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Introduction

- 16.1 Article 3 of Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment as amended by Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending ('EIA Directive') 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).'*
- 16.2 In accordance with the requirements of the EIA Directive, this EIAR sets out assessments of the likely significant environmental effects and impacts of the entire project under a range of environmental topic areas. Where relevant, the interaction between various environmental topic areas, are already addressed within each of the individual assessment or chapters of this EIAR. For example, there are clear overlaps between the land, soils and geology assessment and the hydrological conditions at the site. The purpose of this chapter is to draw attention to significant interactions and interdependencies between one topic and another where they may otherwise be missed.

Interaction of Environmental Factors

- 16.3 There is potential for interactions between one aspect of the environment and another which can result in potential for direct or indirect impacts, and which may be positive or negative. **Table 16-1** provides a matrix to present the main interactions and interdependencies between specific environmental factors given the findings of the preceding chapters of the EIAR. A supporting commentary is provided below, which explains the main interactions of note between the environmental topic areas in the context of the application site / Proposed Development.
- 16.4 The matrix contains each of the environmental topics, which were considered as part of this EIAR, on both axes. These interactions have been identified for both the construction [C] operational [O] and decommissioning [D] phases, of the Proposed Development. Potential interactions during decommissioning will be similar to those of the construction phase.
- 16.5 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 which included:
- Chapter 4 Population and Human Health
 - Chapter 5 Biodiversity
 - Chapter 6 Land, Soils and Geology
 - Chapter 7 Water
 - Chapter 8 Air and Climate
 - Chapter 9 Noise
 - Chapter 10 Landscape and Visual
 - Chapter 11 Shadow Flicker

- Chapter 12 Cultural Heritage
- Chapter 13 Material Assets
- Chapter 14 Traffic
- Chapter 15 Major Accidents and Disasters

16.6 The most dynamic interaction and interdependencies relate to the connection between human beings and biodiversity receptors, and their potential exposure to receptor pathways such as soils, water / hydrology, air and noise. Changes in site run-off from changes and removal of soil cover can result in effects or changes on hydrology, both in terms of water quality and hydraulic regime, which may result in secondary ecological effects on vegetation patterns and habitats and species. The relationship and effects of these aspects have been fully considered in **Chapter 5** Biodiversity of the EIAR. The following is a summary of other key interactions.

Population and Human Health

Population and Human Health and Noise & Vibration and Air Quality & Climate

- 16.7 Plant and machinery used during the construction phase have the potential to cause short term disturbance through noise and dust emissions. Once operational, there will be noise from the wind turbines and substation, however, as assessed in **Chapter 9** of this EIAR, the Project as designed will not result in significant effects for all design permutations of the dimensions set out in **Table 2-1** in **Chapter 2**.
- 16.8 During the operational phase, the Proposed Development will contribute towards eventual national decarbonisation which will have beneficial effects on air quality and climate change and a resultant positive effect on the human environment. This is outlined in **Chapter 8** Air and Climate.

Population and Human Health and Water

- 16.9 Potential accidental leakages or spillages during the construction phase could impact on water receptors that could provide a potential pathway to cause impacts to the human population. **Chapter 7** of this EIAR has assessed the potential impacts and describes mitigation measures that will be implemented to ensure that potential risks are minimised and there are no significant effects from water pollution.

Population and Human Health and Landscape and Visual Resources

- 16.10 The most visually dominant infrastructure of the Proposed Development will be the wind turbines and the erection of the wind turbines will change the landscape to observers. **Chapter 10** of this EIAR considers the magnitude of landscape change and assesses the landscape and visual impact of the project.
- 16.11 The potential impact on landscape and visual resources is explained in terms of wider views, screening and overall context of changes to potential viewers.

Population and Human Health and Traffic and Material Assets

- 16.12 **Chapter 14** of this EIAR discusses how the construction phase of the Proposed Development will give rise to increased traffic including abnormal loads for delivery of turbine components and is likely to create some short-term inconvenience for other road users. A Construction Traffic Management Plan will be implemented to manage traffic

coming to and from the Proposed Development Site and minimise disturbance to local residents.

- 16.13 The underground and overhead utility services in the local area (e.g. water, electricity, phone and gas supply) have been studied to ensure that supply to local residents will be protected during all stages of the Proposed Development. Overall, the interaction with Material Assets is considered a positive effect, resulting from the Project's contribution to the electricity supply with the provision of a sustainable, clean energy source.

Biodiversity

Biodiversity and Land and Soil

- 16.14 There will be some habitat loss during excavation of certain works areas. There will be disturbance to fauna caused by the construction activity. Forestry that will be felled to facilitate the construction of infrastructure will be required to be replanted in accordance with national legislation. **Chapter 5** outlines the extent of treelines and hedgerows to be replanted to compensate for the loss of linear treeline and hedgerow habitats that are the most valuable ecological resource within the site (allowing for movement of species for foraging etc). There will also be more hedgerow planted than will be needed to replace any due to be lost, which will result in a net gain of hedgerow due to the Proposed Development. The placement of these will be designed to ensure connectivity between more valuable habitat features at the Proposed Development is maintained and enhanced.

Biodiversity and Water

- 16.15 There is the potential for water pollution from different sources during the construction works. This could cause a deterioration in the quality of aquatic habitats and thereby adversely impact the fauna that depend on the habitat. These impacts and any others including drainage are fully assessed in **Chapters 5 and 7** of this EIAR. The mitigation measures to reduce potential impacts are also described therein. Mitigation measures will be implemented and there will be no significant inter-related effects.

Biodiversity and Noise & Vibration and Air & Climate

- 16.16 Noise and dust from construction works will likely result in some avoidance behaviour by fauna. This is addressed in **Chapter 5** of this EIAR. There may be disturbance and avoidance behaviour during the construction / demolition works, however this will be temporary and short term. Overall, the inter-related effects will not be significant as mitigation measures will be implemented.

Biodiversity and Landscape

- 16.17 The development of the Project infrastructure including roads and hardstandings will be facilitated through on-site borrow pits from which local aggregates will be sourced. The balance of topsoils and subsoils remaining on site following creation of crane pads, turbine bases and access roads will be re-used on site for landscaping and screening purposes to incorporate them back into the natural landscape as much as possible and to further enhance opportunities for the creation of wildlife habitats.

Land, Soils & Geology, Water, Air & Climate and Noise

Land and Soil and Water and Biodiversity and Cultural Heritage

16.18 The civil engineering works will require the excavation and movement of overburden and rock from the on-site borrow pits. This will lead to habitat loss and create potential pathways to surface and groundwater. There is also the potential for previously unrecorded sites of archaeological interest to be disturbed during excavation works. The potential for all these interactions and the resultant effects are assessed in detail in the relevant chapters in Volume II of this EIAR. The likely impacts will be avoided or minimised through the topic specific mitigation measures. Archaeological supervision during earthworks represents an opportunity for the recording of any archaeological resource underlying the site.

Air and Climate Change and Water and Biodiversity

16.19 The proposed drainage system will be based on two key methods. The first method will involve keeping clean water clean by avoiding disturbance to natural drainage features, minimising any works in or around drainage features, and diverting clean surface runoff around excavations and construction areas. The second method will involve collecting any drainage water from works areas that might carry silts or sediments, and to route them towards settlement ponds prior to controlled diffuse release over vegetated natural surfaces.

16.20 A wet weather protocol will be developed. This will detail the procedures to be adopted by all staff during periods of heavy rainfall, which will include the inspection and maintenance regimes of sediment and runoff control measures will be adopted during these periods. In extreme cases, the above protocol will dictate that work onsite may have to be temporarily suspended until weather/ground conditions allow.

16.21 Therefore, the interaction between Climate Change and Water may see construction work stoppages due to weather conditions happening more frequently. New watercourse crossings will also be designed for storm events in line with the up to date OPW requirements.

16.22 In terms of Climate Change, increasing global temperature adversely affects ecosystems and biodiversity. The Proposed Development is a renewable energy project which will contribute to Ireland's commitments in the 2023 Climate Action Plan, in the Paris Agreement and contribute to UN Sustainable Development Goal 13. The Project has been designed to avoid the highest areas of biodiversity value as set out in **Chapter 5** of this EIAR.

Noise

16.23 The main interactions for noise are the potential for traffic as a source of noise and for noise impacts on the local population and biodiversity.

Landscape & Visual and Cultural Heritage

16.24 The Proposed Development infrastructure has the potential to alter the landscape setting of recorded site and monuments in the area. The potential impacts to these and landscape / scenic designations are described in detail in **Chapter 12** of this EIAR in order to ascertain the acceptability of potential impacts and the potential for any mitigation measures.

Shadow Flicker

Shadow Flicker and Population and Human Health

- 16.25 The Applicant is committed to a zero-shadow flicker strategy which means that the turbines shadow flicker module will be programmed to shut down whenever the conditions for shadow flicker at a property are met. The full shadow flicker assessment is described in **Chapter 11** of this EIAR. The inter-related effects will not be significant.

Material Assets and Traffic

- 16.26 As set out earlier, the main interactions between material assets and traffic are in relation to disturbance to the local population in terms of amenity and utility service (including water supply) provision. The potential interactions identified are set out under the Population and Human Health heading.
- 16.27 The wind energy infrastructure as a significant change in terms of landscape means that there is an interaction between material assets and landscape / visual impacts, which has been explored in **Chapter 10**. Similarly, the use of on-site borrow pits to source aggregates for building ensures maximum efficiency of land resource use (which is considered a positive impact on material assets).

Major Accidents and Natural Disasters

- 16.28 Overall, it is expected that the Proposed Development will not result in significant effects resulting in the risk of major accidents and disasters, nor is the Project considered vulnerable to risks of major accidents and disasters. Vulnerabilities of the application site and the risk of major accidents / disasters arising as a result of the Proposed Development are identified in **Chapter 15** of this EIAR. There is a small area of remaining peat found on this Site. Landslide susceptibility is covered within **Chapter 6** of this EIAR, as well as in **Chapter 15** and is identified as Low to Negligible.
- 16.29 There is potential for the Proposed Development to be impacted by severe weather including periods of heavy rainfall, strong winds and ice. However, wind turbines are designed to withstand extreme weather conditions and are fitted with sophisticated remote monitoring and control systems to manage rotational speed. Turbines also have the capability to shut down in storm conditions through adjustment of blade pitch. The accumulation of ice on the turbines is unlikely to cause problems as the wind turbines will be equipped with anti-vibration sensors. These sensors will detect any imbalance resulting from ice formation on the blades and delay the turbine's operation until the blades have been de-iced.
- 16.30 A Site-Specific Flood Risk Assessment (SSFRA) has been prepared for the Proposed Development and is provided in **Appendix 7-3** found in Volume III of this EIAR. According to National Indicative Fluvial Mapping (NIFM) produced by the Office of Public Works (OPW), part of the application site is situated within areas of identified flood risk. The site is considered to be at low risk of pluvial and groundwater flooding.
- 16.31 Overall, the risk of flooding to the site is considered to be Low to Negligible with mitigation measures in place, and runoff from the site will be limited to the pre-development levels following incorporation of the surface water management plan measures proposed in **Chapter 7** of the EIAR. The flood risk assessment and design of wind turbine development has taken account of climate change predictions.

- 16.32 A recent An Bord Pleanála judgement (case: PL09.306500) has indicated that turbines and access roads are considered to be water compatible development, making them suitable for locating within flood zones.
- 16.33 Large scale wind farms are typically located in rural areas, and this is the case with Proposed Development. There are no industrial sites or regulated manufacturing sites within proximity to the Site. The Proposed Development is not associated with any other regulated activity or industry and is a renewable energy development which is not associated with large volumes of chemicals or hazardous materials. It is not adjacent to or associated with any Seveso site and is not governed by the S.I. No. 209/2015 - Chemicals Act (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2015 (as amended). The Proposed Development does not therefore represent a risk of major accidents and disasters associated with industrial activities.

Table 16-1 Interactions of the Foregoing

	Population & Human Health	Biodiversity	Land, Soils and Geology	Water	Air and Climate	Noise	Landscape and Visual	Shadow Flicker	Cultural Heritage	Material Assets	Traffic	Major Accidents and Natural
Population & Human Health			C/O/D	C/O/D	C/O/D	C/D	C/O/D	O		O	C/D	
Biodiversity			C/D	C/D	C/D	C/D	C/O/D				C/D	
Land, Soils and Geology	C/O/D	C/D		C/D	C/D		C/D		C	C/O/D	C/D	
Water	C/O/D	C/D	C/D							C/D		
Air and Climate	C/O/D	C/D	C/D								C/D	C/O/D
Noise	C/D	C/D									C/D	
Landscape and Visual	C/O/D	C/O/D	C/D							O		
Shadow Flicker	O											
Cultural Heritage			C									
Material Assets	O		C/O/D				O				C/O/D	
Traffic	C/D	C/D	C/D	C/D	C/D	C/D				C/O/D		
Major Accidents and Natural Disasters					C/O/D							

C (Construction Phase), O (Operational Phase), D (Demolition Phase)

Mitigation and Residual Impacts

- 16.34 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.