15. INTERACTION OF EFFECTS

15.1 Introduction

The preceding Chapters 5 to 14 identify the likely significant environmental effects that may have occurred or may occur in terms of Population and Human Health, Biodiversity (Flora and Fauna) Ornithology (Birds), Land, Soils and Geology, Hydrology and Hydrogeology (Water), Air and Climate, Noise and Vibration, Landscape and Visual, Cultural Heritage (Archaeological, Architectural and Cultural Heritage) and Material Assets (Roads and Traffic, Telecommunications and Aviation), as a result of the Cleanrath wind farm development as described in Chapter 4. All of the potential significant effects of the Cleanrath wind farm development during the operational and decommissioning phases and the measures implemented and proposed to mitigate them have been outlined in the preceding chapters. The effects encountered during the construction phase of the Cleanrath wind farm development have been summarised in this EIAR and the mitigation measures for the same are outlined in detail in the remedial EIAR (rEIAR) which accompanies this application. However, for any development with the potential for significant environmental effects there is also the potential for interaction between these effects. The result of interactive effects may exacerbate the magnitude of the effects or ameliorate them, or have a neutral effect.

A matrix is presented in Table 15-1 below to identify potential interactions between the various aspects of the environment already assessed in previous chapters. The matrix highlights the occurrence of potential positive or negative effects during the construction (C), operational (O) and decommissioning phases. It is considered that the potential effects during the decommissioning phase will be similar to those encountered during the construction phase effects but of a lesser magnitude. The matrix is symmetric, with each environmental component addressed in the relevant chapters being placed on both axes of a matrix, and therefore, each potential interaction is identified twice.

Table 15-1 Interaction Matrix: Potential for Interacting Impacts

	Phase	Population and Human Health	Biodiversity	Ornithology	Land, Soils and Geology	Water	Air and Climate	Noise and Vibration	Landscape and Visual	Cultural Heritage	Material Assets
Population and Human Health	C										
	O										
	D										
Biodiversity	C										
	O										
	D										
Ornithology (Birds)	C										
	O										
	D										
Land, Soils and Geology	C										
	O										
	D										
Water	C										
	O										
	D										
Air and Climate	C										
	O										
	D										
Noise and Vibration	C										
	O										
	D										
Landscape and Visual	C										
	O										

	Phase	Population and Human Health	Biodiversity	Ornithology	Land, Soils and Geology	Water	Air and Climate	Noise and Vibration	Landscape and Visual	Cultural Heritage	Material Assets
	D										
Cultural Heritage	C										
	O										
	D										
Material Assets	C										
	O										
	D										

Legend: No Interacting Effect: Positive Effect:
Neutral Effect: Negative Effect:

The potential for interaction of effects has been assessed as part of the Impact Assessment process. While the work on all parts of the Environmental Impact Assessment Report (EIAR) were not carried out by MKO, the entire project and all the work of all sub-consultants was managed and coordinated by the company. This EIAR was edited and collated by MKO as an integrated report of findings from the impact assessment process, by all relevant experts, and effects that potentially interact have been assessed in detail in the individual chapters of the EIAR and summarised in Section 15.2 below.

Where any potential negative impacts have been identified during the assessment process, these impacts have been avoided by design or reduced by the mitigation measures, as presented throughout the EIAR.

15.1.1 Statement of Authority

This section of the EIAR has been prepared by David Naughton and Owen Cahill and reviewed by Michael Watson, of MKO. David is an Environmental Scientist with over three years of consultancy experience with MKO and has been involved in a number of wind energy EIAR applications. David holds a BSc (Hons) in Environmental Science. Owen is an Environmental Engineer with over 11 years' experience in environmental management and construction industries. Owen has held the role of project manager for a range of EIAR applications and projects across Ireland. Owen holds a BSc. in Construction Management and MSc. in Environmental Engineering. Michael Watson is a Project Director with MKO; with over 18 years' experience in the environmental sector. His project experience includes the management and productions of Environmental Impact Statements (EISs)/EIARs, particularly within the wind energy sector.

15.2 Interactions

15.2.1 Population and Human Health

Population and Human Health, Air and Climate, and Noise

As identified in Chapter 5, the construction phase caused a short-term slight negative effect on human health due to the increase in noise levels and vehicular emissions during the construction phase of the Cleanrath wind farm development.

During the operational phase the Cleanrath wind farm development has the potential to generate noise but as identified in Chapter 11 of this EIAR, the potential effects on population and human health are not siginificant.

During the operational phase, the energy generated by the Cleanrath wind farm development will offset energy and the associated emission of greenhouse gases from electricity-generating stations dependent on fossil fuels, thereby having a positive effect on climate change (i.e. slowing the rate of global warming). In doing so, there will likely be reduced effects from climate change on human health and reducing the dependency on fossil fuels to generate energy.

Population and Human Health, Land, Soils and Geology Air and Climate

The excavation and movement of peat and spoil during the construction phase of the Cleanrath wind farm development resulted in some dust emissions. However, these impacts were not significant and were relatively short-term in duration, resulting in a short-term slight negative effect on local air quality and human health. Mitigation measures to reduce dust emissions generated during the construction phase of the Cleanrath wind farm development are presented in Chapter 10 of rEIAR.

Population and Human Health and Water

As described in Chapter 9 of this EIAR, the construction phase of the Cleanrath wind farm development the low levels of water pollution and resulting impacts as a result of site activities did not cause any significant negative impacts on water quality within the catchment. Mitigation measures used to minimise the risk of any such issues are presented in Chapter 9 of the rEIAR.

Population and Human Health, and Material Assets

Chapter 14 of this EIAR discusses how the construction phase of the project resulted in traffic movements of abnormal loads and increased traffic volumes on the local road network. The resulting increase in traffic levels was assessed to be a slight to moderate, short-term negative effect. The increase in traffic levels did not have any significant negative impacts on local population and human health. No impacts are anticipated during the operational stage of the Cleanrath wind farm development, while similar levels of traffic observed during construction are anticipated during the decommissioning phase.

Population and Human Health, and Landscape and Visual

The construction phase of the Cleanrath wind farm development lasted approximately 16 months, resulting in the movement of construction machinery and turbine transport vehicles into and out of the site. The construction phase resulted in a short-term imperceptible negative effect on landscape and visual amenity. Whether the long-term change in landscape created by the erection of the turbines is deemed to be positive or negative is a subjective matter. What appears to be a positive visual effect to one viewer could be deemed to be a negative effect by another viewer. The landscape and visual impact assessment of the Cleanrath wind farm development, included as Chapter 13 of this EIAR, concludes that, from 11 viewpoints assessed, the visual effect is moderate from six locations and ranges from no impact to slight effects at the remaining locations.

It is considered that the potential effects during the decommissioning phase, under the headings above, will be similar to those encountered during the construction phase effects but of a lesser magnitude.

15.2.2 Biodiversity

Biodiversity and Land, Soils and Geology

The removal of forestry, peat and spoil, during construction of the Cleanrath wind farm development, resulted in some loss of habitat in the areas surrounding the works area thereby, causing a long term, negative effect on flora and fauna. A habitat restoration and enhancement plan, which outlines measures to restore 4.13ha of peatland habitats, has been prepared and is included as Appendix 6-8. No significant residual effects are anticipated to have occurred or to occur for biodiversity during any stage of the Cleanrath wind farm development.

Biodiversity and Water

Site activities during the construction phase did not result in water pollution, which would deteriorate habitat quality for flora and fauna that use that water within the same catchment. No significant negative effects are anticipated to have occurred or to occur for biodiversity during any stage of the Cleanrath wind farm development with respect to water quality. The mitigation measures employed during the construction and resulting impacts have been assessed in Chapter 6 and Chapter 9 of the rEIAR.

Biodiversity and Air and Climate

During the construction phase of the Cleanrath wind farm development, the increase in airborne dust particles may have had a short term slight negative impact on the local flora and fauna.

During the operational phase, the Cleanrath wind farm development will help offset carbon emissions from fossil fuel based electricity generation plants, which will help contribute to a slower increase in the rate of global warming and a reduction in air pollution, consequently, could in combination with other renewable energy projects, have a long term, significant positive effect on flora and fauna.

Biodiversity and Noise and Vibration

Site activity during the construction phase resulted in increased noise levels that may have impacted fauna, thereby having a temporary, short-term slight, negative effect. Similarly, local fauna may experience some disturbance/displacement during the operation of turbines.

Biodiversity and Landscape

The removal of some vegetation within the Cleanrath wind farm development and surrounding areas resulted in a change to the visual landscape during the construction phase. The associated habitat loss and fragmentation is likely to have had a long-term slight negative impact on the local flora and fauna.

It is considered that the potential effects during the decommissioning phase, under the headings above, will be similar to those encountered during the construction phase effects but of a lesser magnitude.

15.2.3 Ornithology

Ornithology and Water

Site activities during the construction phase did not result in water pollution, which would deteriorate habitat quality for birds and waterfowl that use that water within the same catchment. No significant negative effects are anticipated to have occurred or to occur for birds during any stage of the Cleanrath wind farm development with respect to water quality. The mitigation measures employed during the construction and resulting impacts have been assessed in Chapter 7 and Chapter 9 of the rEIAR.

Birds and Air and Climate

During the operational phase, the Cleanrath wind farm development will help offset carbon emissions from fossil fuel based electricity generation plants, which will help contribute to a slower increase in the rate of global warming and, consequently, could in combination with other renewable energy projects, contribute to preventing the loss of bird species from Ireland as a result of climate change.

During the construction phase of the Cleanrath wind farm development, the increase in airborne dust particles may have had a short term slight negative impact on the local avian populations.

Birds and Noise and Vibration

Site activity during the construction phase resulted in increased noise levels that may have impacted local bird population, thereby having a temporary, short-term slight, negative effect. Best practice mitigation measures are included in Chapter 7 and Chapter 11 to minimise the potential negative effect of noise generated during the construction phase on ornithology. Similarly, local bird populations may experience some disturbance/displacement during the operation of turbines.

It is considered that the potential effects during the decommissioning phase, under the headings above, will be similar to those encountered during the construction phase effects but of a lesser magnitude.

15.2.4 Land, Soils and Geology

Land, Soils and Geology and Water

As identified in Chapter 9 of this EIAR, the movement and removal of peat and spoil during the construction phase had the potential to have a negative effect on water quality. Mitigation measures were implemented to ensure there are no significant, negative effects on water quality. These mitigation measures are presented in Chapter 9 of the rEIAR.

Land, Soils and Geology and Archaeological, Architectural and Cultural Heritage

The removal of peat and spoil during the construction phase had the potential to have a permanent, significant, negative effect on previously unrecorded sub-surface archaeological site and artefacts. Mitigation measures were implemented, which are outlined in Chapter 12, to reduce the potential for negative effects on unrecorded sites and artefacts during excavations. No previously unrecorded archaeological sites or artefacts were discovered during peat and spoil removal associated with construction activities.

Land, Soils and Geology and Landscape and Visual

The removal of peat and spoil and the subsequent replacement with crushed stone for the construction of site roads and hardstanding areas within the Cleanrath wind farm development slightly altered the local landscape. Visual effects arising from the ancillary project elements are slight, localised and long-term where seen, but remain largely unseen from within and outside the site.

It is considered that the potential effects during the decommissioning phase, under the headings above, will be similar to those encountered during the construction phase effects but of a lesser magnitude.

15.2.5 Air and Climate

Air and Climate and Material Assets

The movement of construction vehicles both within and to and from the site resulted in an increase in airborne dust particles and exhaust emissions causing a short-term slight negative effect during the construction phase. This is summarised in Chapter 10 of this EIAR and assed in detail in Chapter 10 of the rEIAR, and mitigation measures were implemented to help minimise any potential effects.

It is considered that the potential effects during the decommissioning phase will be similar to those encountered during the construction phase effects but of a lesser magnitude.

15.2.6 Landscape and Visual

Landscape and Visual and Cultural Heritage

As described in Chapter 12 of this EIAR, a number of monuments within proximity of the Cleanrath wind farm development have some level of visibility of the turbines at Cleanrath. However, there are no significant negative visual effects on any archaeological, architectural, and cultural heritage.

15.3 Mitigation and Residual Impacts

Where any potential interactive negative impacts have been identified in the above, a full suite of appropriate mitigation measures has already been included in the relevant sections (Chapters 5-14) of the EIAR (and in the rEIAR which accompanies this application). The implementation of these mitigation measures helped to reduce or remove the potential for these effects. Information on potential residual impacts and the significance of effects, is also presented in each relevant chapter.