

16. INTERACTION OF EFFECTS

16.1 Introduction

The preceding Chapters 5 to 15 of this Environmental Impact Assessment Report (EIAR) identify the potential significant environmental effects that may occur in terms of Population and Human Health, Shadow Flicker, Biodiversity (Flora and Fauna), Birds (Ornithology), Land, Soils and Geology, Water (Hydrology and Hydrogeology), 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 proposed development as described in Chapter 4 of this EIAR. 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 improve them or have a neutral effect.

A matrix is presented in Table 16-1 below to identify potential interactions of effects between the various aspects of the environment already assessed in this EIAR. The matrix highlights the potential for the occurrence of positive, neutral or negative effects during both the construction (C) and operational (O) phases. It is considered that the potential effects during the decommissioning phase will be similar to the construction phase effects but of a lesser magnitude. The matrix is symmetric, with each environmental component addressed in the chapters of this EIAR being placed on both axes of a matrix, and therefore, each potential interaction is identified twice.

Table 16-1 Interaction Matrix: Potential for Interacting Impacts

	Phase	Population and Human Health	Biodiversity, Flora and Fauna	Ornithology	Land, Soils and Geology	Water	Air and Climate	Noise and Vibration	Landscape and Visual	Cultural Heritage	Material Assets
Population and Human Health	C	Black	Light Blue	Light Blue	Light Blue	Pink	Pink	Pink	Pink	Light Blue	Pink
	O	Black	Light Blue	Light Blue	Light Blue	Light Blue	Light Green	Pink	Yellow	Light Blue	Light Blue
Biodiversity, Flora and Fauna	C	Light Blue	Black	Light Blue	Pink	Pink	Pink	Pink	Pink	Light Blue	Light Blue
	O	Light Blue	Black	Light Blue	Light Blue	Pink	Light Green	Light Blue	Pink	Light Blue	Light Blue
Ornithology, Birds	C	Light Blue	Light Blue	Black	Pink	Pink	Pink	Pink	Light Blue	Light Blue	Light Blue
	O	Light Blue	Light Blue	Black	Light Blue	Pink	Light Green	Light Blue	Light Blue	Light Blue	Light Blue
Land, Soils and Geology	C	Light Blue	Pink	Pink	Black	Pink	Pink	Light Blue	Pink	Pink	Light Blue
	O	Light Blue	Light Blue	Light Blue	Black	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue
Water	C	Pink	Pink	Pink	Pink	Black	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue
	O	Light Blue	Pink	Light Blue	Light Blue	Black	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue
Air and Climate	C	Pink	Pink	Pink	Pink	Light Blue	Black	Light Blue	Light Blue	Light Blue	Pink
	O	Light Green	Light Green	Light Green	Light Blue	Light Blue	Black	Light Blue	Light Blue	Light Blue	Light Blue
Noise and Vibration	C	Pink	Pink	Pink	Light Blue	Light Blue	Light Blue	Black	Light Blue	Light Blue	Light Blue
	O	Pink	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Black	Light Blue	Light Blue	Light Blue
Landscape and Visual	C	Pink	Pink	Light Blue	Pink	Light Blue	Light Blue	Light Blue	Black	Light Blue	Light Blue
	O	Yellow	Pink	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Black	Pink	Light Blue
Cultural Heritage	C	Light Blue	Light Blue	Light Blue	Pink	Light Blue	Light Blue	Light Blue	Light Blue	Black	Light Blue
	O	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Pink	Black	Light Blue
Material Assets	C	Pink	Light Blue	Light Blue	Light Blue	Light Blue	Pink	Light Blue	Light Blue	Light Blue	Black
	O	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Black

Legend: No Interacting Effect: Light Blue Positive Effect: Light Green
 Neutral Effect: Yellow Negative Effect: Pink

The potential for interaction of effects has been assessed throughout this EIAR, as part of the impact assessment process. While the work on all parts of the EIAR was 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 16.2 below.

Where any potential negative impacts have been identified during the assessment process, these impacts have been avoided or reduced by design and the proposed mitigation measures, as presented throughout the EIAR and highlighted in Section 16.2 below.

16.1.1 Statement of Authority

This chapter of the EIAR was completed by Lorraine Meehan and Michael Watson. Lorraine is a Senior Environmental Scientist with MKO with over 12 years of experience in private consultancy and has been involved in the preparation of EIARs for numerous wind energy projects. Lorraine holds a B.Sc. (Hons) in Environmental Science from NUI, Galway. Michael Watson is Project Director and head of the Environment Team in MKO. Michael has over 18 years' experience in the environmental sector. Following the completion of his Master's Degree in Environmental Resource Management, Geography, from National University of Ireland, Maynooth he worked for the Geological Survey of Ireland.

16.2 Impact Interactions

16.2.1 Population and Human Health

Population and Human Health, Air and Climate, Noise

As identified in Chapter 5 (Population and Human Health) of this EIAR, the construction phase has the potential to create a short-term, negative effect on human health due to the nuisance caused by construction plant and vehicle noise emissions, should the mitigation measures outlined in Chapters 11 and 13 (Air and Climate, Noise and Vibration) not be implemented.

During the operational phase, the proposed development has the potential to generate noise but as identified in Chapter 13, the potential effects on population and human health are not significant.

During the operational phase, the energy generated by the proposed 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 (i.e. slowing the rate of global warming). In doing so, there will be reduced effects from climate change on human health over the 'do-nothing' scenario and continuing reliance on generating energy using fossil fuels.

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

The excavation and movement of spoil during the construction phase of the Proposed Development has the potential to create dust emissions which, consequently, have the potential to have a temporary, slight, negative effect on local air quality and human health. Mitigation measures to reduce dust emissions generated during the construction phase of the Proposed Development are presented in Chapter 11 (Air and Climate).

Population and Human Health and Water

As described in Chapter 10 (Water) of this EIAR, the construction phase of the proposed development has the potential to give rise to some water pollution as a result of site activities, and any water pollution could have a potential significant negative effect on the health of other users of that water within the same catchment. Mitigation measures are presented in Chapter 10 to minimise the potential of any such issues occurring and to ensure the protection of water supplies.

Population and Human Health, and Material Assets

Chapter 15 (Material Assets) of this EIAR discusses how the construction phase of the project will give rise to traffic movements of abnormal size and increased traffic volumes on the local road network and, therefore, is likely to create some short-term inconvenience for other road users. A Traffic Management Plan will be in place to minimise all disruption insofar as possible, as described in the Construction and Environmental Management Plan in Appendix 4-4 of this EIAR.

Population and Human Health, and Landscape and Visual

The construction phase of the proposed development will see the temporary introduction of construction machinery and the erection of wind turbines into a natural, but already modified, landscape. The erection of the turbines in particular will change the existing landscape. 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 proposed development, included as Chapter 12 (Landscape and Visual) of this EIAR, concludes that, from the 15 viewpoints assessed, the visual effect will be moderate from three locations and ranges from not significant to slight at the remaining locations. Therefore, it is considered that the overall visual impact of the proposed development will not be significant.

16.2.2 Biodiversity

Biodiversity and Land, Soils and Geology

The removal of forestry and spoil during construction of the proposed development, is likely to result in some disturbance of flora and fauna in the areas surrounding the proposed works area thereby, potentially causing a long term, slight, negative effect on flora and fauna. Excavated spoil will be used for the restoration of the proposed borrow pits or for landscaping.

Biodiversity and Water

Site activities during the construction phase have the potential to give rise to some water pollution, and consequential indirect effects (such as disturbance and deterioration of habitat quality) on flora and fauna that use that water within the same catchment. The site activities during the construction phase, and continuing on for the operational phase, will give rise to additional localised drainage, which has the potential to have a significant, long term, negative effect on flora and their associated habitats should the appropriate measures not be implemented. These potential impacts have been assessed in Chapter 7 (Biodiversity) and Chapter 10 (Water) of this EIAR, and the relevant measures outlined in these chapters will be in place to avoid any water pollution and subsequent effect on flora and fauna.

Biodiversity and Air and Climate

During the construction phase of the proposed development, increased vehicular and dust emissions within and around the site have the potential to be a nuisance to flora and fauna, thereby having a temporary, slight, negative effect. The mitigation measures outlined in Chapter 11 (Air & Climate) of the EIA will ensure that the potential for negative effects is reduced or eliminated.

During the operational phase, the proposed 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 could give rise to noise that could be a nuisance for fauna, thereby having a temporary, slight, negative effect. Best practice mitigation measures are included in Chapter 7 (Biodiversity) and Chapter 13 (Noise and Vibration) to minimise the potential negative effect of noise generated during the construction phase on ornithology.

Biodiversity and Landscape

The removal of forestry and vegetation within the development footprint and surrounding areas is likely to result in a change to the visual landscape during the construction phase, which will become part of the normal landscape of the wider area for the duration of the operational phase. The visual effect of this change is considered to be long-term, localised and slight.

16.2.3 Ornithology (Birds)

Ornithology and Land, Soils and Geology

The removal of forestry and spoil, during construction of the Proposed Development, is likely to result in some disturbance of flora and fauna, including birds, in the areas surrounding the proposed works area thereby, potentially causing an indirect long term, slight, negative effect on birds.

Ornithology and Water

Site activities during the construction phase have the potential to give rise to some water pollution, and consequential indirect effects on birds and their prey species (such as disturbance and deterioration of habitat quality) that use that water within the same catchment. The site activities during the construction phase, and continuing on for the operational phase, are likely to give rise to additional localised drainage, which has the potential to have a significant, negative effect on the habitats of particular bird species and subsequently a long, term, negative effect on ornithology should the measures outlined in Chapter 10 (Water) of this EIA not be implemented.

Ornithology and Air and Climate

During the construction phase of the Proposed Development, increased vehicular and dust emissions within and around the site have the potential to be a nuisance for birds, thereby having a temporary, slight, negative effect. The mitigation measures outlined in Chapter 11 (Air and Climate) of the EIA will ensure that the potential for negative effects is reduced or eliminated.

During the operational phase, the Proposed 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.

Ornithology and Noise and Vibration

Site activity during the construction phase could give rise to noise that could be a nuisance for birds that use the site, therefore, causing a temporary, slight, negative effect on ornithology. Best practice mitigation measures are included in Chapter 8 (Birds) and Chapter 13 (Noise and Vibration) to minimise the potential negative effect of noise generated during the construction phase on birds.

16.2.4 Land, Soils and Geology

Land, Soils and Geology and Water

As identified in Chapter 10 (Water) of this EIAR, the movement and removal spoil during the construction phase has the potential to have a significant, negative effect on water quality through potentially silt-laden runoff from the proposed works areas. Mitigation measures to ensure there are no significant, negative effects on water quality are presented in Chapter 10.

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

The removal of spoil during the construction phase has the potential to have a permanent, significant, negative effect on previously unrecorded sub-surface archaeological site and artefacts. Mitigation measures outlined in Chapter 14 (Cultural Heritage) will reduce the potential for negative effects on unrecorded sites and artefacts during excavations.

Land, Soils and Geology and Landscape and Visual

The removal of spoil and the subsequent replacement with crushed stone for the construction of site roads and hardstanding areas within the proposed development site has the potential to alter the local landscape. The visual effect of this change is expected to be long term, localised in nature and slight.

16.2.5 Air and Climate

Air and Climate and Material Assets

The movement of construction vehicles both within and to and from the site has the potential to give rise to dust nuisance effects during the construction phase. This is assessed further in Chapter 11 (Air and Climate) of this EIAR, and mitigation measures are presented to minimise any potential effects.

16.2.6 Landscape and Visual

Landscape and Visual and Cultural Heritage

As described in Chapter 14 (Cultural Heritage) of this EIAR, the proposed development has the potential to change the landscape setting of recorded sites and monuments in the wider area. However, it is concluded in Chapter 12 (Landscape & Visual) that any potential, indirect, visual effect of the proposed development on national and recorded monuments would not be significant.

16.3 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 to 15) of the EIAR. The implementation of these mitigation measures will 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.