

## 19. INTRODUCTION

The proposed project encompasses several key components, including the wind farm site, grid connection route (GCR), and turbine delivery route (TDR) work areas. Each of these elements has potential to give rise to environmental effects, which have been systematically identified, described, and evaluated within this EIAR. Where likely significant effects have been identified, appropriate mitigation measures have been proposed to prevent, reduce, or offset these impacts to acceptable levels.

However, it is important to recognise that environmental effects do not occur in isolation. In many cases, the interaction between individual effects can influence the overall magnitude, duration, or significance of impacts. Such interactions may either exacerbate or lessen the total environmental outcome.

In accordance with EIAR requirements and best practice guidance, an assessment of these potential interactions between environmental factors has been undertaken. Table 19-1 below identifies those environmental aspects that may interact, considering both positive and negative effects that could arise during the construction, operational, and decommissioning phases of the project. The nature and significance of these interactions are further examined and discussed in Section 19.2.

The assessment has been carried out with reference to the full range of turbine dimensions described in Chapter 2 to ensure that all possible interactions are considered across the realistic design envelope. Table 19-1 presents the identified interactions, using the symbols (C), (O), and (D) to denote the project phase construction, operational, and decommissioning, respectively. To enhance clarity and avoid duplication, the lower-left portion of the table is shaded grey, as the interactions represented there are identical to those shown in the upper-right portion.

### 19.1 STATEMENT OF AUTHORITY

This chapter has been prepared by Bertha Kasonde of TOBIN. Bertha is a Project Manager with over 8 years of multidisciplinary experience in environmental consulting both in the Public and Private Sectors. She holds a Bachelor of Engineering in Environmental Engineering and M.Sc. in Climate Change, Agriculture and Food Security from University of Galway. She has contributed to EIAR chapters and conducted feasibility studies for various projects including Wind, Solar and BESS.

This chapter has been reviewed by John Dillon (BSc, MSc, MCIWM, Peo), an Environmental and Hydrogeological specialist with over 18 years of experience in geological and hydrogeological assessment for Environmental Impact Assessment (EIA)s. He holds a master’s degree in environmental engineering from Imperial College London and is a Chartered Member of the Chartered Institution of Wastes Management (MCIWM) and a Professional Geologist (Peo).



Table 19-1: Interaction between Environmental Factors

Interaction Matrix	PHASE	Population & Human Health	Biodiversity	Ornithology	Land, Soils & Geology	Hydrology & Hydrogeology	Shadow Flicker	Material Assets	Noise & Vibration	Landscape & Visual	Air Quality & Climate	Cultural Heritage	Traffic & Transport
Population & Human Health	C	█			✓	✓			✓	✓	✓		✓
	O	█			✓	✓	✓	✓	✓	✓	✓		✓
	D	█			✓	✓			✓	✓	✓		✓
Biodiversity	C	█	█	✓	✓	✓			✓		✓		✓
	O	█	█	✓	✓	✓			✓		✓		✓
	D	█	█						✓		✓		✓
Ornithology	C	█	█	█	✓	✓			✓		✓		✓
	O	█	█	█	✓	✓					✓		
	D	█	█	█					✓		✓		✓
Land, Soils and Geology	C	█	█	█	█	✓				✓		✓	
	O	█	█	█	█								
	D	█	█	█	█								
Hydrology & Hydrogeology	C	█	█	█	█	█							
	O	█	█	█	█	█							
	D	█	█	█	█	█							
Shadow Flicker	C	█	█	█	█	█	█						
	O	█	█	█	█	█	█						
	D	█	█	█	█	█	█						
Material Assets	C	█	█	█	█	█	█	█					
	O	█	█	█	█	█	█	█					
	D	█	█	█	█	█	█	█					
Noise & Vibration	C	█	█	█	█	█	█	█	█				✓
	O	█	█	█	█	█	█	█	█				✓
	D	█	█	█	█	█	█	█	█				✓
Landscape & Visual	C	█	█	█	█	█	█	█	█	█		✓	
	O	█	█	█	█	█	█	█	█	█		✓	
	D	█	█	█	█	█	█	█	█	█		✓	
Air Quality & Climate	C	█	█	█	█	█	█	█	█	█	█		✓
	O	█	█	█	█	█	█	█	█	█	█		✓
	D	█	█	█	█	█	█	█	█	█	█		✓
Cultural Heritage	C	█	█	█	█	█	█	█	█	█	█	█	
	O	█	█	█	█	█	█	█	█	█	█	█	
	D	█	█	█	█	█	█	█	█	█	█	█	
Traffic & Transport	C	█	█	█	█	█	█	█	█	█	█	█	█
	O	█	█	█	█	█	█	█	█	█	█	█	█
	D	█	█	█	█	█	█	█	█	█	█	█	█

Interaction between Environmental Aspects (positive and negative) Phases include construction (C), operational (O) and decommissioning (D). Blue denotes identified interactions (which are described in Section 19.2), while grey is used for blocking out part of the table to avoid duplication



## 19.2 DISCUSSION OF INTERACTIONS

This section summarises key interactions between environmental aspects with the potential for likely significant effects from the proposed project, as identified in Table 19-1 above. Only potential interactions listed in Table 19-1 for each project stage are discussed and each environmental interaction relating to any two-chapter topics is addressed only once. Therefore, not all interactions for each chapter are listed under that chapter heading and follows the same principle as outlined in Table 19-1 to avoid repetition.

As described in Chapter 18 (Major Accidents and Natural Disasters), the proposed project may itself present a hazard or interact with other hazards, potentially resulting in a major accident or natural disaster during the construction, operational, or decommissioning phases. All identified hazards and sources of hazard have been considered in the technical assessments presented in Chapters 5 to 17. As a result, any interactions relating to hazards are addressed in Chapter 18 and not repeated in this chapter.

### 19.2.1 Population and Human Health

The following interactions with Population and Human Health have been identified as having the potential to occur during the construction, operational and /or decommissioning phases of the proposed project.

#### Interactions of Population and Human Health, Land, Soils and Geology, Hydrology and Hydrogeology, and Air Quality and Climate

##### Construction Phase

During construction phase of the proposed project, there is potential for short-term interactions between Population and Human Health with Air Quality and Climate, Hydrology/Hydrogeology and Land, Soils and Geology. These interactions are primarily associated with ground disturbance during construction which if not properly managed, could lead to increased levels of suspended solids in nearby watercourses and dust emissions. Suspended solids may enter watercourses or be transported off-site by construction vehicles, while dust emissions could affect air quality.

Ground excavation and soil disturbance activities such as creating access roads, hardstands, and borrow pits disturb soils, which can lead to Increased dust emissions affecting Air Quality and nearby residential amenity. Human health impacts associated with soil contamination during construction are primarily linked to dust emissions generated from material extraction and the transport of soils and excavated rock, as addressed in Chapter 10 and 17 (Air Quality and Climate). Additional risks include potential spills or leaks from construction vehicles, plant, and machinery, which could lead to localised soil contamination.

Given the baseline environmental setting and the proposed mitigation measures during the construction phase, it is not anticipated that significant negative effects will occur on human health and Air Quality and Climate.

Noise and vibration effects from construction and decommissioning traffic are predicted to remain within best practice limits and will be short-term. In-combination effects on ornithology are limited and not significant.



Any potential effects on human health arising from soil quality changes, excavation, or earthworks are predicted to be localised, negative, imperceptible to slight in magnitude, temporary to short-term in duration, and not significant.

These effects, along with mitigation measures, are addressed in detail in Chapters 8 (Land, Soils and Geology), 9 (Hydrology and Hydrogeology), and 10 (Air Quality) and Chapter 17 (Climate) of this EIAR.

Given these mitigation measures in place, there is no significant effects anticipated on Population and Human Health, specifically regarding residential amenity and human health due to these interactions.

### **Operational Phase**

The operation of the proposed project will provide renewable electricity to the grid, thereby reducing reliance on fossil fuel-based electricity generation. This results in a positive interaction with air quality and climate, as reduced fossil fuel use lowers greenhouse gas emissions and other air pollutants. In turn, this improvement in air quality has a positive effect on human health, particularly for local and regional populations. Overall, this interaction is expected to result in a slight, long-term positive effect during the operational phase of the project.

During the operational phase, onsite activities will be limited to routine maintenance of wind farm components. Although far less intensive than the construction phase, all personnel will ensure machinery is properly maintained and switched off when not in use to prevent unnecessary exhaust emissions from maintenance traffic.

Maintenance personnel are the principal receptors for potential soil-related impacts on human health, given the likelihood of direct contact with soils and any polluting substances during routine maintenance activities. In the event of accidental release, mobilisation, spillage, or leakage of such substances, impacts are anticipated to be localized and effectively contained. These incidents will be managed in accordance with the mitigation measures specified in Chapter 8 (Land, Soils and Geology).

Overall, following the implementation of mitigation measures, the potential effects arising from the interaction between Land, Soils and Geology, Hydrology and Hydrogeology and Air Quality and Climate are considered not significant.

### **Decommissioning Phase**

The decommissioning phase is expected to produce environmental effects similar to those identified during the construction phase. However, the effects will be substantially lesser in extent given some of the infrastructure will remain in situ. The removal of the project infrastructure will lead to a reduction in the amount of renewable electricity supplied to the grid, effectively reversing some of the positive climate and air quality effects achieved during the operational phase of the project. Despite this, the scale of the reversal is small, and no significant negative effects are anticipated from these interactions during the decommissioning phase.

## **Interactions of Population and Human Health and Shadow Flicker**

### **Construction Phase**



Shadow flicker is something that almost exclusively occurs during operational phase of a wind farm, however, there is potential for brief, momentary effects to arise during turbine commissioning at the end of the construction phase. During commissioning the proposed turbine blades and shadow flicker management software will be installed and tested. These are expected to be minimal due to the short duration (approximately two months) and the fact that turbines are generally stationary unless rotation is required. Therefore, no significant effect is anticipated.

#### **Operational Phase**

During the operational phase, there is potential for interactions between Shadow Flicker and Population and Human Health, specifically in relation to residential amenity of nearby properties. Shadow flicker could potentially be a nuisance for local residential properties.

However, as outlined in Section 16.5 of Chapter 16 (Shadow Flicker), the Applicant will implement a shadow flicker impact control system on turbines identified as having the potential to cause shadow flicker at nearby receptors. The control system, comprising light sensors and dedicated software, will be installed on the relevant turbines to ensure that mitigation measures are automatically applied when shadow flicker exceeds the thresholds specified in the assessment criteria. This will effectively prevent any significant impacts.

Following these mitigation measures, no significant negative effects from shadow flicker on the local community are anticipated during the operational phase of the project.

#### **Interactions of Population and Human Health and Material Assets**

##### **Operational Phase**

During the operational phase, the generation of electricity from wind energy has the potential to affect the quality of radio waves and microwaves used for communication purposes, including television signals, radio signals, aircraft landing and navigation systems, and microwave links.

Chapter 15 (Material Assets, Telecommunications & Aviation) outlines a thorough consultation process carried out with relevant operators and service providers to identify and assess any potential sources of electromagnetic interference associated with the proposed project. The assessment concludes that with the application of the embedded mitigation measures no significant effects are anticipated on telecommunication links, aviation systems, and other material assets at any stage of the proposed project.

Furthermore, the applicant has committed to maintaining ongoing communication with relevant operators and to addressing any issues that may arise during the construction and operational phases. This proactive approach provides an additional safeguard, ensuring that potential effects can be managed effectively throughout the project's lifespan. Consequently, no likely significant effects are expected from this interaction.

#### **Interactions of Population and Human Health and Noise and Vibration**

##### **Construction Phase**

During construction phase, wind farms generate noise in the vicinity of the project site. Noise and vibration effects have been assessed in Chapter 11 (Noise and Vibration) of this EIAR. The assessment concludes that, during construction, noise and vibration will remain within the relevant guidance limits for all properties. Therefore, no significant effects on Population and Human Health are anticipated from interaction with Noise and Vibration.



### Operational Phase

During the operational phase, noise levels from the wind farm will continue to remain within the relevant guidance limits for all properties. Assessment findings outlined in Section 11.6.4.1 of Chapter 11 (Noise and Vibration) confirms that operational noise levels generally meet best practice criteria. The noise assessment assessed cumulative noise effects (See Section 11.9.1 of Chapter 11) and found that effect on the noise environment associated with the proposed project in combination with other wind farm developments is not significant

Modern wind turbines can be programmed to operate in reduced or low-noise modes to provide the necessary attenuation under specific wind conditions, such as wind speeds and directions.

As a result, no significant effects are expected from the interaction of operational noise with Population and Human Health.

### Decommissioning Phase

The decommissioning phase may produce noise similar to that experienced during construction phase, with potential effects on nearby sensitive receptors. However, the scale of activity will be substantially lower, as most stone and soil materials will remain on site. Any interactions between noise and residential amenity and human health are not predicted to result in likely significant effects.

## Interactions of Population and Human Health and Landscape and Visual Effects

### Construction Phase

Landscape and visual effects associated with the construction of the proposed project have the potential to interact with residential amenity within the local community. In this instance, such effects are expected to be predominantly localised and not significant, except for turbine erection activities. The visual influence of turbine erection will be comparable to that experienced during the operational phase and is therefore addressed under that phase. Accordingly, no significant negative effects are anticipated to arise from interaction between Population and Human Health and Landscape and Visual effects during the construction phase of the proposed project.

## Interactions of Population and Human Health, Land, Soils and Geology and Landscape and Visual

### Construction Phase

During the Construction phase of the project, movement of soil and stone may cause temporary, localised visual effects for local receptors, particularly at ancillary locations (GCR and TDR). These effects are not anticipated to result in likely significant effects.

### Operational Phase

The visual impact assessment concludes that the proposed turbines have high potential for visibility within the central study area, with some locations offering views of up to 11 turbines. Potential interactions may occur between landscape and visual effects and residential amenity of people living, working, or travelling nearby, as well as with some tourism receptors. These interactions are subjective and may be perceived as positive or negative.



Landscape impact is assessed as High-Medium within 1 km of the site, reducing to Medium across the remainder of the Central Study Area, Low beyond 5 km, and Negligible at greater distances. The ZTV indicates potential visibility along sections of the N65 and N52, however, this map is theoretical and does not account for screening by vegetation or structures.

Based on Chapter 12 (Landscape and Visual) and analysis of photomontages, it is anticipated that no significant interactions occur between residential amenity and landscape or visual effects. Local visual effects are assessed as slight, and no significant regional effects are expected.

The proposed project also supports local amenity through a community benefit scheme, which may provide positive effects on tourism and public health. Chapter 5 (Population and Human Health) concludes that the proposed project will not result in any significant effects on tourism. Therefore, no significant negative effects are predicted from these interactions.

### **Decommissioning Phase**

Landscape and visual effects associated with the decommissioning phase will be similar in character to those experienced during construction, though of reduced magnitude and temporary in duration. Consequently, no significant negative effects are expected to result from the interaction between Population and Human Health and Landscape and Visual effects during the decommissioning phase of the proposed project.

### **Interactions of Population and Human Health and Traffic and Transportation**

Potential effects on the surrounding road network are addressed in Chapter 14 (Traffic and Transportation). Traffic and transportation activities may interact with population and human health primarily through the generation of noise, dust emissions (which may affect local residential amenity), and traffic disruption. Public perception during the construction phase is anticipated to be influenced predominantly by traffic movements.

To mitigate potential impacts associated with construction traffic, a Traffic Management Plan has been developed for the project. These impacts will be temporary, as the construction phase is expected to last approximately 24 months, and no significant negative effects are predicted.

During the operational phase, traffic volumes associated with the wind farm will remain low, primarily involving maintenance personnel and visitors to amenity car parks. Traffic and transportation impacts during the decommissioning phase are expected to be similar in nature to those during construction, albeit to a lesser extent.

Overall, the interaction between Population and Human Health and Traffic and Transportation is considered not significant. Any increase in traffic volumes has the potential to generate noise and dust, which may affect residential amenity and human health for those living in the vicinity. Further details on the interaction between Noise and Vibration and Traffic and Transportation are provided in Section 19.2.8.

No significant interactions with other environmental factors were identified in the Population and Human Health assessment.

## **19.2.2 Biodiversity**

The following interactions with Biodiversity have been identified as having potential to occur during the construction, operational, and/or decommissioning phases of the proposed project.



## Interactions of Biodiversity, Land, Soils and Geology and Hydrology and Hydrogeology

### Construction Phase

Exposing soils during the construction phase has potential to cause sedimentation of nearby watercourses if not properly managed, thereby creating potential interactions between Biodiversity, Soils and Geology, and Hydrology and Hydrogeology. Excavation of turbine foundations, construction of internal access tracks (including bridges), and works along the GCR and TDR could lead to increased suspended solids in surface water run-off. However, mitigation measures will be implemented throughout the construction phase to control siltation and protect the aquatic environment, and the effects of these interactions are not expected to be significant.

Excavation and removal of soils for permanent infrastructure such as hardstands, TDR and access tracks will result in some habitat loss. The direct loss of habitats during construction phase is assessed as likely, permanent, negative in the absence of mitigations measures.

Section 6.7 of Chapter 6 (Biodiversity) outlines mitigation measures to offset significant effects. A Detailed Biodiversity Enhancement Management Plan (Appendix 6-1) has also been prepared.

Potential interactions between the site drainage regime and aquatic ecology will also be managed through measures detailed in the CEMP and Chapter 20 (Schedule of Mitigations), ensuring that any effects are temporary, localised, and not significant. Following the implementation of the mitigation measures the effects are likely to be not significant.

Overall, no significant negative effects are anticipated from these interactions during the construction phase.

### Operational Phase

During the operational phase the existing on-site drainage system, together with the surface water management plan, will ensure that there is no significant negative interaction between Lands, Soils and Geology, Hydrology and Hydrogeology, and Biodiversity. Runoff from the site will be managed at greenfield rates and directed through carefully designed surface water attenuation ponds, providing effective control of surface water flows. As a result, no significant negative effects are anticipated from these interactions during the operational phase.

## Interactions of Biodiversity, Noise and Vibration, and Traffic and Transportation

### Construction and Decommissioning Phase

There is potential for interaction between Biodiversity, Noise and Vibration, and Traffic and Transport during the construction and decommissioning phases of the proposed project. However, noise and vibration effects during these phases are predicted to remain within best practice guidance limits across the wider area, and any effects are expected to be short-term in nature. Changes in traffic noise levels associated with both 'peak' and 'average' construction traffic have been assessed, and the resulting increase in traffic noise is expected to be imperceptible. Traffic movements related to construction and decommissioning will be restricted to designated internal access tracks, as described in Chapter 14 (Traffic and Transportation).

Detailed baseline surveys of biodiversity have been undertaken across the site, and the findings have been incorporated into the project design and site layout. As a result, construction works,



including traffic movements, will avoid areas of highest biodiversity importance, and no significant negative effects are anticipated from these interactions.

#### **Operational Phase**

During the operational phase, the limited traffic on site will continue to be restricted to designated internal access tracks. Noise and vibration effects from the are predicted to remain within best practice guidance limits. Potential direct and indirect noise, vibration and traffic effects on Natura 2000 sites have also been considered in Chapter 6 (Biodiversity), as well as in the AA Screening Report and the accompanying NIS. With the implementation of mitigation measures no significant negative effects are anticipated from these interactions during the operational phase.

### **Interactions of Biodiversity and Air Quality and Climate**

#### **Construction and Decommissioning Phase**

There is potential for interaction between Biodiversity and Air Quality and Climate during the Construction and decommissioning phases of the proposed project. Construction activities may generate dust, which could temporarily affect biodiversity in specific areas. However, any such effects are expected to be short-term and localised, and mitigation measures, as described in section 10.7.2 Chapter 10 (Air Quality) will be implemented to ensure that no significant disturbance occurs. This interaction therefore will not result in any significant negative effects.

#### **Operational Phase**

During the operational phase, onsite activities will be limited to maintenance works associated with the wind farm components. The intensity of these activities will be only a small fraction of that during construction phase. The operation of a wind farm will contribute to the reduction of greenhouse gas emissions, thereby supporting efforts to mitigate climate change.

Emissions from infrequent maintenance vehicles have been assessed as having a long-term, direct, localised, negative, but imperceptible effect on air quality, as discussed in Chapter 17 (Climate).

Overall, no significant negative effects are anticipated from this interaction during the operational phase.

### **Interactions of Biodiversity and Ornithology**

There is an interaction between biodiversity and ornithology in relation to the full assessment of Special Protection Areas (SPAs) as these are not considered within the biodiversity chapter. The topics share potential effects on habitat loss during the construction and decommissioning phases of the proposed project.

#### **Construction Phase**

During construction, habitat disturbances will occur where works take place, including the clearance of forestry for bat buffers around turbines. Birds in these areas may be temporarily disturbed, causing a direct, short-term negative effect. Following mitigation and compensation measures, including the implementation of a Biodiversity Enhancement Management Plan (Appendix 6-1), no significant negative effects are anticipated. This is discussed further in Chapter 6 (Biodiversity: Flora & Fauna).



The spread of non-native invasive species also has the potential to outcompete native flora, thereby reducing biodiversity and/or altering habitat conditions or structure (for example, by changing soil chemistry). Appropriate biosecurity and management measures will be applied to minimise the risk of invasive species introduction and spread. No significant negative effect is anticipated.

#### Operational Phase

Ecological mitigation measures, including a Biodiversity Enhancement Management Plan (Appendix 6-1) and biodiversity enhancement on lands surrounding the site, are expected to restore and improve habitat quality. This will likely increase the abundance of insects and prey species, resulting in a slight long-term positive effect on ornithology. No significant negative effects are anticipated.

No significant interactions with other environmental factors were identified in the biodiversity assessment.

### 19.2.3 Ornithology

The following interactions with Ornithology have been identified as having the potential to occur during the construction, operational, and/or decommissioning phases of the proposed project.

#### Interactions of Ornithology, Lands, Soils and Geology, and Hydrology and Hydrogeology

##### Construction Phase

Excavation works for turbine foundations, crane hardstands, internal access tracks, and other associated infrastructure may result in the temporary or permanent loss of habitats used by birds for nesting, foraging, or roosting. These activities could also increase suspended solids in surface water run-off, potentially affecting birds indirectly through the deterioration of aquatic habitats. However, mitigation measures will be implemented to control siltation and protect the aquatic environment as outlined in section 7.7.1 of Chapter 7 (Ornithology). The impact of flood risk has been assessed for the proposed project.

Therefore, no significant negative effects are anticipated from this interaction.

##### Operational Phase

The operational footprint will remain largely confined to areas of low ecological value, and no further habitat loss or degradation is anticipated beyond that which occurs during construction. Occasional maintenance activities coupled with low-intensity use of site roads during the operational phase presents minimal risk of sedimentation and may result in minor but temporary habitat loss or disturbance to birds. The ornithology assessment considered the cumulative effects and found that no significant effects are anticipated. However, no significant negative effects are expected from this interaction.

#### Interactions of Ornithology, Noise and Vibration, and Traffic and Transportation

##### Construction and Decommissioning Phase

The presence of machinery, vehicles, and personnel along with construction noise may disturb birds and lead to their temporary or permanent displacement from sensitive habitats, particularly during breeding season. Best practice measures have been integrated into the



project design to prevent significant impacts on surrounding biodiversity. A Construction Environmental Management Plan (CEMP) has been prepared to establish a comprehensive framework for avoiding environmental impacts during the construction phase. This plan incorporates all mitigation measures outlined in section 7.7.1 of Chapter 7 (Ornithology). Potential effects on Natura 2000 sites have been assessed in the AA Screening Report, and the NIS, and are predicted to be short-term and not significant.

The Applicant has committed to undertake works outside of the bird breeding season to avoid disturbance or displacement of birds among other mitigations measures

Noise and vibration effects from construction and decommissioning traffic are predicted to remain within best practice limits and will be short-term. In-combination effects on ornithology are limited and not significant.

#### **Operational Phase**

Operational traffic is minimal, and noise and vibration are within best practice limits, resulting in no significant negative effects on ornithology.

#### **Interactions of Ornithology and Air Quality and Climate**

##### **Construction and Decommissioning Phase**

There is potential for interaction between Ornithology, and Air Quality and Climate during the construction and decommissioning phases of the proposed project. Localised dust and emissions from construction activities may affect birds in specific areas, but effects are short-term. Mitigation measures outlined in Chapter 10 (Air Quality) and Chapter 17 (Climate) will be implemented. There will be no significant negative effects anticipated arising from this interaction.

#### **Operational Phase**

During the operational phase, the proposed project will contribute to reducing greenhouse gas emissions, thereby providing a slight indirect positive effect on ornithology. Refer to Section 17.4.1.2 of Chapter 17 (Climate). No significant negative effects are anticipated.

No significant interactions with other environmental factors were identified in the Ornithology assessment.

## **19.2.4 Land, Soils and Geology**

### **Interactions of Lands, Soils and Geology and Archaeology and Cultural Heritage**

There is potential for interaction between Land, Soils and Geology and Archaeology and Cultural Heritage during excavations or material removal, particularly if unrecorded subsurface archaeological artefacts or sites are encountered.

Chapter 13 (Archaeological, Architectural and Cultural Heritage) notes that, following the implementation of mitigation measures, there will be no significant residual effects on previously unrecorded archaeological, architectural, or cultural heritage resources as a result of the proposed project. This is because any remains discovered during monitoring or test trenching will be preserved either by record or in situ.



Residual effects will persist regarding the setting of archaeological, architectural, and cultural heritage sites, as impacts on their setting cannot be fully mitigated. However, these effects will not be significant or permanent and will be removed once the turbines are decommissioned.

Therefore, with mitigation in place, the potential effects arising from the interaction between Land, Soils and Geology and Archaeology and Cultural Heritage are considered not significant. The interactions of Population and Human Health, Land, Soils and Geology, Hydrology and Hydrogeology, and Air Quality and Climate are discussed in Section 19.2.1 above.

### 19.2.5 Hydrology and Hydrogeology

Potential interactions with Hydrology and Hydrogeology during the construction, operation, and/or decommissioning phases of the proposed project are addressed in the following sections of this chapter:

- Section 19.2.1 Interactions of Population and Human Health
- Section 19.2.2 Interactions of Biodiversity
- Section 19.2.3 Interactions of Ornithology
- Section 19.2.4 Interactions of Land, Soils and Geology

#### Interactions of Hydrology and Hydrogeology and Land and Soil

Potential effects from interaction between Land, Soils and Geology and Hydrology and Hydrogeology during the construction phase are considered not significant.

Excavation of foundations and construction of access tracks during construction phase may increase suspended solids in surface water and alteration of surface water flow. This interaction is not anticipated to result in significant effect following the implementation of mitigation measures outlined in section 9.5.1 of Chapter 9 (Hydrology and Hydrogeology).

Flood risk has been assessed in Appendix 9-3 and considered in the Biodiversity Assessment. Surface water settlement, interceptor drains and track edge drainage/swales will be installed up-gradient of all proposed infrastructure elements of the proposed project. Potential impact on air quality during the construction phase is construction dust emissions and nuisance dust. Section 10.7.2 of Chapter 10 (Air Quality) provides further details on mitigation measures to offset significant effects.

No significant interactions with other environmental factors were identified in the Hydrology and Hydrogeology assessment (Chapter 9).

### 19.2.6 Shadow Flicker

The interaction between Shadow Flicker and Population and Human Health has been addressed in Section 19.2.1 above.

No significant interactions with other environmental factors were identified in the Shadow Flicker assessment (Chapter 16).

### 19.2.7 Material Assets

Interactions between Material Assets and Air Quality and Climate have the potential to occur. Waste management measures will be implemented to minimise the amount of waste sent to landfill, as landfill disposal is associated with higher embodied carbon emissions compared to



alternatives such as recycling. Where feasible, materials will be reused on site or removed for recycling.

Waste management for the project is detailed in Chapter 15 (Material Assets) and within the Construction Environmental Management Plan (CEMP) in Appendix 2-3 of this EIA. The effect of interactions between waste and climate is considered not significant.

The potential interaction between Material Assets and Human Health has been addressed in Section 19.2.1 above.

No significant interactions with other environmental factors were identified in the Chapter 15 (Material Assets) assessment.

## 19.2.8 Noise and Vibration

### Interactions of Noise and Vibration and Traffic and Transport

During construction and decommissioning phases, traffic related to material deliveries, machinery movement, and personnel access may cause temporary increases in noise and vibration along transport routes to and within the site. However, given the significant distance between main construction areas and sensitive receptors, combined with the short-term and intermittent nature of these activities, any potential effects are expected to be minor and temporary. Works along the GCR and TDR will also be short in duration and temporary, further reducing the likelihood of disturbance.

Therefore, no significant negative effects are anticipated from this interaction.

### Operational Phase

During the operational phase, traffic levels will be very low, limited to occasional maintenance and monitoring visits. The infrequent nature of these movements means there is minimal potential for noise or vibration impacts on surrounding receptors, and no significant negative effects are expected from this interaction. The following sections discuss the interactions further.

- Section 19.2.1: Interactions with Population and Human Health
- Section 19.2.2: Interactions with Biodiversity
- Section 19.2.3: Interactions with Ornithology

## 19.2.9 Landscape and Visual

### Interactions of Landscape and Visual and Cultural Heritage

#### Construction Phase

Any potential effects arising from interactions between Landscape and Visual and Cultural Heritage during construction phase are likely to be associated with changes to the setting of monuments. However, no significant negative effects are anticipated from this interaction, given that construction works will be short-term in duration and restricted to the footprint of the proposed infrastructure.



In addition, the project design has been developed with consideration for archaeological and cultural heritage features within the vicinity of the site, thereby minimising potential impacts. No significant effects are anticipated.

#### **Operational Phase**

During the operational phase, negative landscape and visual effects on Cultural Heritage resources may arise, particularly in relation to archaeological features and their settings within the landscape, due to the visibility of turbines and associated infrastructure. This visibility may also create an interaction with tourism, especially where the setting of archaeological features contributes to the visitor experience.

A slight significance of effect was identified at Kilcomin Church and Cemetery, however, this is a substantially enclosed feature located on private property and does not appear to be regularly visited. At other sensitive or notable viewpoints, such as Birr Castle and Demesne, the turbines would be substantially screened from view. No visibility of the proposed wind farm is afforded from within these heavily enclosed grounds that are over 5km from the wind farm site.

Therefore, no significant negative effects are anticipated from the interaction. Chapter 12 (Landscape and Visual Effects) and Chapter 13 (Archaeological, Architectural and Cultural Heritage) outlines further details on this.

No significant effects are anticipated from associated interactions along the proposed GCR and TDR, as works along these routes will be short-term and temporary in nature.

#### **Decommissioning Phase**

Any potential effects from the interaction between Landscape and Visual and Cultural Heritage are likely to be limited to the setting of monuments while turbines and other infrastructure are removed. Given that site disturbance will be minimal and much less extensive than during construction, no significant negative effects are expected from this interaction.

No significant interactions with other environmental factors were identified in the landscape and visual assessment.

## **19.2.10 Air Quality and Climate**

### **Interactions of Air Quality and Climate and Traffic and Transport**

#### **Construction and Decommissioning Phase:**

There will be no significant interaction between Traffic and Transport and Air Quality and Climate during the construction and decommissioning phases of the proposed project, aside from the temporary and localised effects of exhaust emissions and dust generated by construction vehicles. These effects are short-term and transient in any one location and are not expected to result in significant impacts. Appropriate mitigation measures to minimise dust and emissions, as detailed in the CEMP (Appendix 2-3), will be implemented throughout the works. Therefore, no significant negative effects are anticipated from this interaction.

There is potential for interaction between climate and traffic, as vehicles accessing the site will generate CO<sub>2</sub> emissions, which is a greenhouse gas. The impact of the proposed project on climate has been assessed by reviewing changes in annual average daily traffic on roads near the site.



According to assessments on Air Quality (Chapter 10) and Climate (Chapter 17), these interactions between traffic and climate are considered not significant.

#### Operational Phase

During the operational phase, traffic associated with the proposed project will be very low, limited mainly to occasional maintenance and monitoring activities. As a result, there will be no significant effects arising from the interaction between Traffic and Transport and Air Quality and Climate during this phase.

### 19.2.11 Archaeology and Cultural Heritage

Potential interactions with Archaeology and Cultural Heritage and Land, Soils and Geology mainly relate to the possibility of finding of unrecorded archaeology during the construction phase when disturbing the soils for ground works.

This interaction is discussed above in Section 19.2.4 - Interactions of Land, Soils and Geology.

No significant interactions with other environmental factors were identified in Archaeology, and Cultural Heritage assessment.

### 19.2.12 Traffic and Transportation

Interactions with Traffic and Transportation primarily relate to increased traffic associated with the project. The potential interactions during the construction, operation, and decommissioning phases of the proposed project are addressed in the following sections of this chapter:

- Section 19.2.1 - Interactions of Population and Human Health (also addressed interactions with noise and dust)
- Section 19.2.2 - Interactions of Biodiversity
- Section 19.2.3 - Interactions of Ornithology
- Section 19.2.10 - Interactions of Air Quality and Climate

## 19.3 POSITIVE INTERACTION OF ELEMENTS

In addition to the interactions outlined above, the proposed project is expected to generate positive effects on the receiving environment and foster beneficial interactions between environmental factors, including:

- The new land use, comprising wind energy production within the proposed wind farm site, will supply renewable electricity to the grid, reduce reliance on fossil fuels, and contribute to lowering emissions that drive climate change. This represents a positive interaction between Material Assets (energy infrastructure), Air Quality, Climate, Population and Human Health, and Biodiversity.
- Employment opportunities created by the project and the use of local services and facilities by project personnel during all phases will result in a positive interaction between Material Assets (electrical infrastructure) and Population and Human Health (local economy, employment, and socio-economic conditions).
- The Community Benefit Fund will create a positive interaction between Material Assets (energy infrastructure) and Population and Human Health, enhancing local socio-economic conditions, residential amenity, and tourism. Further details are provided in Chapter 5 (Population and Human Health) and Chapter 15 (Material Assets).



- The development of wind farms and associated community benefits can enhance the character of an area or region, promoting its image as environmentally sustainable and attractive to visitors. The proposed project will support initiatives funded through the Community Benefit Fund, which may positively influence tourism and public health in the area. Public and tourist attitudes toward wind farms, amenity, and community benefits are discussed in Chapter 5 (Population and Human Health).

## 19.4 MAJOR ACCIDENTS AND NATURAL DISASTERS

As outlined in Chapter 18 (Major Accidents and Natural Disasters) of this EIAR, the proposed project has the potential to act as a source of hazard or interact with other hazards that could lead to a major accident and/or disaster during construction, operation or decommissioning phases.

Chapter 18 assesses potential risks of major accidents and natural disasters across the Construction, Operational, and Decommissioning phases of the project. In accordance with DoEHLG guidance (referenced in Chapter 18), the overall risk of a major accident and/or natural disaster is considered low.

The likelihood of significant natural disasters occurring at the proposed wind farm site is low. Ireland is geologically stable and experiences a mild temperate climate.

Monitoring will be undertaken during all phases construction, operation, and decommissioning to identify any changes that could increase the risk of major accidents or natural disasters. All monitoring proposals for the pre-construction and construction phases are detailed in various sections of the EIAR and the Natura Impact Statement (NIS).

The Construction Environmental Management Plan (CEMP) (see Appendix 2-3) consolidates these monitoring measures, enabling systematic checks and reporting throughout the project.

During the operational phase, the project operator will continue to assess risks on an ongoing basis. This includes monitoring the maintenance programme, incident reports, and general site activities to ensure that the risk of major accidents does not increase over time.

With the implementation of embedded mitigation measures, and any additional measures proposed in Chapters 5 to 18 (as referenced in Chapter 20 – Schedule of Mitigation Measures) and the CEMP, no significant residual effects are anticipated during the construction, operation, or decommissioning phases of the proposed project.

## 19.5 CONCLUSION

All environmental factors are interrelated to some extent. All permutations and variations of the proposed turbines have been considered in this chapter, and the significance of the interactions and likely significant effects remains the same across these variations. The GCR and TDR have been considered throughout this assessment.

Having assessed the interactions of potential effects during construction, operational, and decommissioning phases, it has been concluded that there are no additional interactions beyond those described in this chapter. The detailed assessment found that these interactions do not result in any likely significant effects.



The proposed project is also expected to have positive effects at the international, national, regional, and local levels, particularly through its contribution to renewable energy targets, domestic energy security, and the community benefit scheme supporting local initiatives.

