



Cush Wind Farm

Environmental Impact Assessment Report

Chapter 14: Interaction of the Foregoing

Cush Wind Limited

Galetech Energy Services

Clondargan, Stradone, Co. Cavan Ireland

Telephone +353 49 555 5050

www.galetechenergy.com



Contents

14.1 Introduction	1
14.2 Interactions	1
14.2.1 Interaction 1: Population & Human Health and Landscape	2
14.2.2 Interaction 2: Population & Human Health and Noise & Vibration	2
14.2.3 Interaction 3: Population & Human Health and Shadow Flicker	3
14.2.4 Interaction 4: Population & Human Health and Materials Assets	3
14.2.5 Interaction 5: Biodiversity and Land & Soils	4
14.2.6 Interaction 6: Biodiversity and Water	4
14.2.7 Interaction 7: Land & Soils and Cultural Heritage	5
14.2.8 Interaction 8: Air Quality & Climate and Materials Assets (Transport & Access)	5
14.2.9 Interaction 9: Landscape and Cultural Heritage	5
14.2.10 Interaction 10: Cultural Heritage and Materials Assets (Transport & Access)	5
14.3 Summary of Interactions & Effects	6



14.1 Introduction

This chapter identifies interactions between the separate environmental assessments discussed in the preceding chapters which might otherwise not be noticed but which are required to be assessed to ensure all likely significant effects on the environment are identified and assessed.

The interactions between environmental factors have also been assessed throughout this EIAR by ensuring cross-assessments between factors, as relevant. As described in **Chapter 1**, close coordination and management of the EIAR project team, and careful read-across editing, ensured that competent experts were vigilant to the potential for complex interactions between environmental factors to result in likely significant effects; including direct, indirect, secondary and cumulative effects; and, where identified as likely, were adequately assessed. This also included an assessment of the possible accumulation of effects arising from the mitigation measures proposed in this EIAR that could unintentionally result in adverse effects such that they could become both likely and significant.

Reference should also be made to **Chapter 2** which provides an evaluation of reasonable project alternatives and **Chapter 3** which provides a detailed description of the project. As discussed, the design of the project was an iterative process and the final project integrates numerous 'mitigation by design', or 'embedded mitigation', measures which *ex ante* mitigate likely significant adverse effects, including the interaction between effects.

14.2 Interactions

It is general practice that interactions are shown by a means of a matrix, as set out in **Table 14.1** below, examining each aspect of the receiving environment which is assessed in detail in the respective chapters of this EIAR, and cross-tabulated against all other aspects that have also been assessed. This is accompanied by a brief text describing the interactions, including during the construction and operation phases.

Where an interaction is assessed to be both likely and significant, it is given a reference number in the matrix and the detail of the interaction is further discussed below, including whether it is weak or strong, or whether the interaction is positive or negative. Where there is no number indicated in the matrix, it is assessed that there is no likelihood for any significant effects by way of interaction between the environmental factors.

Interactions	Population and Human Health	Biodiversity	Land and Soils	Water	Air Quality & Climate	Landscape	Cultural Heritage	Noise & Vibration	Shadow Flicker	Material Assets
Population and Human Health						1		2	3	4
Biodiversity			5	6						
Land and Soils		5					7			
Water		6								
Air Quality & Climate										8
Landscape	1						9			
Cultural Heritage			7			9				10
Noise & Vibration	2									
Shadow Flicker	3									
Material Assets	4				8		10			

Table 14.1: Matrix of Interactions

14.2.1 Interaction 1: Population & Human Health and Landscape

The likely effects of the project on landscape, and the interaction with population and human health, have been discussed in **Chapter 4** and **Chapter 9** of this EIAR. The project has been assessed having regard to the sensitivity of the landscape, the degree of intrusion or dominance created and the degree to which is it visible in the landscape. Viewshed Reference Points (VRPs) consisting of views from key prospects and receptors were identified and a detailed analysis of each, accompanied by photomontages, is discussed in **Chapter 9**. Overall, it is concluded that the project will not give rise to any likely significant landscape or visual impacts such that could result in adverse population and human health effects.

14.2.2 Interaction 2: Population & Human Health and Noise & Vibration

During the construction phase, noise will be generated through a number of typical on-site construction stage activities which will be mitigated through appropriate mitigation and good construction practices. Likely effects will therefore be short-term and temporary in nature and a perceptible increase in noise, which is sufficient to

cause a significant effect to local residential amenity, is not likely. No significant vibration generating activities are proposed to be undertaken.

Predictions for noise likely to be generated during the operation phase have been carried out at all 106 no. receptors within 10-times overall tip height of a proposed turbine (2,000m). The noise prediction model confirms that the project will not result in the generation of likely significant noise levels such that adverse effects on population or human health would occur (see **Chapter 11**).

14.2.3 Interaction 3: Population & Human Health and Shadow Flicker

Once the project is operational, there is potential for shadow flicker to occur, depending on certain and highly infrequent, coincident set of meteorological conditions, as explained in detail in **Chapter 12**. All properties within 10-times overall tip height of the proposed turbines (2,000m) have been assessed for shadow flicker, with a total of 106 no. properties being identified and assessed.

It is predicted that, under an unlikely 'worst-case' scenario, 23 no. of the 106 no. receptors identified could exceed the 30-minutes per day threshold as set out in the *Wind Energy Development Guidelines for Planning Authorities 2006*. However, this calculation is a 'worst-case' scenario and not representative of actual conditions, and a very significant over-estimation of likely impacts.

A more realistic projection is the 'expected' hours per year. Under this scenario, none of the receptors surveyed is predicted to experience shadow flicker in excess of the 30-hours per annum threshold.

In terms of cumulative effects, it is predicted that, under the unlikely 'worst-case' scenario, 23 no. of the 106 no. receptors identified could exceed the 30-minutes per day threshold, and that none of the receptors surveyed would be predicted to experience shadow flicker in excess of the 30-hours per annum 'expected' threshold.

Following the implementation of standard technological mitigation measures to fully exclude any exceedances, any likely significant adverse effects on local population and human health can be entirely eliminated.

14.2.4 Interaction 4: Population & Human Health and Materials Assets

In terms of population and human health and material assets, the only likely interaction relates to transport and access.

The project will generate construction traffic during the initial construction stage. In terms of vehicle movements, it is estimated that approximately 18,330 trips (includes both in and out) of HGVs will be required, including abnormal loads transporting turbine components. Some minor levels of disruption may occur during public road upgrade works and the delivery of wind turbine components; however, traffic management measures will be agreed with the relevant local authority to ensure that any likely significant impacts are avoided.

The increase in traffic volumes on the surrounding road network will be temporary in nature as the expected duration of the construction phase is 15-18 months. Once turbines are in operation, traffic movements to and from the project site will be infrequent, probably averaging 1-2 no. visits per week by a light commercial vehicle for maintenance purposes. All trips to and from the site will be undertaken in accordance with a traffic management plan, which will be prepared and agreed with the local authorities. Overall, it is concluded that the project will not result in any

likely significant interactions between population and human health, and transport and access.

The project will not result in any likely interactions between population and human health, and aviation. As requested by the IAA, aviation warning lights will be fitted to the proposed wind turbines (and cranes during the construction phase); the specific requirements of which will be agreed with the IAA prior to the commencement of construction.

Generating electricity from wind energy has the potential to interfere with the quality of radio waves and microwaves used for communication purposes e.g. analogue TV signals, radio signals, aircraft and navigation systems and microwave links. As discussed in **Chapter 13**, a range of bodies were consulted regarding the project. As part of the environmental scoping and constraints analysis process, a number of organisations and service providers identified a risk of interference with existing telecommunication links. Through a combination of embedded and other mitigation measures, likely effects on telecommunication services can be avoided. Accordingly, interactions with population and human health are not likely to be significant.

The project will not result in any likely significant interactions between population and human health, and renewable and non-renewable resources.

14.2.5 Interaction 5: Biodiversity and Land & Soils

As outlined in **Chapter 6**, excavated ground exposed during the construction phase may lead to the sedimentation of nearby watercourses. Mitigation measures will be implemented such that there will be no likelihood of silt laden runoff to have an adverse effect on water quality and aquatic ecology in surrounding water bodies. Mitigation measures proposed during construction will also ensure that the project does not result in a likely significant effect on soils or the geological environment.

The excavation and removal of soils for the construction of permanent features will lead to localised habitat loss. However as discussed in **Chapter 5**, the project is generally located within areas of cutover peat, agricultural grassland and commercial forestry, which is of lower ecological importance and is not located within an ecologically sensitive area. The most ecologically sensitive area of the project site is the area around T2 which includes an area of bog woodland. However it has been determined that this woodland is non-Annex I.

Overall the conclusion of the biodiversity assessment is that the residual effects on important ecological receptors; including designated sites, habitats, flora and fauna; are not likely to be significant. Therefore, it is concluded that the project will not result in a likely significant interaction between biodiversity, and land and soils.

14.2.6 Interaction 6: Biodiversity and Water

As outlined in **Chapter 7**, excavated ground exposed during the construction phase may, in the absence of mitigation, lead to the sedimentation of nearby watercourses and downstream effects on habitats and species. A set of comprehensive mitigation measures is proposed which will be fully implemented in order to exclude the possibility for silt laden runoff to discharge to surface water features and to ensure that adverse effects on water quality and aquatic ecology do not occur.

The interaction between biodiversity and water is also closely related to the interaction between biodiversity and land and soils, and this interaction should also be read in conjunction with **Interaction 5**.

In light of the assessment undertaken and the mitigation proposed, there is no likelihood of significant interactions between biodiversity and water.

14.2.7 Interaction 7: Land & Soils and Cultural Heritage

The excavation of soils raises the possibility for previously unrecorded sub-surface cultural heritage features to be discovered. To limit any likely adverse effects or significant interactions, as is normal practice on construction sites, archaeological monitoring of all excavations; amongst other measures; will be undertaken under licence from the Department of Housing, Local Government and Heritage to ensure that any features uncovered are appropriately recorded and managed. Overall, therefore, it is concluded that the excavation of soils will not result in any likely significant interaction with cultural heritage.

14.2.8 Interaction 8: Air Quality & Climate and Materials Assets (Transport & Access)

There will be no likely significant effects as a result of the interaction between Material Assets (Transport & Access), and Air Quality and Climate. Exhaust emissions from construction vehicles will, as described at **Chapter 8**, result in a imperceptible, not significant, and short-term effect on local air quality. As the likely traffic volumes associated with the operation phase of the project will be very low; overall, it is assessed that there will be no likely significant interaction between Air Quality, Climate and Material Assets (Transport and Access).

14.2.9 Interaction 9: Landscape and Cultural Heritage

The likely effects of the project on landscape, and the interaction cultural heritage, have been discussed in **Chapter 9** and **Chapter 10** of this EIA. The project has been assessed having regard to the sensitivity of the landscape, the degree of intrusion or dominance created by it and the degree to which is it visible in the landscape. VRPs consisting of views from key prospects and receptors were identified and a detailed analysis of each, accompanied by photomontages, is discussed in **Chapter 9**.

The heritage and amenity sites which are located across the study area are typically clustered within the vicinity of the Shannon River and the town of Birr. Representative views from these areas are assessed in **Chapter 9**. Of these views, the overall significance of impact ranges from slight to slight-imperceptible.

As outlined in **Chapter 10**, there are no Recorded Monuments within the project site. It is assessed, based on analysis of photomontages prepared for the project (**Annex 9.2**), that there will be a likely long-term, reversible and moderate operation phase visual effect on these Recorded Monuments. Following decommissioning any moderate effects will be entirely reversed.

There is 1 no. National Monument with a Preservation Order within 5km of the project site. It is assessed, based on analysis of photomontages prepared for the project (**Annex 9.2**), that there will be a likely long-term, reversible and imperceptible operation phase visual effect on this National Monument. Following decommissioning the imperceptible effect will be entirely reversed.

Overall, it is concluded that the project will not give rise to any likely significant landscape or visual effects that could result in adverse cultural heritage effects.

14.2.10 Interaction 10: Cultural Heritage and Materials Assets (Transport & Access)

As discussed in **Chapter 10**, there are no recorded archaeological, architectural or cultural heritage features within the direct footprint of the proposed alteration works

to the turbine component haul route. As a result there will be no likely significant impact on archaeological features.

The removal of all topsoil and overburden within the proposed land take, including all temporary haul route works identified in **Chapter 13**, will be monitored under licence from the Department of Culture, Heritage and the Gaeltacht. Provision will be made for the full excavation and recording of any archaeological features or deposits that may be exposed. Overall, it is concluded that excavations, associated with the transportation of turbine components to the proposed development site will not result in any likely significant interactions with cultural heritage.

14.3 Summary of Interactions & Effects

All environmental factors are interrelated to some degree and the assessment of these interactions is an important requirement of the EIAR process. Having assessed the interaction of likely effects during the construction, operation and decommissioning phases; the interaction of effects is not assessed as likely to result in any likely significant effects that could magnify effects through the interaction or accumulation of effects. All interactions of effects are assessed and have been fully considered in the relevant chapters of this EIAR.

The project will result in positive effects at international, national, regional and local level, particularly in relation to population, human health, air quality and climate. During the operation phase, the project will result in a long-term positive effect on both air quality and climate. The generation of c. 187 GWh of electricity will lead to a net saving in terms of greenhouse gas emissions. The production of this renewable electricity results in the project having a net positive annual reduction of GHG emissions from the annual Total GHG Emissions in Ireland in 2030.

Overall, it is assessed that the impact of the project on the receiving environment is not likely to be significant. Likely adverse effects from the project vary in significance but are generally in the minor to negligible range. A number of positive impacts have also been identified such as community benefits; a reduction in the use of fossil fuels and the generation of greenhouse gases; and a significant contribution towards achieving Ireland's national and European targets for energy production from renewable sources.

