15. INTERACTION OF EFFECTS

15.1 Introduction

The preceding Chapters 5 to 14 of this Environmental Impact Assessment Report (EIAR) identify the potential significant environmental effects that may occur in terms of Population and Human Health, Biodiversity (Flora and Fauna) Ornithology (Birds), Land, Soils and Geology, Water (Hydrology and Hydrogeology), Air and Climate, Noise and Vibration, Cultural Heritage (Archaeological, Architectural and Cultural Heritage), Landscape and Visual, 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 potential significant 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 15-1 below to identify potential interactions of impacts 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 the operational phase (O) and the decommissioning phase (D). As the Proposed Development does not include any new construction works, related construction phase effects are not included. It is considered that the potential effects during the decommissioning phase will be similar to typical wind farm construction phase effects, but of a lesser magnitude, and these have been included in the interactions matrix below. 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 15-1 Interaction Matrix: Potential for Interacting Impacts

EIAR Chapter Title	Phase	Population & Human Health	Biodiversity, Flora & Fauna	Ornithology, Birds	Land, Soils & Geology	Water	Air & Climate	Noise & Vibration	Landscape & Visual	Cultural Heritage	Material Assets
Population & Human Health	O										
	D										
Biodiversity, Flora & Fauna	O										
	D										
Ornithology, Birds	O										
	D										
Land, Soils & Geology	O										
	D										
Water	O										
	D										
Air & Climate	O										
	D										
Noise & Vibration	O										
	D										
Landscape & Visual	O										
	D										
Cultural Heritage	O										
	D										
Material Assets	O										
	D										

Notes: O = Operational Phase D = Decommissioning Phase

No Interacting Effect: Positive Effect:

Neutral Effect: Negative Effect:

The potential for interaction of impacts 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 impacts that potentially interact have been assessed in detail in the individual chapters of the EIAR above and summarised in Section 15.2 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 15.2 below.

15.1.1 Statement of Authority

This section of the EIAR has been prepared by Eoin Hurst and reviewed by Michael Watson, both of MKO.

Eoin Hurst is a Project Environmental Engineer with MKO with over 12 years of progressive experience in private sector civil and environmental engineering consultancy. Eoin holds a BE in Civil Engineering from NUI Galway, a MSc in Environmental Technology from Imperial College London and is a full member of Engineers Ireland (MIEI). Prior to joining MKO in 2019, Eoin worked as an Environmental Engineer with Tetra Tech in the United States.

Michael Watson has over seventeen years' experience in the environmental sector and had worked for the Geological Survey of Ireland and then a prominent private environmental & hydrogeological consultancy prior to joining MKO in 2014. Michael completed an MA in Environmental Management at NUI, Maynooth in 1999. Michael is a professional geologist (PGeo) and full member of IEMA (MIEMA) as well as a Chartered Environmentalist (CEnv).

15.2 Impact Interactions

15.2.1 Population and Human Health

Population and Human Health, Air and Climate, and Noise

As identified in Chapter 5: Population and Human Health of this EIAR, the operational phase has the potential to create long-term, imperceptible residual impacts related to health and safety during the operational life of the Proposed Development. Mitigation measures to remove any potential health and safety impacts from the wind farm operation are provided in Chapter 5 of this report.

During the operational and decommissioning phases the Proposed Development has the potential to generate noise but as identified in Chapter 11: Noise, the potential effects on population and human health are not siginificant. Mitigation measures and best practices to be adopted concerning noise are presented in Chapter 11.

During the operational phase, the energy generated by the Proposed Development will offset energy and the associated emissions of greenhouse gases (GHGs) from electricity-generating stations dependent on fossil fuels, thereby having a positive effect on air quality and 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, and Air and Climate

The potential for excavation and movement of soils during the decommissioning phase of the Proposed Development may lead to generation of dust emissions which, consequently, have the potential to have a temporary, imperceptible, 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 10: Air and Climate.

Population and Human Health, and Water

As described in Chapter 9: Water of this EIAR, the operational phase of the Proposed Development does not involve any alterations to the site drainage or otherwise and will not give rise to significant impacts to the water environment.

The future decommissioning phase of the Proposed Development, in circa 15 years, has the potential to give rise to some limited water pollution as a result of likely on-site activities (earthworks, use of hydrocarbons for plant and machinery), 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 9 to minimise the potential of any such issues occurring.

Population and Human Health, and Material Assets

Chapter 14: Material Assets of this EIAR discusses how the operational and decommissioning phases of the Proposed Development will impact traffic volumes. The operational phase will have long term, imperceptible, neutral impacts on traffic and transportation and will not give rise to any significant effects upon the local road network or road users. The decommissioning phase of the development will likely result in a residual impact to other road users that is slight, temporary, and negative in effect. Prior to any future decommissioning of the wind farm, a decommissioning plan, including material recycling / disposal and a traffic management plan will be prepared for agreement with the local authority.

Population and Human Health, and Landscape and Visual

The Proposed Development is an existing wind farm facility, first commissioned in 2002, and no significant changes to the wind turbines or other site infrastructure are proposed. The Carnsore Wind Farm has been in operation for 19 years and therefore forms part of the existing landscape setting. The Proposed Development will remain aligned with the future landscape and visual designations and policies guiding the development of Co. Wexford. The scale, siting and design of the turbines is considered appropriate, as the turbines do not detract from the scenic amenity views and are readily absorbed into the surrounding flat landscape. The landscape and visual impact assessment of the Proposed Development, included as Chapter 13 of this EIAR, concludes that, from 12 viewpoints assessed, the visual effect will be 'moderate' from four locations, and ranges from 'slight' to 'not significant' at the remaining locations. Therefore, it is considered that the overall visual impact of the Proposed Development will not be significant.

15.2.2 Biodiversity

Biodiversity, and Land, Soils and Geology

No excavations, groundworks or other disturbance to land or soils is included as part of the operational phase of the Proposed Development. Therefore, no disturbance to flora or fauna related to land, soils or geology is likely during the wind farm's proposed continued operation.

The decommissioning phase of the Proposed Development may involve limited excavations and groundworks around the turbines, in order to return the site to beneficial use as agricultural lands. Reuse of local excavated soils and re-seeding with native plant species is proposed. Chapter 6: Biodiversity provides a full assessment of the likely effects and impacts upon habitats including designated sites, bats and other mammals and concludes that the operational phase of the wind farm is unlikely to give rise to significant effects on the Key Ecological Receptors (KERs).

Biodiversity and Water

Chapter 6 of this EIAR assessed the potential impacts of the operational phase upon aquatic ecology and concluded that the habitat Key Ecological Receptors (KERs), assessed as being of local (higher) value, would have a high sensitivity to changes in water quality. Site activities during the operational phase of the Proposed Devleopment have a low potential to give rise to water pollution incidents, when the proposed measures to protect water quality are implimented, as outlined in Chapters 4, 6 and 9 of this EIAR. Potential impacts have therefore been assessed as not significant, and no consequential indirect effects, such as disturbance and deterioration of habitat quality on flora and fauna, that use that water within the same catchment are likely.

Biodiversity, and Air and Climate

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, this is likely, in combination with other renewable energy projects, have a long term, significant positive effect on flora and fauna.

During the decommissioning 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: 10 Air and Climate will ensure that the potential for negative effects is reduced or eliminated.

Biodiversity, and Noise and Vibration

No potential impacts upon biodiversity from noise and vibration arising during the operational phase of the Proposed Development were identified in Chapter 6 of the EIAR.

Site activity during the decommissioning 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 6 and Chapter 11 to minimise the potential negative effect of noise generated during the decommissioning phase on biodiversity.

Biodiversity, and Landscape

No significant impacts are likely upon vegetation within the development footprint and surrounding area during the operational phase of the existing wind farm. As the wind farm has been in operation since 2002 it is now considered to have become become part of the normal landscape of the wider area. No significant visual effects are likely during the operational phase.

The decommissioning phase proposes to replace hardstanding areas with soil and re-seed these locations resulting in a long-term, localised and slight positive impact.

15.2.3 Ornithology

Ornithology, and Land, Soils and Geology

There is no removal or likely disturbance to land and soils as part of the Proposed Development. Chapter 7: Ornithology concluded that there will no likely significant effects on the integrity of any designated sites during the operational phase.

The proposed restoration of lands around the base of turbines as part of the decommissioning phase is not likely to have a significant effect upon birds.

Ornithology, and Water

The limited site maintenance activities that will take place during the operational phase, do not include any changes to the existing site drainage. With implementation of the mitigation measures outlined in Chapter 9 of this EIAR, no impacts to birds from the water environment are envisaged during the operational phase.

Site activities during the future decommissioning 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. Mitigation measures (as per Chapter 9) if implemented will ensure there are no significant effects on birds or their habitat. Further measures would also be included in a decommissioning plan to be agreed with the local authority in advance of works.

Ornithology, and Air and Climate

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.

During the decommissioning 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 10 of the EIAR will ensure that the potential for negative effects is reduced or eliminated.

Ornithology, and Noise and Vibration

Chapter 7: Ornithology concluded that as the operational parameters of the wind farm are not changing then the magnitude of change resulting from noise and visual disturbance causing displacement of birds by extending the operational phase is low, and is not significant.

Site activity during the future decommissioning of the Proposed Development could give rise to noise that could be a nuisance for birds that use the site, therefore, causing a temporary, 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 decommissioning phase on ornithology.

15.2.4 Land, Soils and Geology

Land, Soils and Geology, and Water

The operational phase of the Proposed Development will not include any groundworks (e.g. excavations) or other activities likely to result in ground disturbance or pollution, which may give rise to impacts upon the water environment. Chapter 8 of the EIAR concluded that no significant effects to the subsurface environment will occur during the operational phase.

As identified in Chapter 8: Land Soils & Geology and Chapter 9: Water of this EIAR, groundworks including excavations and movement of spoil during the decommissioning 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 9.

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

No disturbance to the subsurface (soils and geology) is proposed as part of the extended operational phase of the wind farm. Chapter 12: Cultural Heritage concluded that as no groundworks will take place during the operational phase, no direct effects on archaeology, architecture and cultural heritage will occur.

Potential groundworks including localised excavations and movement of spoil during the decommissioning phase of the Proposed Development has the potential to have a permanent, significant, negative effect on previously unrecorded sub-surface archaeological site and artefacts. The implementation of mitigation measures outlined in Chapter 12 will reduce the potential for negative effects on unrecorded sites and artefacts during excavations.

Land, Soils and Geology, and Landscape and Visual

There are no likely significant effects upon lands, soils and geology during the operational phase that could result in associated landscape and visual impacts.

Localised groundworks and excavations that may occur during the decommissioning phase are largely concerned with restoration of the site and therefore likely to have a positive impact on the local landscape. The visual effect of this change is expected to be positive, long term, localised in nature and slight.

15.2.5 Air and Climate

Air and Climate, and Material Assets

Chapter 14: Material Assets of the EIAR assessed the traffic effects of the Proposed Development during the operational phase and found that typically, no more than two trips per day to the site are made by car or light goods vehicle. As per Chapter 10: Air and Climate of the EIAR, there will be no significant direct or indirect effects to air quality associated with the continued operation of the wind farm.

During the decommissioning phase, the movement of construction vehicles (e.g. cranes and heavy plant) both within, and to and from the site, has the potential to give rise to dust nuisance effects. This is assessed further in Chapters 10 and 14 of this EIAR, and mitigation measures are presented to minimise any potential effects.

15.2.6 Landscape and Visual

Landscape and Visual, and Cultural Heritage

As described in Chapter 12: Cultural Heritage of this EIAR, the Proposed Development, as it is an extension of operation of an existing wind farm, will not change the landscape setting of recorded sites and monuments, either within the site bounds or in the wider area. It is considered that no direct effects would occur at the operational phase. It is concluded in Chapter 12 that no built heritage structures will be impacted either directly or indirectly by the Proposed Development, since nothing additional to the existing baseline environment is being proposed as part of the extended operation of the wind farm.

During the decommissioning phase a number of mitigation measures will likely be required such as buffer / exclusion zones and fencing, to ensure that large turbine / crane components do not encroach on existing historic sites present. A decommissioning plan will be agreed with the local authority at least three months prior to decommissioning of the Proposed Development. No significant landscape or visual effects are likely to occur should the wind turbines be removed.

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. 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.