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17. INTERACTION OF EFFECTS

17.1 Introduction

The preceding Chapters 5 to 16 of this EIAR identify the potential for 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 Quality, Climate, Noise and Vibration, Landscape and Visual, Cultural Heritage (Archaeological, Architectural and Cultural Heritage), Material Assets (Roads and Traffic, Telecommunications and Aviation), and Major Accidents and Natural Disasters as a result of the Proposed Project as described in Chapter 4 of this EIAR. All of the potential significant effects of the Proposed Project and the measures proposed to mitigate them have been outlined in the preceding chapters of this EIAR. Mitigation measures and best practice measures for the construction, operation and decommissioning of the Proposed Project are detailed in the accompanying Construction and Environmental Management Plan (CEMP) (Appendix 4-5 of this EIAR) and Surface Water Management Plan (SWMP) (Appendix 4-7). 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 17-1 below to identify potential interactions between the various aspects of the environment already assessed in this EIAR. The matrix highlights the occurrence of potential positive 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 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. In Section 17-2 below, the potential interactions between each environmental component have been discussed in order of the relevant chapters of the EIAR. Once a potential interaction between two environmental components has been discussed, for example, Population & Human Health and Water, the interaction will not be discussed again in the following relevant section, therefore there is no Water and Population & Human Health section.

Table 17-1 Interaction Matrix: Potential for Interacting Impacts

	Phase	Population and Human Health	Biodiversity, Flora and Fauna	Birds	Land, Soils and Geology	Water	Air	Climate	Noise and Vibration	Landscape and Visual	Cultural Heritage	Material Assets	Major Accidents & Natural Disasters
Population and Human Health	C												
	O												
Biodiversity, Flora and Fauna	C												
	O												
Birds	C												
	O												
Land, Soils and Geology	C												
	O												
Water	C												
	O												
Air	C												
	O												
Climate	C												
	O												
Noise and Vibration	C												
	O												
Landscape and Visual	C												
	O												
Cultural Heritage	C												

Material Assets	O	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Black	White	White
	C	Pink	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Pink	Light Blue	Light Blue	Light Blue	Black	White	White
	O	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Green	Light Blue	Light Blue	Light Blue	Black	White	White
Major Accidents & Natural Disasters	C	Pink	Pink	Pink	Pink	Pink	Pink	Pink	Pink	Pink	Pink	Pink	Black	White
	O	Pink	Pink	Pink	Pink	Pink	Pink	Pink	Pink	Pink	Pink	Pink	Black	White

Legend:

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

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 Environmental Impact Assessment Report (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 17.2 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 17.2 below.

17.1.1 Statement of Authority

This section of the EIAR, has been prepared by Michéal Cahill and Sophie O'Rourke and reviewed by Eoin McCarthy, all of MKO.

Michéal Cahill is an Environmental Scientist with MKO. Michéal holds a first-class honours degree in Environmental Science at the University of Galway and was awarded the Professor Emer Colleran Medal for his academic achievements. Michéal has over 2 years of experience in environmental consulting. Michéal's key strengths and areas of expertise are in environmental impact assessment, the preparation and writing of environmental impact assessment reports, proficiency in geographic information systems, ecological assessment and risk assessment. As an environmental scientist within MKO's environmental renewables team, Michéal is involved in the preparation and revision of a variety of reports and EIAR chapters for a range of energy infrastructure projects.

Sophie O'Rourke is a Graduate Environmental Scientist with MKO. Sophie holds a first-class honours master's degree in environmental science at Trinity College Dublin. As part of MKO's Renewables team Sophie is involved with the production of EIARs for a variety of wind energy projects. Sophie's areas of expertise include environmental policy, high quality report writing, and geographic information systems.

Eoin McCarthy holds a BSc. (Env.) in Environmental Science and is a Project Director with over 14 years' experience in the consultancy sector. Eoin has produced and reviewed numerous Interactions of the Foregoing chapters for wind farm developments. Eoin has held the role of project manager on over 550MW worth of wind energy projects. Within MKO Eoin plays a large role in the management of and sharing of knowledge with junior members of staff and works as part of a large multi-disciplinary team to produce EIA Reports.

17.2 Impact Interactions

17.2.1 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 peat and spoil may result in the potential for soil and ground contamination. A wind farm and associated underground grid connection cabling 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 8, Chapter 9 and the Construction and Environmental Management Plan (CEMP) (Appendix 4-5), the potential for residual effects associated with soil or ground contamination during the construction and operational phases and subsequent health effects are imperceptible. Therefore, no significant effects will occur.

Population and Human Health and Water

As described in Chapter 9 (Water) of this EIAR, the construction phase of the Proposed Project 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.

The primary potential for cumulative effects will occur during the construction phase of the Proposed Project as this is when earthworks and excavations will be undertaken at the Site. The potential for cumulative effects during the operational phase of the Proposed Project will be significantly reduced as there will be no exposed excavations, there will be no sources of sediment to reach watercourses, there will be no use of cementitious materials and fuels/oil will be kept to a minimum in bunded containers at the Site. During the decommissioning phase, the potential cumulative effects are similar to the construction phase, but to a much lesser degree with much less ground disturbance.

A more robust listing of mitigation measures is presented in Chapter 9 and Appendix 4-7, Surface Water Management Plan (SWMP) to minimise the potential of any such issues occurring. As such, there is no potential for any significant interacting effects.

Population and Human Health and Air

During the construction phase, the Proposed Project has the potential to create a short term, negative effect on human health via exhaust emissions as a result of the use of construction vehicles/machinery and plant on the site and the transport of workers and materials to/from the site. As outlined in Chapter 10 (Air), the potential effects on human health are short-term, imperceptible, negative impacts.

By providing an alternative to electricity derived from coal, oil or gas-fired power stations, the Proposed Project will result in emission savings of carbon dioxide (CO₂), oxides of nitrogen (NO_x), and sulphur dioxide (SO₂). The production of renewable energy from the Proposed Project will have a long-term, significant, positive impact on air quality.

Population and Human Health and Climate

During the construction phase, the Proposed Project has the potential to create a short term, negative effect on climate via exhaust emissions as a result of the use of construction vehicles/machinery and plant on the site and the transport of workers and materials to/from the site. This potential impact will be short-term and slight and will be restricted to the duration of the construction phase.

During the operational phase, the energy generated by the Proposed Project will offset energy and the associated emission of greenhouse gases from electricity-generating stations dependent on fossil fuels, thereby having a significant, 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, and 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 Chapter 12 (Noise), as well as Section 5.11.2.2.4 of this EIAR not be implemented.

During the operational phase the Proposed Project has the potential to generate noise but as identified in Chapter 12, the potential effects on population and human health are not significant.

Population and Human Health, and Landscape and Visual

The construction phase of the Proposed Project will see the temporary introduction of construction machinery and the erection of wind turbines into a natural, but already modified working landscape. All landscape and visual effects during the construction phase are deemed to be short-term and negative. 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.

Chapter 13 (Landscape and Visual) of this EIAR comprises the landscape and visual impact assessment of the Proposed Project. As detailed in Chapter 14 (Landscape and Visual), 15 No. viewpoints were selected and comprehensively assessed for visual effects, of which 10 No. viewpoints were located within 5km of the proposed turbines. Of the viewpoints assessed, 11 No. had residual visual effects rating either ‘Not Significant’, ‘Slight’ or ‘Moderate’ according to the EPA (2022), see Appendix 14-3, and 4 No. viewpoints had residual effects rating as ‘Significant’ including VP11-14. The greatest potential for cumulative landscape effects is from the lower elevated lands immediately west and south of the Proposed Wind Farm, where lower elevated coastal lands allow for expansive views towards the Slieve Callan Uplands, where the Proposed Wind Farm is seen in conjunction with other wind farms. The number of receptors experiencing these effects is very low as the landscape surrounding the Proposed Wind Farm site has a significantly low population density, as discussed in Chapter 5 of this EIAR. As seen in the photomontages presented in *Volume 2: Photomontage Booklet*, the scale and character of the receiving upland landscape is such that it can absorb a wind energy development of this scale without resulting in Significant cumulative landscape effects.

When considering the above and the subjective nature of landscape and visual assessments, it was deemed that the interaction between population and human health, and the landscape and visual effects would result in a long-term, neutral effect.

Population and Human Health, and Material Assets

Chapter 15 (Material Assets) of this EIAR discusses how the construction phase of the Proposed Project will give rise to traffic movements of abnormal loads 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 outlined in the Section 15.1 of this EIAR. A Traffic Management Plan (Appendix 15-2) will be in place to minimise all disruption, as described in Chapter 15 Material Assets and the CEMP (see Appendix 4-5). During the operational phase, impacts on the surrounding local road network will be imperceptible. With the

implementation of measures detailed in Chapter 5 and the CEMP (Appendix 4-5) dust and exhaust emission will be contained and the potential for impact on health will be imperceptible.

As detailed in Chapter 15, the Proposed Wind Farm will have a short-term effect on utilities imperceptible effect during the construction phase. During the operational phase, there will be an imperceptible effect on utilities, Gas Networks Ireland, telecoms, and aviation.

17.2.2 Biodiversity

Biodiversity and Land, Soils and Geology

The Proposed Project has been designed to minimise impacts on the receiving environment and maximise use of existing roads and tracks, however, the removal of some forestry and soil during the construction phase of the Proposed Project is likely to result in some disturbance of flora and fauna in and adjacent to the Proposed Project footprint thereby, potentially causing a long term, slight, negative effect on flora and fauna. This impact is not considered to be a significant effect at any scale greater than the local geographical scale, given their widespread distribution in the surrounding landscape. Potential impacts have been assessed in Chapter 6 of this EIAR, and excavated spoil will be contained on site in the spoil management areas or used for landscaping. Accounting for the mitigation measures within the Proposed Wind Farm site the construction will have a direct, slight, negative, long term effect on biodiversity within the site at a local scale only.

As outlined in Chapter 6 this project proposes to permanently fell 56.3 ha of conifer forestry and restore underlying peatlands as part of the Hen Harrier Enhancement Plan (Appendix 7-8), which will henceforth be referred to as HHEP. An Invasive Species Management Plan, which will henceforth be referred to as ISMP, has also been proposed aimed at removing invasive species and thereby alleviating pressures on peat habitats within the site and preserving the remaining peat habitat within the Site.

During the implementation of the mitigation measures, involving deforestation operations, there is the potential for the of erosion of peat and spoil due to the disturbance of soils and subsoils associated with vehicle and plant movements. There is also potential for accidental spillage of petroleum hydrocarbons of plant and machinery which are highly toxic to humans and biodiversity. Tree felling also has the potential to cause a negative, direct, slight, temporary, likely effect on water quality with a subsequent impact on flora and fauna within that catchment. However, when factoring in the mitigation measures outlined in Chapter 8 of this EIAR, the impacts on biodiversity are deemed to be temporary, imperceptible and negative. Once the proposed HHEP and ISMP are implemented, there will be a direct, significant positive effect on peatland habitat in the vicinity of the Proposed Wind Farm site.

On this basis, the identified interaction is not significant.

Biodiversity and Water

Site activities during the construction phase of the Proposed Project may have the potential to give rise to 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 proposed Grid Connection has the potential to cause negative, slight, indirect, temporary, likely effect to surface water quality. These potential impacts have been assessed in Chapter 6 (Biodiversity) and Chapter 9 (Water) and the relevant mitigation measures outlined in these chapters and the CEMP (Appendix 4-5). With the implementation of relevant mitigation measures the residual effect of the interaction between biodiversity and water will be a negative, temporary, direct, imperceptible during the construction phase.

As outlined in Section 17.2.2 Biodiversity and Lands, Soil and Geology above, during the deforestation operations as part of the HHEP, there is the potential for accidental spillage of petroleum hydrocarbons of plant and machinery which are highly toxic to humans and biodiversity as well as aquatic

environments. Sedimentation due to tree felling also has the potential to cause a negative, direct, slight, temporary, likely effect on water quality with a subsequent impact on flora and fauna within that catchment. When factoring in the mitigation measures outlined in Chapters 8 and 9 of this EIAR, the impacts on biodiversity are deemed to be temporary, imperceptible and negative.

During the operational phase the main the potential for increased surface water runoff is the primary potential impact during the operational phase of the Proposed Project. Unmitigated, there could be a negative, imperceptible, indirect, long-term, likely effect on all downstream surface water bodies which could have a subsequent imperceptible, negative and long-term effect on biodiversity in this water catchment. Chapter 9 and Appendix 4-7 outline the mitigation measures that are proposed to attenuate runoff. Considering the mitigation measures the direct, negative, neutral, long term, likely effect on surface waters.

On this basis, the identified interaction is not significant.

Biodiversity and Air

During the construction phase of the Proposed Project, 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 of the EIAR will ensure that the potential for negative effects is reduced or eliminated. Taking into account the relevant mitigation measures the impact of air quality on biodiversity is likely to have a short-term imperceptible negative effect.

During the operational phase, the potential for effects on biodiversity from vehicular and dust emissions are imperceptible, however the overall displacement of fossil fuel emissions will have a long-term moderate positive effect on air quality for biodiversity.

The removal of forestry and rhododendron from the HHEP and ISMP will cause some carbon emissions and remove the carbon sequestration properties associated with the trees and plants at the site. This will have a temporary, slight, negative effect on air quality. Subsequently, the planned restoration of the underlying peatland will have a positive impact on carbon sequestration and subsequent long-term, significant, positive impact on biodiversity and air quality.

On this basis, the identified interaction is not significant.

Biodiversity and Climate

As outlined in 'Biodiversity and Air' above, during the construction phase of the Proposed Project, the use of construction vehicles/machinery and plant, the transport of workers and materials to/from the Site will give rise to exhaust emissions. The construction phase will also involve the removal of some carbon fixing vegetation, although this will be limited by maximising the use of the pre-existing network of forest tracks. The production of these emissions and removal of carbon fixing vegetation will result in short-term imperceptible negative impact on biodiversity.

As part of the HHEP it is proposed to permanently remove 56.3 ha of coniferous forestry. The ISMP also proposes to remove rhododendron, which while an invasive species, does have carbon fixing properties. Consequently, this will cause some carbon emissions and remove the carbon sequestration properties associated with the trees and vegetation at the Site. This will have a temporary, slight, negative effect on climate and air quality. Subsequently, the planned restoration of the underlying peatland will have a positive impact on carbon sequestration and subsequent long-term, significant, positive impact on biodiversity and climate.

As outlined in Chapter 11, during operational phase the Proposed Project 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, moderate positive effect on biodiversity.

On this basis, the identified interaction is not significant.

Biodiversity and Noise and Vibration

Site activity during the construction phase and during the implementation of HHEP and ISMP 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 12 to minimise the potential negative effect of noise generated during the construction phase on biodiversity. Factoring the relevant mitigation measures the noise and vibration from the Proposed Project could have a temporary, slight, negative effect on biodiversity.

On this basis, the identified interaction is not significant.

Biodiversity and Landscape

The removal of forestry, hedgerow and soil during the construction phase of the Proposed Project is likely to result in some disturbance of flora and fauna in at and adjacent to the Proposed Project footprint thereby, potentially causing a long term, slight, negative effect on flora and fauna. These potential impacts have been assessed in Chapter 6 of this EIAR, and excavated spoil will be contained on site in the spoil management areas or used for landscaping.

Once the HHEP and ISMP are implemented resulting in the permanent removal of commercial forestry and the subsequent planned restoration of underlying peatland opening up land to Hen Harriers. These biodiversity enhancement measures are likely to lead to a long term, significant positive effect on the landscape at the Hen Harrier Enhancement Lands.

On this basis, the identified interaction is not significant.

17.2.3 Ornithology

Ornithology and Land, Soils and Geology

The removal of hedgerows and soil, during construction phase of the Proposed Project is likely to result in some disturbance of fauna, including birds, in the areas surrounding the Proposed Project works area. The relevant mitigation measures outlined in Chapter 7, Chapter 8 and the CEMP (Appendix 4-5) will be in place to avoid any subsequent effect on ornithology. Accounting for the mitigation measures within the Proposed Wind Farm site the construction will have a direct, significant, negative, long-term effect on birds.

During the operational phase the loss of foraging ground for Hen Harrier and is deemed to be of high significance. To mitigate this effect the HHEP proposes to permanently remove 56.3ha of coniferous forestry, which alone nearly matches the total habitat loss figures calculated for hen harrier within the Proposed Wind Farm (62ha). In addition, it is proposed to enhance a further 67.4ha of farmland. These measures will have a slight long term positive effect on mammals, birds, bats, and invertebrates as these measures will both create and increase suitable habitat for foraging, commuting, and nesting for a wide range of fauna including those listed above. Please see Chapter 7 Ornithology and the associated Hen Harrier Enhancement Plan (Appendix 7-8), for details. Land use within the forestry parcels of the enhancement lands will be changed from commercial forestry to open peatland habitat, and land use within the agricultural parcels will remain the same but with modifications to the management regimes. Appendix 8-1 of the EIAR analyses the impact of the proposed forestry felling in the enhancement

lands on peat stability. 174 peat probes were taken across these parcels and the results of the peat stability risk assessment found that there are no peat stability concerns associated with the proposed works in these areas.

On this basis, the identified interaction is not significant.

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 mitigation measures outlined in Chapter 9 of this EIAR not be implemented. As outlined in 'Biodiversity and Water' above, during deforestation operations associated with the HHEP, tree felling as well as the potential for accidental spillage of hydrocarbons, have a negative, direct, slight, temporary, likely impact on water quality. However, when factoring in the mitigation measures outlined in Chapter 9 and Appendix 4-7 of this EIAR, the impacts on biodiversity are deemed to be temporary, imperceptible and negative.

As outlined in Section 17.2.2 Biodiversity and Water above, during operations the primary potential impact on water is increased surface water runoff. Considering the relevant proposed mitigation measures, the impact of increased surface water on birds is imperceptible, indirect, neutral, and long-term.

On this basis, the identified interaction is not significant.

Ornithology and Air

During the construction phase of the Proposed Project, 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 and the CEMP (Appendix 4-5) will ensure that the potential for negative effects is reduced or eliminated. During the operational phase, the potential for effects on ornithology from vehicular and dust emissions are imperceptible.

On this basis, the identified interaction is not significant.

Ornithology and Climate

As outlined in 'Biodiversity and Climate' above, the construction of the Proposed Project will result in greenhouse gas emissions associated with removal of carbon fixing vegetation, production of construction materials, and operation of vehicles and plant. This impact on ornithology will be temporary and slight only, given the quantity of greenhouse gases that will be emitted to the atmosphere and will be restricted to the duration of the construction phase. As discussed above in section 17.2.1 Population and Human Health and Climate, 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.

As outlined in Chapter 11, during the operational phase, the Proposed Project 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, and the destruction of their preferred habitats as a result of climate change.

As discussed above the Hen Harrier Enhancement Plan will cause some carbon emissions and remove the carbon sequestration properties associated with the trees at the site. This will have a temporary, slight, negative effect on climate and air quality. Subsequently, the bog habitat underlying the plantation forestry will be restored back to a heath/ scrub habitat over time following deforestation, which will benefit Hen Harriers. This will have a positive impact on carbon sequestration, given bog habitats have significantly greater sequestration capacity than coniferous forestry and similarly, will also have a positive impact on birds.

On this basis, the identified interaction is not significant.

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. There will also likely be some disturbance to birds in the area resulting from noise and vibration caused by the deforestation works associated with the HHEP and vegetation removal associated with ISMP. This is anticipated to be a temporary, slight negative effect on biodiversity. Best practice mitigation measures are included in Chapter 7 and Chapter 12 to minimise the potential negative effect of noise generated during the construction phase on ornithology. Factoring the relevant mitigation measures the noise and vibration from the Proposed Project could have a temporary, slight, negative effect on biodiversity.

Site activity during the operational phase could give rise to noise that could be a nuisance for birds, which use the Proposed Project site. Best practice mitigation measures are included in Chapter 7 and Chapter 12 and to minimise the potential negative effect of noise generated during the operational phase. The limited onsite noise activity generated by the Proposed Project during the operational phase will have an imperceptible negative effect on birds. On this basis, the identified interaction is not significant.

17.2.4 Land, Soils and Geology

Land, Soils and Geology and Water

As identified in Chapter 8 of this EIAR, the movement and removal of 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 Project works areas. Mitigation measures to ensure there are not significant, negative effects on water quality are presented in Chapter 8, Chapter 9, and the CEMP Appendix 4-5 and the SWMP Appendix 4-7.

As previously mentioned, the permanent removal of trees and operation of machinery within the Hen Harrier Enhancement lands bears the potential for erosion of peat and spoil due to the disturbance of soils and subsoils associated with vehicular and plant movements, release of suspended sediment attached to timber in stacking area, as well as potential petroleum hydrocarbon spills. The exposure of soil and subsoils due to vehicle tracking, compaction and skidding or forwarding extraction methods has the potential to provide a source of suspended sediment which can become entrained in surface water runoff and enter surface watercourses. When considered with the mitigation measures outlined in chapters 8 and 9 of this EIAR, it is deemed there will be a temporary, imperceptible, negative effect on hydrology.

As outlined in Section 17.2.2 Biodiversity and Water above, during operations the primary potential impact on water is increased surface water runoff. This could impact land, soils and geology by causing soil erosion, flooding and removing vegetation. Considering the relevant proposed mitigation measures it is deemed that the effect will be negative, long term, slight and likely.

On this basis, the identified interaction is not significant.

Land, Soils and Geology and Air

The excavation works and transportation of vehicles to/from and around the site will give rise to dust and exhaust emissions which is considered a short-term, slight, negative impact on air quality. Mitigation measures outlined in Chapter 10 will reduce the potential for negative effects on land, soils, and geology, including includes dust suppression measures which is further outlined in the CEMP (Appendix 4-5). No ground works are required for the operational phase.

On this basis, the identified interaction is not significant.

Land, Soils and Geology and Climate

The construction of the Proposed Project will result in greenhouse gas emissions associated with production of construction materials, excavation works and operation of vehicles and plant. This impact will be negative and slight only, given the quantity of greenhouse gases that will be emitted to the atmosphere and will be restricted to the duration of the construction phase. As discussed above in Section 17.2.1 Population and Human Health and Climate, 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. It should however be acknowledged that the Proposed Wind Farm will offset energy and the associated emission of greenhouse gases from electricity-generating stations dependent on fossil fuels, thereby having a significant, positive effect on climate (i.e. slowing the rate of global warming).

As part of the HHEP, it is proposed to permanently remove 56.3 ha of coniferous forestry. Consequently, this will cause some carbon emissions and remove the carbon sequestration properties associated with the trees at the site. This will have a temporary, slight, negative effect on climate and air quality. Subsequently, the planned restoration of underlying peatland will have a positive impact on carbon sequestration and a subsequent positive impact on climate.

On this basis, the identified interaction is not significant.

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

The removal of peat and spoil during the construction phase is likely to have a permanent, significant, negative effect on any previously unrecorded sub-surface archaeological site and artefacts. Any archaeological sites/features, if detected, during monitoring will be preserved by record (archaeologically excavated) or preserved in-situ (avoidance) and therefore a full record made of the same. Mitigation measures outlined in Chapter 14 will reduce the potential for negative effects on unrecorded sites and artefacts during excavations. It is predicted that there will be no interacting effects between landscape and visual and cultural heritage features as a result of the Hen Harrier Enhancement Plan.

On this basis, the identified interaction is not significant.

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 the site roads and hardstanding areas within the Proposed Wind Farm site has the potential to alter the local landscape. The visual effect of this change is expected to be negative, long term, localised in nature and slight. During the construction phase of the Proposed Project, 2 no. Borrow pits are proposed to be excavated and whilst the northern borrow pit will be screened by existing forestry, the southern borrow pit will be more visible within the immediate vicinity. The landscape and visual effects will be very localised, temporary, 'Short-Term,' and 'Slight' at this location, and will be backfilled with

spoil and reseeded for the duration of the duration of the operational phase. Therefore the residual interacting effects will not be significant.

The overall aim of Proposed Offsetting Lands is to deforest 56.3ha of coniferous forestry. This will revert the Hen Harrier Enhancement lands into a more natural state than the current baseline environment, which has been highly modified by human activity. As such, the Hen Harrier Enhancement Plan will have a positive effect on the land environment in these areas. Once the measures have been implemented, landscape effects on the Proposed Offsetting Lands themselves will be positive, long-term and 'Not Significant'.

On this basis, the identified interaction is not significant.

17.2.5 Air

Air, and Material Assets

The transportation of vehicles to/from and around the Proposed Project site will give rise to dust and exhaust emissions which is considered a short-term, slight, negative impact on air quality. Following implementation of mitigation measures as outlines in Chapter 10, Chapter 15, and the CEMP (Appendix 4-5) there will be a short-term imperceptible negative effect on air quality due to transportation movements. Dust and exhaust emissions generated through the transportation of vehicles to/from and around the Proposed Project site during the operational phase (average of 1-2 LGVs per day) are imperceptible.

17.2.6 Climate

Climate and Material Assets

The construction of the Proposed Project will result in greenhouse gas emissions, e.g., carbon dioxide (CO₂), carbon monoxide and nitrogen oxides, associated with tree felling, production of construction materials, and operation of vehicles and plant. This impact will be permanent and slight only, given the quantity of greenhouse gases that will be emitted to the atmosphere, and will be restricted to the duration of the construction phase. This is assessed further in Chapter 11 of this EIAR, and mitigation measures are presented to minimise any potential effects.

The Proposed Project will displace carbon dioxide from fossil fuel-based electricity generation, over the proposed 35-year lifespan of the Proposed Project. Therefore, while there will be greenhouse gas emissions associated with the operation of the Proposed Project, this will be offset by the operation of the Proposed Project which will offset 37,110 tonnes of carbon dioxide per annum or approximately 1,298,850 tonnes over its operational life from traditional carbon-based electricity generation. Subsequently, this will cause a long-term positive effect on Climate as a result of reduced greenhouse gas emissions.

17.2.7 Landscape and Visual

Landscape and Visual and Cultural Heritage

As described in Chapter 14 of this EIAR, the Proposed Project has the potential to change the landscape setting of recorded sites and monuments in the wider area. However, it is concluded in Chapter 14 that any potential, indirect, visual effect of the Proposed Project on national and recorded monuments would not be significant.

17.2.8 Major Accidents and Natural Disasters

As described in Chapter 16 of the EIAR, major accidents or natural disasters are hazards which have the potential to affect the Proposed Project and lead to environmental effects both directly and indirectly. These include accidents during construction, operation and decommissioning of the Proposed Project 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 EIAR. This includes aspects such as population and human health, biodiversity, land and soil, hydrology and hydrogeology, air quality, climate, material assets, cultural heritage, and landscape. The risk of a major accident and/or disaster during the construction of the Proposed Project is considered 'low' in accordance with the 'Guide to Risk Assessment in Major Emergency Management' (DoEHLG, 2010).

When the above mitigation is implemented, and all mitigation detailed in the EIAR is implemented, the residual effect(s) associated with the construction, operation and decommissioning of the Proposed Project are not significant.

17.3 Mitigation and Residual Effects

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 5-15) 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.