

14. INTERACTION OF THE FOREGOING

14.1 Introduction

The preceding Chapters 4 to 13 of this rEIAR identify the potential significant environmental effects that may have occurred or may occur in the future in terms of Population and Human Health, Biodiversity (Flora and Fauna) including Ornithology (Birds), Land, Soils and Geology, Water (Hydrology) Air Quality, Climate, Noise and Vibration, Cultural Heritage (Archaeological, Architectural and Cultural Heritage), Landscape and Visual, Material Assets (Roads and Traffic, Utilities and Waste Management), and Vulnerability to/from Major Accidents and Natural Disasters as a result of the Subject Development as described in Chapter 3 of this EIAR. All of the potential significant effects of the Subject Development and the measures proposed to mitigate them have been outlined in the preceding chapters of this rEIAR. Mitigation measures and best practice measures for the construction, operation and decommissioning of the Subject Development are detailed in the accompanying Construction Environment Management Plan (CEMP). 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 ameliorate them or have a neutral effect.

A matrix is presented in Table 14-1 below to identify potential interactions between the various aspects of the environment already assessed in this rEIAR. The matrix highlights the occurrence of potential positive or negative effects. Since the Subject Development will become a passive part of the Meenbog Windfarm and will be left in situ following a grant of substitute consent, no further significant effects are anticipated. It is considered that the potential effects during the decommissioning phase will be similar to the construction phase effects but of a much lesser magnitude. The matrix is symmetric, with each environmental component addressed in the chapters of this rEIAR being placed on both axes of a matrix, and therefore, each potential interaction is identified twice. In Section 17.2 below, the potential interactions between each environmental component have been discussed in order of the relevant chapters of the rEIAR. Once a potential interaction between two environmental components has been discussed, for example, Population & Human Health and Lands, Soils and Geology, the interaction will not be discussed again in the following relevant section, therefore there is no Land, Soils and Geology and Population & Human Health section.

Table 14-1 Interaction Matrix: Potential for Interacting Impacts

	Population, Human Health	Biodiversity and Ornithology	Land, Soils & Geology	Hydrology & Hydrogeology	Air & Climate	Noise & Vibration	Landscape and Visual	Cultural Heritage	Material Assets	Vulnerability to natural Disasters
Population, Human Health	Black	White	Light Blue	Light Blue	Light Blue	Light Blue	Yellow	White	Light Blue	White
Biodiversity and Ornithology	White	Black	Light Blue	Light Blue	Light Blue	Light Blue	White	White	White	White
Land, Soils & Geology	Light Blue	Light Blue	Black	Light Blue	Light Blue	White	Light Blue	Yellow	White	White
Hydrology & Hydrogeology	Light Blue	Light Blue	Light Blue	Black	White	White	White	White	White	White
Air & Climate	Light Blue	Light Blue	Light Blue	White	Black	White	White	White	Light Blue	White
Noise & Vibration	Light Blue	Light Blue	White	White	White	Black	White	White	White	White
Landscape & Visual	Yellow	White	Light Blue	White	White	White	Black	White	White	White
Cultural Heritage	White	White	Yellow	White	White	White	White	Black	White	White
Material Assets	Light Blue	White	White	White	Light Blue	White	White	White	Black	White
Vulnerability to natural Disasters	White	White	White	White	White	White	White	White	White	Black
Legend:	Positive Effect:					Green	Green	Green	Green	
	Neutral Effect:					Yellow	Yellow	Yellow	Yellow	
	Negative Effect:					Light Blue	Light Blue	Light Blue	Light Blue	
	No Interacting Effect:					White	White	White	White	

The potential for interaction of effects has been assessed throughout this rEIA as part of the Impact Assessment process. While the work on all parts of the rEIA were not carried out by MKO, the entire Subject Development and all the work of all sub-consultants was managed and coordinated by MKO. This rEIA 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 rEIA and summarised in Section 14.2 below.

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

14.1.1 Statement of Authority

This section of the rEIA has been prepared by Malena Thren and Thomas Blackwell and reviewed by Michael Watson, of MKO. Malena Thren is a Graduate Environmental Scientist with MKO. Malena holds a first-class Honours in BSc (Hons) Environmental Science from NUI Galway (2023). Prior to taking up her position with MKO in September 2023, she worked with the university and local authorities on a variety of award-winning environmental campaigns as Students' Union Officer and Sustainability Leadership Intern. Her key strengths and expertise are in report writing, research and communication and she is experienced in data analysis and QGIS mapping. Since joining MKO, Malena has been involved in the preparation of Environmental Impact Assessment Screening and Scoping Reports, License Monitoring, Project Management, Construction Management Plans, Environmental Impact Assessment Reports, Research projects and Environmental Reports. Thomas is a Senior Environmental Consultant with over 18 years of progressive experience in environmental consulting. Thomas' professional experience includes managing Environmental Impact Assessments, environmental permitting, environmental due diligence and compliance, and general environmental assessment on behalf of clients in the renewable energy, mining, solid waste management, residential and commercial development, and public sectors. Thomas also has extensive experience in environmental and ecosystem restoration design, project management, and construction oversight. Thomas' multi-sector experience working on projects in multiple jurisdictions has allowed him to develop a wealth of knowledge and understanding of the challenges involved in guiding complex project through the regulatory and planning process.

Michael Watson is a Director of Environment in MKO. Michael has over 20 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 and then a prominent private environmental & hydrogeological consultancy prior to joining MKO in 2014. Michael's professional experience includes managing Environmental Impact Assessments, EPA License applications, hydrogeological assessments, environmental due diligence and general environmental assessment on behalf of clients in the wind farm, waste management, public sector, commercial and industrial sectors nationally. Michael's key strengths include project strategy advice for a wide range and scale of projects, project management and liaising with the relevant local authorities, Environmental Protection Agency (EPA) and statutory consultees as well as coordinating the project teams and sub-contractors. Michael is a key member of the MKO senior management team and as head of the Environment Team has responsibilities to mentor various grades of team members, foster a positive and promote continuous professional development for employees. Michael also has a Bachelor of Arts Degree in Geography and Economics from NUI Maynooth, is a Member of IEMA, a Chartered Environmentalist (CEnv) and Professional Geologist (PGeo).

14.2 Impact Interactions

14.2.1 Population and Human Health

Population and Human Health, Land, Soils and Geology

The use of plant machinery on Site during excavation works and the movement of spoil could have resulted in the potential for soil and ground contamination, however there is no evidence to suggest that this occurred and therefore there was no effect on Human Health as a result of soil contamination.

If the Subject Development is granted substitute consent, it will be left in situ with no works required other than maintenance during the operational phase. A wind farm is not a recognised source of pollution and so the potential for effects during the operational phase are imperceptible. With the implementation of mitigation and monitoring measures detailed in Chapter 6 and the CEMP (Appendix 3-2), the potential residual effects associated with soil or ground contamination during the construction and operational phases and subsequent health effects are imperceptible.

Population and Human Health, and Hydrology & Hydrogeology

Potential health effects arise mainly through the potential for surface and groundwater contamination which may have negative effects on public and private water supplies. There are no mapped groundwater or surface water resources affected by the Subject Development. Notwithstanding this, the Subject Development design and mitigation measures detailed in Chapter 7 and the CEMP for the Meenbog Windfarm (Appendix 3-2) ensured that the potential for effects on the water environment were not significant. Comprehensive surface water mitigation and controls are outlined in Chapter 7 to ensure protection of all downstream receiving waters. Mitigation measures ensured that surface runoff from the developed areas of the Site did not impact significantly on the quality of downstream surface water bodies, no impact on group water schemes, wells and therefore no subsequent health effects. There were no emissions to environmental media which could have impacted receptor locations associated with the Subject Development, which could have led to environmental effects on Hydrology and Hydrogeology which in turn could have impacted on human health. No further works that could impact on Hydrology and Hydrogeology are anticipated. Thus, no significant effects on Population and Human Health from Hydrology or Hydrogeology arose from the Subject Development in the construction phase and no further effects are anticipated from the Subject Development.

Population and Human Health, and Air and Climate

As identified in Chapter 4, the construction phase caused a temporary, slight, negative effect on human health at worst due to the increase in dust and vehicular emissions during the construction phase of the Subject Development.

The construction of the Subject Development had a permanent, imperceptible negative effect on climate. The Subject Development will become a part of the Meenbog Windfarm. During the operational phase, the energy generated by the Meenbog Windfarm 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, and Noise

Noise from construction machinery and plant can have the potential to cause negative effects on human health. As identified in Chapter 4, the construction phase caused at worst at the closest receptor location negative, temporary and not significant to slight effects on human health due to the increase in noise levels

during the construction phase of the Subject Development. Mitigation measures were in place to reduce impacts.

Population and Human Health, and Landscape and Visual

The construction phase of the Subject Development saw the temporary introduction of construction machinery into a natural, but already modified landscape. No components of the Subject Development are visible from outside the Site. As such, there was neutral effect on Population and Human Health with Landscape and Visual.

Population and Human Health, and Material Assets

The Subject Development did not result in any additional traffic in the construction phase and will not create any additional traffic during the operational phase. As detailed in Chapter 12, Waste Management was the only material asset affected by the Subject Development due to a minor increase in waste arising from the Subject Development. Any effect was at worst, short term, imperceptible and negative on Population and Human Health. No further impacts are anticipated in the operational phase.

14.2.2 Biodiversity

Biodiversity and Land, Soils and Geology

The removal of forestry and soil, during construction phase of the Subject Development likely resulted in some disturbance of flora and fauna in, at and adjacent to the Subject Development footprint thereby, potentially causing effects on flora and fauna. These potential impacts have been assessed in Chapter 5 of this rEiAR.

There were permanent, slight negative effects on subsoils and soils due to the removal of soil and peat during construction of the Subject Development. The removal of subsoils indirectly removed certain habitats. The main habitat loss was related to conifer plantation, the removal of which did not have a significant effect on biodiversity. Peat storage cells are associated with permanent, imperceptible positive effects on subsoils and soils, due to the relocation, but not destruction of, peat. The cells have since revegetated. The removal of habitats associated with the removal of soil due to the Subject Development is not associated with significant effects on biodiversity or designated Sites.

Biodiversity and Hydrology and Hydrogeology

Site activities during the construction phase did not result in water pollution which deteriorated habitat quality for flora and fauna that use water within the same catchment. No significant negative effects are anticipated to occur or have occurred for biodiversity during any stage of the Subject Development with respect to water quality. The mitigation measures employed during the construction and resulting impacts have been assessed in Chapter 5 and Chapter 7 of this rEiAR. Both chemical and biological monitoring of water quality during the construction phase and beyond have shown that any impact on water quality and aquatic flora and fauna had at worst, a short term, imperceptible, and negative effect. No ongoing deterioration in water quality downstream of the Subject Development was detected to date.

Biodiversity and Air and Climate

During the construction phase of the Subject Development, increased plant and dust emissions within and around the Subject Development site had the potential to be a nuisance to flora and fauna, thereby having a temporary, imperceptible, negative effect. The mitigation measures outlined in Chapter 8 of the EiAR ensured that the potential for negative effects was reduced or eliminated. There were no significant negative effects on air quality during the construction phase and any effects on air quality during the operational phase will be imperceptible.

The construction of the Subject Development resulted in greenhouse gas emissions associated with tree felling and peat soil disturbance, and operation of vehicles and plant. This impact on biodiversity will be short-term and slight only, given the quantity of greenhouse gases that were emitted to the atmosphere, and were restricted to the duration of the construction phase. As discussed above in section 14.2.1, once emitted to the atmosphere, the greenhouse gas emissions that will arise from construction phase activities will have a permanent imperceptible negative effect on Climate and consequently biodiversity. This is assessed further in Chapter 8 of this rEiAR, and mitigation measures are presented to minimise any potential effects.

No further effects on climate are anticipated from the Subject Development during the operational phase, when the Subject Development will become a passive part of the Meenbog Windfarm. The Meenbog Windfarm when in operation, will reduce the input of carbon intensive energy into the national grid and reduce the amount of greenhouse gas (GHG) emissions being released to the atmosphere that are associated with electricity generation and use.

Biodiversity and Noise and Vibration

Site activity during the construction phase gave rise to noise that could be a nuisance for fauna, which use the Site. Best practice mitigation measures are included in Chapter 5, Chapter 9 and the CEMP (Appendix 3-2) that minimised the potential negative effect of noise generated during the construction phase on biodiversity. Any noise impact was at worst, negative, temporary and not significant to slight. The limited onsite noise activity that may be generated by the Subject Development during the operational phase from possible maintenance works will have at worst a temporary, negative and imperceptible effect on biodiversity.

14.2.3 Land, Soils and Geology

Land, Soils and Geology and Hydrology and Hydrogeology

As identified in Chapter 6 of this rEiAR, the movement and removal of spoil during the construction phase had short-term, imperceptible, negative effects on water quality through potentially silt-laden runoff from the Subject Development works areas and surrounding forestry land use. Mitigation measures to prevent effects on water quality are presented in Chapter 6, Chapter 7, and the CEMP (Appendix 3-2).

Land, Soils and Geology and Air and Climate

The construction of the Subject Development resulted in greenhouse gas emissions, e.g., carbon dioxide (CO₂), carbon monoxide and nitrogen oxides, associated with tree felling, earthworks, and operation of vehicles and plant. Mitigation measures outlined in Chapter 8 reduced the potential for negative effects on Air and Climate. There were short-term, negative and imperceptible effects on air quality during the construction phase and any effects on air quality during the operational phase will be imperceptible. The removal of peat leads to greenhouse gases being released. Once emitted to the atmosphere, the greenhouse gas emissions that arose from the construction phase activities will have a permanent imperceptible negative effect on Climate. The Subject Development will become a part of the Meenbog Windfarm, which, when in operation, will reduce the input of carbon intensive energy into the national grid and reduce the amount of greenhouse gas (GHG) emissions being released to the atmosphere that are associated with electricity generation and use.

Land, Soils and Geology and Cultural Heritage

The removal of spoil during the construction phase had the potential to have a permanent, significant, negative effect on any previously unrecorded sub-surface archaeological site and artefacts, which could have been damaged during soil removal. Archaeological monitoring took place during all construction works and mitigation measures were implemented as set out in Chapter 10 of this rEiAR, 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. No further excavation works are required and therefore there was a neutral effect from Land, Soils and Geology on cultural heritage.

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 Site, and the construction of peat cells and borrow pits slightly altered the local landscape within the Site. The visual effect of this change is expected to be long term, localised in nature, negative and slight in the immediate area around each deviation.

14.2.4 Air and Climate

Air and Climate and Material Assets

Small amounts of additional waste were generated by the Subject Development in the construction phase which had a short term imperceptible negative effect on waste services. Management of waste would have resulted in a short term imperceptible negative effects on air and climate as a result of vehicle exhaust emissions.

14.2.5 Vulnerability to Natural Disasters

As described in Chapter 13 of the rEIAR, major accidents or natural disasters are hazards which have or had the potential to affect the Subject Development and lead to environmental effects both directly and indirectly. These include accidents during construction, operation and decommissioning of the Subject Development caused by operational failure and/or natural hazards. The assessment of the potential for significant accidents or disasters is conducted in connection with the information that must be included in the rEIAR. This includes aspects such as population and human health, biodiversity, land and soil, hydrology and hydrogeology, air quality, climate, material assets, cultural heritage, and the landscape. The risk of a major accident and/or disaster during the construction of the Subject Development considered 'low' in accordance with the 'Guide to Risk Assessment in Major Emergency Management' (DoEHLG, 2010). If a natural disaster or major accident had occurred as a result of the Subject Development there would have been potentially negative interactions with population and human health, biodiversity, land and soil, hydrology and hydrogeology, air quality, climate, material assets, cultural heritage, and the landscape. However, there were no major accidents or natural disasters associated with the construction phase of the Subject Development and there is no real likelihood of any occurring in the post construction phases. Therefore, there were no interactions between Natural Disasters and Major Accidents and any of the other aspects assessed in the rEIAR.

14.3 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 3-13) of the rEIAR and are detailed in the CEMP (Appendix 3-2). The implementation of these mitigation measures reduced or removed the potential for these effects. Information on potential residual impacts and the significance of effects, is also presented in each relevant chapter.