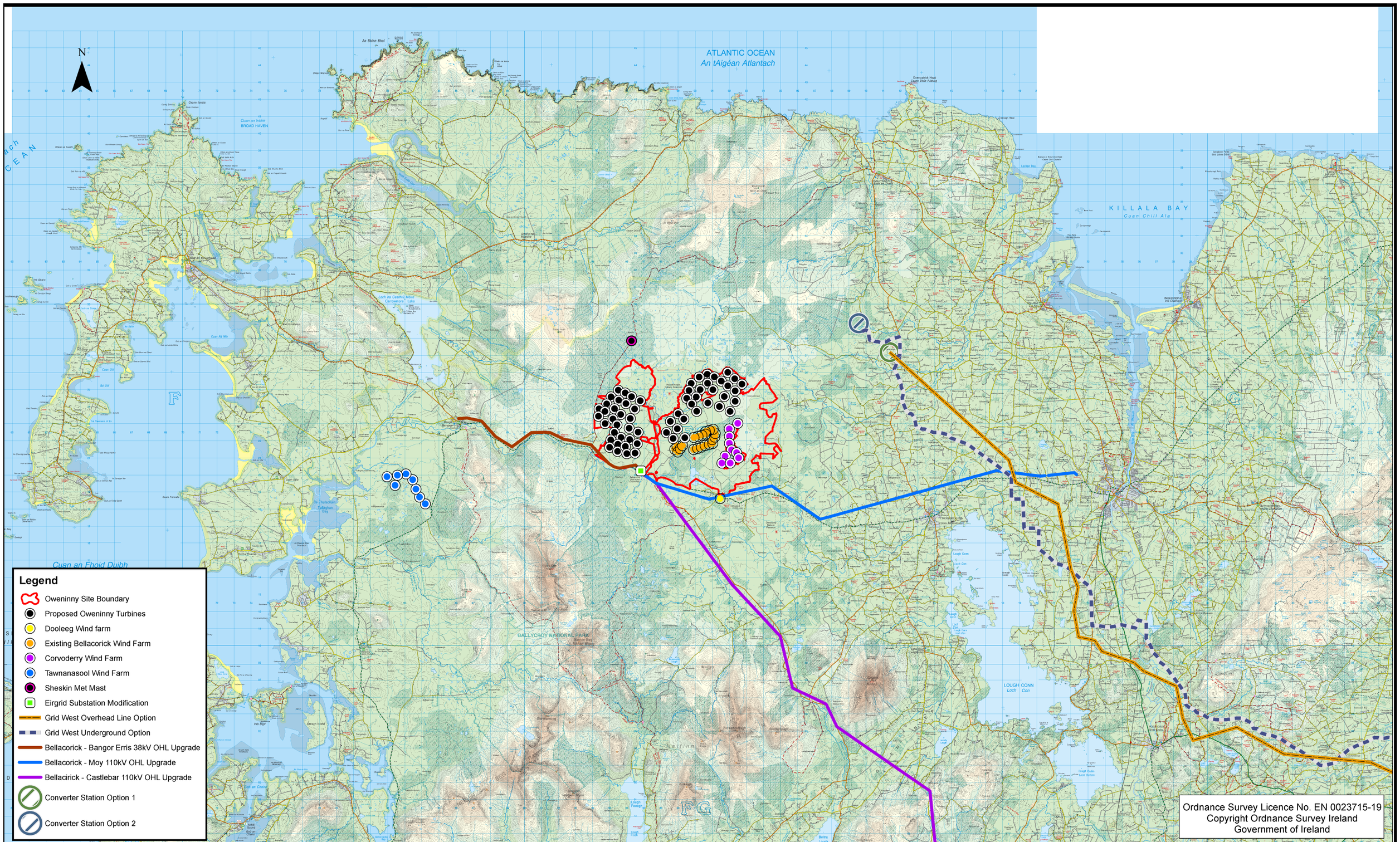
Production Unit
Civil, Building & Environment Group

DRAWN BY	PRODUCED BY	VERIFIED BY	APPROVED BY	APPROVED DATE
CF	CF	P.K	N.Q	15/10/2015

CLIENT REF.	NO. OF SHEETS	SHEET SIZE	SCALE
00-00	1/1	A3	1:170,000

MAP REFERENCE

FIGURE 3



Ordnance Survey Licence No. EN 0023715-19
Copyright Ordnance Survey Ireland
Government of Ireland

Oweninny Power Ltd.

Client
Oweninny Power Ltd.

Project
Wind Farm Project at Oweninny, Bellacorick, Co. Mayo

Title
Location of Other Projects within 20km of Oweninny

Production Unit
Civil & Environmental Engineering

DRAWN BY	PRODUCED BY	VERIFIED BY	APPROVED BY	APPROVED DATE
E.O'S	E.O'S	P.K	N.Q	15/10/2015

CLIENT REF.	NO. OF SHEETS	SHEET SIZE	SCALE
00-00	1/1	A3	1:200,000

MAP REFERENCE

Figure 4