MWP

Chapter 18 Interaction of the Foregoing

Ballinlee Wind Farm

Ballinlee Green Energy Ltd.

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18. Interaction of the Foregoing

18.1 Introduction

This Environmental Impact Assessment Report (EIAR) has presented the environmental assessments of the proposed development under each required environmental factor. Where relevant, the interaction between the factors, which is the interactions between specific environmental aspects and effects, are already addressed within each of the individual assessment topic areas or chapters of this EIAR.

This chapter of the EIAR evaluates the potential interaction of impacts, which the proposed development may have on the receiving environment and sensitive receptors.

18.1.1 Scope and Methodology of Assessment

Article 3 of EIA Directive 2011/92/EU, as amended by Directive 2014/52/EU, stipulates that:

> "*The environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the following factors: (a) population and human health; (b) biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC; (c) land, soil, water, air and climate; (d) material assets, cultural heritage and the landscape; (e) the interaction between the factors referred to in points (a) to (d)*".

The purpose of this chapter is to draw attention to important interactions and interdependencies between one factor or topic and another. Consequently, this chapter highlights those interactions of the environmental aspects and topics previously detailed and assessed throughout this EIAR. The potential for interactions between one aspect of the environment and another can result in direct or indirect effects, which may be positive or adverse. This chapter is completed based on a desktop review and by provision of a matrix to present the main interactions. The assessments and results have previously been presented in the preceding chapters of this EIAR.

18.2 Identification of Environmental Impacts

While all environmental aspects can be inter-related to some extent, the following outlines the key interactions identified between each of the various environmental subject areas considered in this EIAR for the construction, operational and decommissioning phases of the proposed development.

Where the potential for significant effects has been identified, the impacts have been avoided or reduced by mitigation measures, as outlined throughout the chapters of the EIAR.

A matrix has been generated to summarise the relevant interactions between specific environmental factors identified for the proposed development. The matrix is presented in Table 18-1. It contains each of the environmental factors or aspects, which were considered as part of this environmental impact assessment, on both axes. These interactions have been identified for the construction, operation and decommissioning phases of the proposed development and potential impacts are identified.

Full details of the significance of the effects and the relevant interactions of the environmental aspects along with any proposed mitigation are discussed within each of the individual preceding chapters.

18.2.1 Population and Human Health

During the construction phase there is potential for interactions between population and human health, traffic and transport, water, air quality, material assets, landscape and visual, land and soils, and noise and vibration. The construction phase of the proposed development has the potential to create noise and dust, which could create a temporary disturbance for occupants of nearby dwellings. The interactive effects are **likely** to be **short term** and **insignificant**.

During the operational phase there is potential for some long-term interactions between population and human health and landscape and visual effects, shadow flicker, and noise and vibration effects. At the same time the development will have positive effects on air quality, climate change and energy security. The interactive effects are **likely** to be **long term** and **insignificant**.

During the decommissioning phase there is potential for insignificant adverse effects on population and human health in relation to traffic and transport, and noise and vibration which could create a temporary disturbance for occupants of nearby dwellings. However, the removal of the wind turbines will have long term moderate positive effects on the visual landscape and noise (for occupants of nearby dwellings). The interactive effects are **likely** to be **short** and **long term** and **insignificant**.

The effects associated with each individual aspect are addressed in the relevant chapters.

18.2.2 Biodiversity

Changes associated with biodiversity during the construction stage such as the removal of habitats, have the potential for interaction between biodiversity, land and soils, water, air quality and climate, noise and vibration and traffic and transportation. The effects of water quality, land and soils, air quality and climate and disturbance from noise/vibration and traffic effects were taken into consideration in the assessment of biodiversity effects (i.e. there will be some habitat loss and disturbance to fauna during excavation of certain works areas). With the proposed mitigation measures in place, the interactive effects during the construction phase are considered **short term** and **insignificant**.

During the operational phase there is potential for turbines to interact with biodiversity. The operation of the turbines is unlikely to cause significant displacement effects for habitats, mammals and amphibians. The proposed development includes rigorous biodiversity monitoring and mitigation (in line with best practice) at pre-construction, construction, operational and decommissioning phases. There are no interactive effects during the operational phase.

Overall, the impacts of decommissioning a wind farm are potentially similar to construction impacts and will comprise temporary disturbance such as noise associated with decommissioning of turbines and on-site machinery and increased traffic.

The potential impacts, associated effects, and mitigation measures are described in full in **Volume II Chapter 06** Biodiversity of this EIAR, which includes biodiversity enhancement measures for the site. With the proposed mitigation, the adverse interactions of biodiversity and ornithology, land and soils, water, air quality and climate, noise and vibration and traffic and transport are **not likely** to result in **significant effects** on biodiversity.

18.2.3 Ornithology

During the construction phase, increased human activity, vehicle movements, noise and vibration have the potential to cause temporary disturbance to local bird assemblages, particularly wintering populations of

whooper swan, golden plover, lapwing and snipe. These species are known to be sensitive to disturbance, especially during periods of harsh weather or peak wintering activity and may be temporarily displaced from key foraging and roosting habitats within the 500 m buffer zone around the site.

Given the mobility of the species concerned, the presence of extensive comparable habitats nearby, and the implementation of appropriate mitigation measures outlined in Volume II Chapter 07, such as adherence to recommended buffer distances, timing restrictions on construction activities and minimisation of the working footprint, the likelihood of population-level effects is considered low. Consequently, the overall significance of disturbance-related effects on wintering whooper swan, golden plover, lapwing, and snipe during construction is assessed as minor and not significant.

In the absence of mitigation, operational-phase effects on ornithological features may arise from water quality deterioration, long-term habitat loss, or disturbance related to turbine operation and maintenance. However, these effects are considered minor and not significant at the population level. Water-dependent species like cormorant and mute swan may be sensitive to localised water quality changes due to runoff or sedimentation, but such impacts are likely confined to immediate areas and diluted in the wider hydrological network.

Overall, disturbance during the operational phase from maintenance is minimal, and turbine layout avoids key habitats, reducing sustained disturbance risk. For species recorded in locally notable numbers, displacement risk is minimised through siting, buffers and provision of alternative areas of enhanced habitats. Minor barrier or deflection effects are not expected to be significant. Considering species mobility, distribution, and available habitat, no significant long-term effects on ornithological receptors are predicted.

Decommissioning activities (e.g. turbine removal, infrastructure dismantling, and site reinstatement) may cause temporary disturbance to birds through increased human activity, noise, and habitat alteration. Although reduced in scale compared to construction, these effects may still be significant if they coincide with sensitive periods (e.g. breeding or wintering).

Updated ornithological surveys are recommended prior to decommissioning to inform a site-specific plan and ensure appropriate mitigation. Assuming appropriate surveys are completed, any residual effect on avifauna would be minor and not significant. Full details are described in Volume II Chapter 07 Ornithology of this EIAR.

18.2.4 Land and Soils

The excavation, stockpiling and movement of soil for the proposed development has the potential to interact with air quality in terms of increased dust emissions during the construction and decommissioning phases. There is also potential for related impacts on surface and ground water (sediment release), biodiversity, landscape, noise and vibration and traffic and transportation. The associated effects and interactions for each aspect are addressed individually in the preceding chapters.

Soil and rock will require excavating to accommodate the footprint of the turbines, substation and grid connection. A minor interaction will occur with traffic and transport to import the materials required for the proposed development. A potential adverse effect on surface water can arise from construction works. The project will be developed in line with the drainage proposals for surface water management detailed in the CEMP as part of the civil works to ensure adequate protection of water courses during the construction phase.

These adverse interactions with biodiversity and ornithology, water, landscape, noise and vibration and traffic and transport effects are likely to result in no significant effects during construction, operational and decommissioning phase.

18.2.5 Water

During the construction phase there is potential for the effects associated with surface water and ground water to interact with population and human health (due to water quality), land and soils (soil characteristics and contamination) and biodiversity (habitat related to water quality). The interactive effects are **likely** to be **short** and **insignificant**.

These interactive effects are not relevant to the operational or decommissioning phases. The underground turbine hardstands and underground cables will stay in place during the decommissioning, as removing them would do more harm than leaving them in situ

The potential effects associated with surface water and ground water due to the construction and operational phases of the proposed development are addressed individually and in detail, in particular in relation to suitable mitigation measures to minimise effects, within the preceding individual chapters.

A CEMP (EIAR **Volume III, Appendix 2A**) and Surface Water Management Plan (EIAR **Volume III, Appendix 2E**) have been completed as part of the EIAR to manage run-off, particularly of sediment laden water, as a means of protecting water quality and aquatic habitats.

18.2.6 Air Quality

During the construction phase, there is the potential for short term, adverse effects on human health for residents of nearby dwellings and biodiversity in terms of dust emissions. Dust generated during the construction phase is not likely to significantly affect the local air quality; however, there is the possibility of disturbance occurring from dust generated in the vicinity of the site entrances and along the local public road which could affect road users. Dust mitigation measures are presented in **Volume II Chapter 10** Air Quality of this EIAR, to minimise the risk of any such effects. The interaction of adverse construction air quality effects and biodiversity and population and human health are not likely to be significant.

Once operational, the generation of electricity from the renewable energy wind farm will cause a **long-term positive** effect on air quality, in terms of reducing GHG. The electricity generated will assist to displace electricity otherwise generated from coal, oil and gas fired power plants, thus reducing emissions which reduce air quality.

The decommissioning phase of the proposed development will be similar to the construction stage however no excavations will be required, only dismantling of turbines and therefore less adverse effects, such as dust emissions are predicted.

18.2.7 Climate

During the construction phase, there is potential for short term, adverse effects on human health for residents of nearby dwellings and biodiversity in terms of GHG emissions. GHG emissions generated during the construction phase is not likely to significantly affect the local climate; however, there is the possibility of disturbance occurring from GHG emissions in the vicinity of the site entrance and along the local public road which could affect the local population. GHG emission mitigation measures are presented in **Volume II Chapter 11** Climate of this EIAR, to minimise the risk of any such effects. The interaction of adverse construction climate effects and biodiversity and population and human health are not likely to be significant.

Once operational, the electricity generated by the wind farm will displace electricity that would otherwise be produced by burning fossil fuels. This will also displace the associated greenhouse gas emissions. Therefore, in the context of the proposed project, there will be a **long-term**, **moderate**, **positive** effect.

The lifecycle assessment of turbines includes for decommissioning within the lifecycle and payback period. This period will vary depending on the final turbine choice but is likely to be a maximum of 8 months. Decommissioning

will be undertaken in accordance with the methods set out in Volume II Chapter 02 Description of the Proposed Project of this EIAR and will have no effects on climate or interactions of effects.

18.2.8 LVIA & Visuals

During the construction phase, there is potential for short term insignificant adverse effects on population and human health in relation to landscape and visual effects related to the construction works, machinery and traffic. The interactive effects are likely to be short term and moderate.

During the operational phase, the proposed wind turbines will be prominent in some views from very close to the site and will be visible from certain long-distance viewpoints. Overall, the development will be visible from a number of different viewpoints and the significance of effects will range from slight-significant. This effect would likely have slight adverse interactive effects on population and human health. These interactive long-term effects are unlikely to be significant.

During the decommissioning phase there is potential for moderate positive long-term effects on population and human health in relation to landscape and visual effects due to the removal of the turbines for all those able to see the turbines in the landscape. At the same time there is potential for short term adverse effects on population and human health from the visual effects associated with increased traffic during the removal of the turbines. The interactive effects are likely to be short and long term and insignificant.

18.2.9 Noise and Vibration

Noise effects will occur during the construction phase of the project as a result of increased levels of site associated traffic and excavations during the construction phase. Noise and vibration has the potential to effect population and human health, biodiversity and traffic and transportation which are addressed individually and in detail within the preceding chapters. Appropriate noise mitigation measures and best practice methodologies provided in the CEMP (EIAR Volume III, Appendix 2A) will be implemented during the construction phase.

The adverse interaction of biodiversity and ornithology, land and soils, water, air quality and climate, noise and vibration and traffic and transport effects are likely to be insignificant.

During the operational phase, the only minor noise effects will be associated with the turbine operations and maintenance traffic. This noise will have long-term insignificant effects on population and human health (for nearby residents) and biodiversity.

During the decommissioning phase, there will be some slight noise effects associated with the deconstruction and removal of the turbines. This will have interactive effects with population and human health and biodiversity. The interactive effects are likely to be short term and insignificant.

18.2.10 Cultural Heritage

The excavation of soils and cable trenches during the construction of the proposed development has the potential to have an effect on archaeology and cultural heritage, as well as land and soils. Given that cultural heritage is a component of landscape character, the indirect visual effects on cultural heritage also the potential to affect the landscape character during the operational phase. These effects are not significant, and the interaction of these effects is likely to result in insignificant short term interactive effects.

During the decommissioning phase there will be a long term moderate positive interactive effect with landscape character due to the removal of the wind turbines.

18.2.11 Shadow Flicker

The proposed development has the potential to give rise to long term shadow flicker and visual effects on residents of surrounding dwellings during the operational phase only. Wind turbines will, however, be equipped with a shadow flicker module to prevent shadow effects at sensitive receptors/nearby dwellings during the wind farm operational phase. Therefore, the proposed development will not have significant adverse interactive visual, and population and human health effects on residents of nearby dwellings as a result of shadow flicker (Refer to Volume II Chapter 15 Shadow Flicker of this EIAR for further details).

18.2.12 Material Assets – Traffic and Transportation

During the construction phase there is potential for adverse interactive effects between traffic and transport and population and human health, air quality, material assets, landscape and visual, and noise and vibration. These effects have a potential to pollute and create temporary disturbance for occupants of nearby dwellings. The interactive effects are likely to be short term and insignificant.

During the operational phase there is potential for long term imperceptible adverse interactive effects on population and human health, landscape and visual, and noise and vibration effects. The interactive effects are likely to be long term and insignificant.

During the decommissioning phase there is potential for insignificant adverse effects on population and human health and noise and vibration which could create a temporary disturbance for occupants of nearby dwellings. The interactive effects are likely to be short term and insignificant.

18.2.13 Material Assets – Built Services

During the construction phase there is potential for adverse interactive effects to population and human health from disruption to services. The accommodation works for the Turbine Delivery Route (TDR) will require some brief disruption to electrical supplies due to movement of existing overhead lines. The interactive effects will be brief to temporary and not significant. There will be interaction with biodiversity due to the removal of forest and hedgerow however replant areas will be identified to replace the forestry, and new hedgerow will result in an overall net gain.

During the decommissioning phase, effects are likely to be similar to the construction phase.

18.3 Summary

A matrix has been generated to summarise the relevant interactions and interdependencies between specific environmental aspects and a significance rating has been given. The matrix is presented in Table 18-1. It contains each of the environmental topics, which were considered as part of this environmental impact assessment, on both axes. These interactions have been identified for both the construction [C], operation [O] and decommissioning [D] phases of the proposed development. Full details of the significance of the effects and the relevant interactions of the environmental aspects along with any proposed mitigation are discussed within each of the individual preceding chapters. A number of interactions have been identified in the EIAR. These are set out below and have been addressed in the relevant chapters.

Table 18-1: Matrix of Interactions

C	Construction Phase Effect
O	Operation phase Effect
D	Decommissioning Phase Effect

	Population and Human Health	Biodiversity	Ornithology	Land and Soils	Water	Air Quality	Climate	LVIA & Visual	Noise & Vibration	Archaeology & Cultural Heritage	Shadow Flicker	Material Assets - Traffic and Transport	Material Assets – Built Services
Population and Human Health				C	C	C/O	C/O	C/O/ D	C/O/ D		O	C/D	C
Biodiversity				C	C	C/ O/ D	C/O		C/O			C/D	C
Ornithology				C	C	C/O/ D	C/O		C/O				
Land and Soils		C/O	C/O		C/O	C		C	C			C	
Water		C	C	C									
Air Quality	C/O	C/O	C/O	C			C/O					C/O	
Climate	C/O	C/O	C/O	C		C/O							
LVIA & Visual	C/O/ D									C/O			
Noise & Vibration	C/O/ D	C/O	C/O									C/D	
Archaeology & Cultural Heritage	C			C									
Shadow Flicker	O							O					
Material Assets – Traffic & Transportation	C/D	C/D	C/D			C/O	C/O	C/D	C/D				
Material Assets – Built Services	C/O					C/D	C/D					C	

	Interaction Occurs
	No Interaction