

# Oweninny Wind Farm

Oweninny Power Ltd.

Environmental Impact Statement

Chapter 20

Indirect and Interaction of Impacts

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## 20. INDIRECT AND INTERACTION OF IMPACTS

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### 20.1 INTRODUCTION

The EU Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions states that

*“Including an assessment of the indirect and cumulative impacts, and interactions in an EIA is required by legislation, contributes towards sustainable development, is good practice and aids the decision making process.”*

The assessment of indirect and cumulative impacts, and impact interactions are considered to be an integral part of all stages of the process.

This chapter addresses indirect impacts and main interactions of impacts between different aspects of the environment likely to arise from the proposed Oweninny Wind Farm Development. In this respect only relevant topics which can be linked to the development are discussed and where not mentioned no potential for impact has been identified.

Mitigation measures in relation to primary impacts are outlined in the relevant Sections of the EIS. Mitigation measures are not repeated herein and only mitigation that is additional to the primary impacts is described.

Cumulative impacts have been addressed in individual chapters in the EIS and are not discussed further here.

### 20.2 APPROACH AND METHODOLOGY

This chapter has been prepared with specific reference to the Guidelines on the information to be contained in Environmental Impact Statements (EPA, 2002), and Advice Notes on Current Practice in the preparation of Environmental Impact Statements, (EPA, 2003) (EPA guidelines). Reference is also made to the Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions (Office for Official Publications of the European Communities, 1999) (EU guidelines) and to Guidance: Cumulative Effects of Windfarms (Scottish National Heritage, 2005).

The potential for significant cumulative and indirect impacts and interactions was examined at the screening stage of the project and any such potential impacts were identified. Where the potential for significant cumulative and indirect impacts and interactions was identified, these were included in the scope and addressed in the baseline and impact assessment studies for each of the relevant environmental media and aspects of the project. The cumulative impacts are presented in the chapters of the EIS which address the most relevant environmental media.

### 20.3 INDIRECT IMPACTS (Secondary Impacts)

Indirect impacts are described in the EPA Guidelines as being

*“impacts which are caused by the interaction of effects, or by associated or off-site developments”.*

For the Oweninny Wind Farm proposed development, indirect impacts are those not directly caused by the project but are associated with the development or arise from the

main mitigation measures proposed in relevant chapters.

The main indirect impacts are described in the following sections and summarised in the matrix

### **20.3.1 Economic**

There will be additional indirect temporary economic benefits arising from the construction of the Oweninny wind farm.

It is estimated that construction will require the importation of approximately 0.7 million tonnes of fill material to the site in the worst case scenario where no onsite borrow pit will be developed. This material is likely to be sourced from local quarries which in turn will result in additional employment opportunities in the area. Cement and concrete production external to the Oweninny site will also give rise to additional employment as will its transportation.

There will also be increased demand for accommodation and for a range of goods and services giving rise to temporary economic benefits for local residents, retailers and other commercial operators.

Overall there will be an indirect temporary positive economic benefit to the region during the construction phase of the project.

#### **Additional Mitigation**

No additional mitigation is required

### **20.3.2 Road Maintenance**

The main haul route for materials to the site will be via the N59. As such, this route will be maintained to a high standard in order to accommodate the level of construction traffic expected to occur as part of this project. Arising from these maintenance activities, there will be an indirect impact on the local communities along the local road network from temporary, short term localised disturbance.

Road pavement assessment has already been identified as a mitigation measure in Chapter 14 and this will ensure that the road condition during and post construction will be maintained and restored as appropriate. The level of maintenance required will result in an overall positive indirect impact on amenity and transport from maintenance of the road.

The development of the existing site access locations to the proposed wind farm site will give rise to temporary disruption of traffic on the N59 during the construction phase and will result in short temporary loss of amenity for local residents.

#### **Additional Mitigation**

It will be the responsibility of the relevant Local Authority to inform local residents of the timing and duration of any maintenance works which will be undertaken.

Local residents will be informed well in advance of the proposed timing and duration of the works as part of an overall traffic management plan for the development construction.

### **20.3.3 Noise**

There will be increased noise at quarrying locations and at cement and concrete production locations arising from material winning and processing of materials. However, these activities are already controlled under existing permits at these locations and a

significant noise issue is not expected.

There will be some increase in road traffic noise associated with the collection and delivery of fill, cement and concrete materials at these locations also.

#### **Additional Mitigation**

Noise arising from operations of plant and machinery at external sources will be controlled by the relevant permits and plans associated with the activity.

#### **20.3.4 Air and Climate**

Emissions of CO<sub>2</sub>, SO<sub>2</sub> and NO<sub>x</sub> are normally associated with quarrying activities and cement production and there will be temporary increases of these pollutants arising from the equipment used to quarry fill material and to produce cement required for the Oweninny wind farm construction. Emissions of CO<sub>2</sub>, SO<sub>2</sub> and NO<sub>x</sub> are also associated with turbine component manufacture and delivery to the site giving rise to temporary increases during production and transport.

#### **Additional Mitigation**

These emissions will be controlled in accordance with any respective licence for these activities and their impact will not be significant.

#### **20.3.5 Indirect impact from mitigation**

#### **Landscape**

In Chapter 9 Ecology, mitigation to protect winter roosting Hen Harrier (Section 9.5.11.2) recommends that six turbines should be fitted with warning lights at hub height level to alert birds flying in poor light of their presence. These turbines are located in the south-eastern section of the site. These lights will flash in red at regular intervals between the months of November and March, and become visible at night or during low light weather conditions. Warning lights installed at height can be recognised over long distances in clear weather conditions at night. The warning lights will introduce a new source of light at height. The general landscape effects are considered moderate. The visual effects of the warning lights would be slight to moderate and intermittent in nature due to their seasonal use, dependence on weather conditions and the time of day.

#### **Traffic**

The road safety audit carried out as part of the traffic and transport assessment in Chapter 14 recommended that visibility splays from the three proposed site entrance locations be improved through removal of vegetation. This will also improve visibility splays on the N59 in the vicinity of the entrance locations a positive benefit to road traffic.

## **20.4 INTERACTIONS**

In addition to the requirement to describe the likely significant effects of the proposed development on the different elements of the environment, it is also required to consider the interaction of those effects. All environmental factors are interrelated to some extent. An interaction matrix is provided in *Table 20-1* where the potential for the topic in the left hand column to have an effect on the environmental media listed in the top row of the matrix is presented. Construction stage interactions are indicated by 'C', operational phase by an 'O' and for both phases by 'CO'.

Likely interactions are summarised in Table 20-2 and discussed below.

**Table 20-1: Potential interaction of effects**

	Human Beings	Noise and Vibration	Terrestrial Ecology	Water and Aquatic Ecology	Landscape	Air and Climate	Geology and Soils	Roads and Traffic	Forestry	Material Assets	Cultural heritage
Human Beings		-	-	-	-	-	-	CO	-	-	-
Noise and Vibration	CO		CO	-	-	-	-	-	-	-	-
Terrestrial Ecology	-	-		-	-	-	-	-	-	-	-
Water and Aquatic Ecology	-	-	-		-	-	-	-	-	-	-
Landscape	CO	-	O	-		-	-	-	-	O	-
Air and Climate	CO	-	CO	-	-		C	-	-	-	-
Geology and Soils	-	-	C	CO	-	-		-	-	-	C
Roads and Traffic	CO	-	C	-	C	CO	-		-	-	-
Forestry	-	-	C	C	-	C	-	-		-	-
Material Assets	CO	-	-	-	-	-	-	-	-		CO
Cultural heritage											

#### **20.4.1 Human Beings / Noise**

In terms of the construction noise, any impacts arising will be short-term in nature and a perceptible increase in noise sufficient to cause harm to residential amenity will not result given the distance from the site to the existing properties in the area. In addition predicted construction noise levels at Oweninny are below relevant limit values issued by the National Roads Authority, see Chapter 7.

Turbines are typically a minimum of 1 km from any residence. Noise prediction modeling indicates that the noise limits as set out in the Department of Environment, Heritage and Local Government Planning Guidelines (Wind Farms) will not be exceeded at any noise sensitive location. Consequently, noise levels resulting from the operation of Oweninny Wind Farm will not impact significantly on human beings.

#### **20.4.2 Human Beings / Landscape**

In terms of wind farm developments, impacts on the landscape are commonly considered to be the most significant for this type of development. Photomontages (32) were generated for 27 viewshed reference points and a detailed analysis of each was presented in Chapter 11.

In addition to impacts on visual character and landscape character, impacts on human beings were considered in the context of built-up areas, recreational areas and roads (scenic routes, national primary roads, regional roads and country roads).

Settlement is generally sparse within the Primary Principal Visual Zone around the Oweninny wind farm site, but individual houses located in the landscape will experience views of the proposal. This will particularly be the case for houses on the L52925 in the central area of the site, the L52936 to the west of the site (Tawnaghmore townland), the L5292 (Shanvolahan townland) and the L5160 (Doobehy townland) to the east of the site and in the Dooleeg area. Settlement is more sparse and dispersed within the mountain ranges to the north, west and south and the majority of available views of the proposed wind farm from within this area will result often in substantial visual effects. This is due to open views of the proposal and the absence of significant vertical screening by natural or built features.

There are no known views from the towns and villages of Pontoon, Beltra, Newport, Rosturk, Mulranny, Ballycroy, centre of Bangor, Belmullet, Killala, Ballycastle, Belderg, Glenamoy and Ross Port due to intervening topography and vegetation.

Visual effects on walking routes will range from slight to moderate depending on the distance of the observer from the proposed wind farm site.

Scenic routes 16 and 18 within the Western Way will experience substantial visual effects in areas where open views are possible and are not fully or partially obstructed by intervening often coniferous commercial vegetation.

#### **20.4.3 Human Beings / Roads & Traffic**

The development will generate traffic on the N59 during the construction phase with the maximum number of traffic movements to the site being determined as being up to approximately 73 per day. Rather than occurring uniformly throughout the construction period, traffic movements will likely peak on non-consecutive days for 30 days during Phase 1, 31 days in Phase 2 and 51 days in Phase 3 on which concrete for turbine foundations and piling will be delivered. This was calculated as being approximately 16

heavy goods vehicle movements per hour spread over the duration of each of the construction phases. A potential maximum of 44 heavy goods vehicle movements per hour on and off the site could occur at peak periods.

The N59 national secondary road has been assessed as having adequate capacity for both the Oweninny wind farm construction with over 60% spare capacity remaining and also were the construction of Cluddaun and Corvoderry wind farm developments to occur at the same time as Phase 3 of Oweninny (with 42%) spare capacity remaining

Any local road improvements that may be necessary for delivery of wind turbine components will improve overall road safety in the long term.

#### **20.4.4 Human Beings / Material Assets**

No impacts were predicted in relation to electromagnetic interference.

In the very unlikely event of interference with television reception, all necessary measures will be undertaken by the developer in accordance with a standard protocol developed by RTÉ to fully eliminate any negative impact.

#### **20.4.5 Ecology / Landscape**

Other than the Bellacorick Iron Flush cSAC and Lough Dahybaun cSAC which are located within the Oweninny site boundary the proposed Oweninny Wind Farm is located largely outside all relevant designated Natural Heritage Areas and Natura 2000 sites in its vicinity. There will be therefore no effects arising on the existing landscape character of these external sites. The two designated sites, (Bellacorick Iron flush and Lough Dahybaun SAC) located within the study area will experience visual effects. Sites located outside of the principal zones, within the Northern Mayo Drumlin Zone and on elevated slopes and summits of the mountain ranges to the south, west and east will also experience visual effects.

Oweninny Wind Farm will be openly visible mainly from landscape designated areas, views and routes located within 1 to 10km radius from the wind farm site boundary, due to the flat or very gently undulating nature of the terrain surrounding the wind farm site and the lack of significant vertical features, as well as from elevated slopes and mountain summits located to the north, west and south. Visual effects will generally range from Moderate to Substantial. Large designated areas are not accessible by public roads and can be reached by foot only.

It should be noted that these sites are designated for their nature conservation value, which is not impacted upon by the visibility of the proposed wind farm.

#### **20.4.6 Geology and Soils/Water**

A drainage plan will be developed which will be integrated into the overall drainage of the site. This could potentially affect the rate of runoff from the site during heavy rainfall events and subsequently lead to higher peak flows in the receiving waters draining the site. This could affect the aquatic ecology of the rivers. However, an assessment made in Chapter 19 indicates that the percentage change in land use within individual river catchments is generally low, being generally less than 1% and hence no significant effect is predicted.

Sediment loss from bare areas during construction, via the drainage system could also impact on the aquatic ecology, particularly juvenile salmon and trout and to control this a Sediment and Erosion Control Plan incorporating settlement ponds and overland flow has

been prepared and will be implemented, see Chapter 19.

#### **20.4.7 Geology and Soils/Ecology**

The Bellacorick Iron Flush cSAC within the site is designated for the Marsh Saxifrage a rare protected species. This species is dependent on both the groundwater level within the flush and the hydrochemistry of the flush itself. A borrow pit is proposed in an area located to the east of the Bellacorick Iron Flush cSAC and its excavation could potentially effect the water level and the hydrochemistry of the groundwater even though it is a considerable distance away. To maintain the water level the borrow pit will be wet extracted, that is the groundwater level will be maintained. A detailed hydrogeological study has also been carried out, see Chapter 18, and this predicts no impact on the hydrochemistry of the flush area.

#### **20.4.8 Geology & Soils/Ecology**

Due to the presence of peat on site, the primary geotechnical consideration is the stability of the peat on sloping ground at the site. A potentially serious adverse impact on ecology could arise if a peat slip were to occur. A Peat Stability Risk Assessment was undertaken on site which identified two substantial areas of risk. However, this risk would be significantly reduced by adopting appropriate mitigation measures during the construction stage.

#### **20.4.9 Aquatic Ecology / Water**

The site is drained westward by the Oweninny/Owenmore systems and their tributaries, by the Shanvolahan/Deel system to the southeast and the Owenmore/Cloonaghmore system to the east. There are also many small streams and drainage channels feeding into these systems within the site. In the earlier years of peat harvesting these river systems received significant sediment loads from the site during the peat harvesting operations which was alleviated in later years by installation of sediment ponds. Some sediment loss continued to occur post harvesting, but to a much lesser extent, due to large expanses of bare peat area generating suspended solids. In response to this Bord na Móna developed a bog rehabilitation programme which led to significant improvement of river water quality, see Chapter 10. The proposed works has the potential to impact on water quality during the construction phase. In the absence of suitable standard pollution control measures, the excavation and removal of soils for the construction of permanent features such as cranestands, turbine and building foundations could lead to potential pollutants entering drains, thereby affecting water quality downstream of the site. A suitable drainage system, which incorporates measures to reduce the movement of sediment, has been designed for the development in order to reduce the potential for pollution, see Chapter 19.

The construction of additional tracks over blanket bog can result in hydrological changes to adjacent peat areas. However, over 80% of the access track network will be located on shallow peat areas, mainly on ridgelines and the overall access track design has been integrated into the Bord na Móna bog rehabilitation programme. This rehabilitation programme is leading to rewetting of previously drained areas and establishment of a vegetative cover reducing peat soil loss from the site. Existing bog remnant areas have also been avoided and this coupled with the bog rehabilitation programme will ensure that hydrological change from the development will not impact on the rehabilitation programme in the long term.

#### **20.4.10 Forestry /Ecology**

Ten of the turbines are in coniferous forest and the structures, associated tracks and access route will require the removal of 36 ha of forest. Coniferous forest is not a habitat of conservation value and is alien and, in the long-term, detrimental to the site – the removal of forest from this site is considered a neutral or positive impact from a habitats perspective.

#### **20.4.11 Forestry /Water Quality**

Felling of forest plantation can give rise to increased sediment and nutrient loss particularly on deep peat. Forest plantation in the Muing river catchment is situated on deep peat and brash decay arising from felling at this location could give rise to phosphorus release with subsequent enrichment impact on the river. Brash from this area will be removed as part of the access track construction and placed in a central peat repository within the site. At the repository area the potential for nutrient loss is low and hence the potential for significant impact on water quality low also.

#### **20.4.12 Forestry/Air and Climate**

Forest plantation acts as a carbon sink and the permanent loss of forest plantation will lead to a reduction in CO<sub>2</sub> being absorbed and locked up in the plantations. However, this loss is insignificant when compared to the amount of CO<sub>2</sub> which will be displaced by energy production from the Oweninny wind farm as opposed to conventional power production from coal, gas and oil.

#### **20.4.13 Landscape / Material Assets**

The landscape assessment concluded that Oweninny Wind Farm will alter the landscape and visual character within the landscape basin in the centre of the study area due to its extent and height. However, considering the large scale of the surrounding generally homogeneous landscape, the introduction of the wind farm will not be perceived as being out of context with the overall underlying landscape character. Large areas within the basin have been transformed by industrial peat harvesting activities in the past to fuel the now removed Bellacorick Power Station. The introduction of large scale wind turbines will therefore not be uncharacteristic when set within the attributes of the receiving landscape. It will intensify and re-establish an industrial sized energy harvesting activity. In contrast to the large scale horizontal extraction method of the past and the current small scale wind harvesting, the proposed development will result in a sustained presence of vertical man-made elements, which will form a new landmark over time.

One of the main findings of the Irish public's attitude to wind energy was that those with direct experience of wind farms in their locality do not in general consider that they have had any adverse impact on the scenic beauty of the area or on tourism. Fáilte Ireland surveys of tourist attitudes to wind farms indicates that the presence of wind farms makes no difference to most tourists' enjoyment of their holiday.

The proposed Visitor Centre at Bellacorick will provide an added attraction to tourists coming to area also helping to boost tourist interest in the general region.

#### **20.4.14 Air & Climate / Roads & Traffic**

The primary air quality issue relates to dust potentially arising from a number of activities that include construction transport within and off the site. Traffic associated with the development will also give rise to exhaust emissions during the construction phase. It is

proposed to use dust covers on vehicles carrying dust producing materials and to water appropriate sections of the access routes in order to minimise any dust emissions arising. The potential impacts are not considered significant in the context of the extent of traffic movements arising.

#### **20.4.15 Geology & Soils / Cultural Heritage**

The density of known monuments on the Oweninny site is low when compared to the general region. There are a total of four sites of archaeological interest/potential, three listed as Recorded Monuments, and one listed solely in the Sites and Monuments Record (SMR) of the Archaeological Survey of Ireland as being located within the overall proposed wind farm. The locations of these areas were integrated into the overall project design and will be clearly marked and avoided during construction. Although peat has been removed from large areas of the site reducing the potential for archaeological finds excavations of soils during construction have the possibility of uncovering previously unrecorded features and material of archaeological interest and potential. Archaeological monitoring of groundwork is proposed to ensure that any such finds are fully addressed and recorded.

### **20.5 EPA GUIDANCE**

The Environmental Protection Agency (EPA) published its Advice Notes on Current Practice (in the preparation of Environmental Impact Statements), which are designed to accompany the Guidelines on the information to be contained in Environmental Impact Statements, also published by the EPA.

The Advice Notes contain greater detail on many of the topics covered by the Guidelines and offer guidance on current practice for the structure and content of Environmental Impact Statements. They are divided into five sections, each providing detailed guidance on specific aspects to be considered in the preparation of an EIS.

Section 3 provides guidance on the topics which would usually be addressed when preparing an EIS for a particular class of development, highlighting typical issues which arise. The projects are grouped into 33 generic types, which have similar development or operational characteristics.

Project Type 33 addresses installations for the harnessing of wind power for energy production and the guidance on interaction of impacts for this project type notes as follows:

*The interaction of noise, visual impacts, access to underdeveloped areas and effects on ecology can combine to affect perceptions of the integrity of natural areas.*

At Oweninny the magnitude of separate impacts on the listed environmental factors is not such as to combine to affect the perception of integrity of a natural area.

### **20.6 CONCLUSIONS**

In terms of indirect and interaction of impacts no unacceptable environmental impacts are envisaged as a result of the construction and operation of the proposed Oweninny Wind Farm, provided that the recommended mitigation measures are implemented.

**Table 20-2: Summary of Potential Interactions during the Construction stage**

Chapter	Topic	Potential Impact	Interaction	Potential Impact	Relevant Chapter
Chapter 6	Human Beings	Increase in noise	Community	Reduction in recreational and amenity value	Chapter 7
		Landscape effects	Community	Reduction in recreational and amenity value	Chapter 11
Chapter 7	Noise	Increase in noise	Community	Reduction in recreational and amenity value	Chapter 7 and Chapter 14
		Ecology disturbance to birds	Terrestrial Ecology	Loss of Habitat or Species	Chapter 8
Chapter 8	Terrestrial Ecology	Loss of Habitat and Species	Ecology	Loss of Habitats and Species	Chapter 8
Chapter 10	Water and Aquatic Ecology	Loss of Habitat and Species	Freshwater Ecology	Loss of Habitat or Species	Chapter 10 Chapter 19
Chapter 11	Landscape	Change in Landscape character	Community	Reduced recreational amenity and residential quality	Chapter 11
Chapter 12	Air and Climate	Increase in dust and/or air emissions	Community	Reduced residential and recreational amenity	Chapter 12 and Chapter 14
Chapter 13	Geology and Soils	Impact on Hydrochemistry and water levels of protected areas	Ecology of designated areas	Loss of Habitat or Species	Chapter 8 and Chapter 18
		Impact of drainage plan on site	Groundwater and surface water	Increased peak flow from site	Chapter 19
				Increased solids loss	Chapter 10
Contamination of soils and groundwater	Groundwater and surface water	Reduced amenity value	Chapter 13		

Chapter	Topic	Potential Impact	Interaction	Potential Impact	Relevant Chapter
		Peat slippage	Terrestrial and Aquatic Ecology	Loss of Habitat and Species	Chapter 2 Appendix 4
Chapter 14	Traffic& Transport	Increased traffic on the N59	Community	Reduced recreational amenity and residential quality	Chapter 14
Chapter 15	Forestry	Loss of Habitat Species	Ecology	Disturbance of birds	Chapter 9
		Felling related loss of water quality	Aquatic ecology and water quality	Reduced water quality and loss of Habitat and species	Chapter 15 Chapter 10
		Loss of carbon adsorption	Community	Increased CO <sub>2</sub>	Chapter 12
Chapter 16	Material Assets	Loss of communication signals	Community	Reduced recreational amenity and residential quality	Chapter 16
		Loss of tourism	Community	Reduced recreational and landscape amenity	Chapter 16 and Chapter 11
Chapter 17	Cultural Heritage	Disturbance of previously unknown archaeological material	Community	Impact on cultural heritage	Chapter 17