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DESIGNING AND DELIVERING A SUSTAINABLE FUTURE

ENVIRONMENTAL IMPACT ASSESSMENT REPORT (EIAR) FOR THE PROPOSED SHANCLOON WIND FARM, CO. GALWAY

VOLUME 2 - MAIN EIAR

CHAPTER 18: INTERACTIONS OF THE FOREGOING

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Date: **August 2025**

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

18 INTERACTIONS OF THE FOREGOING

18.1 Introduction

The requirement for the identification of interactions between the various aspects of the environment as detailed throughout the EIAR is set out in Article 3(1) of the amended EIA Directive 2011/92/EU as amended by the Directive 2014/52/EU, which states the following:

"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).**"

This chapter adheres to guidance in the Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact interactions (European Commission, 1999)[1], the EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports 2022[2], and the European Commission's Guidance on the Preparation of the Environmental Impact Assessment Report (2017)[3]

This Chapter assesses the potential for interactions and inter-relationships between one aspect of the environment and another which can result in an impact being either positive or negative, as well as having varying significance. The chapter considers potential significant environmental effects that may occur in terms of the interaction and inter-relationships of Air Quality & Climate; Noise & Vibration; Biodiversity; Ornithology; Soils, Geology and Hydrogeology; Hydrology & Water Quality and FRA; Population and Human Health; Shadow Flicker; Traffic & Transportation; Archaeology, Architectural & Cultural Heritage; Landscape & Visual Impact; Material Assets, Telecommunications & Aviation as a result of the proposed project as described in Chapter 2 of this EIAR.

Direct, indirect, cumulative, and interactive impacts were considered during the siting of the proposed turbines and associated infrastructure in order to minimise impacts on the environmental aspects mentioned above. The interactions and inter-relationships of the potential impacts as set out throughout this EIAR are detailed in this Chapter.

Figure 18-1 below, provides a matrix detailing the key interactions and inter-relationships between the key environmental aspects of the Proposed Development.

[1] European Commission (1999), Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions. Office for Official Publications of the European Communities, May 1999

[2] EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports (2022)

[3] European Commission (2017), Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report. Publications Office of the European Union.

Table 18-1 provides further details and examples of the diverse range of interaction and inter-relationships between the key environmental aspects. Each individual chapter of the EIAR has assessed the applicable interactions between different potential impacts. For example, Hydrology and Water Quality & FRA has assessed the potential impacts on Biodiversity; Ornithology, Land, Soils and Geology.

The Proposed Development, for which consent is being sought, as assessed in this EIAR comprises the following elements:

- The wind farm site (referred to in this EIAR as the 'Site') which includes the on-site 110 kV substation and loop-in connection to the existing Cashla-Dalton overhead line;
- The turbine delivery route (referred to in this EIAR as the 'TDR').

An overview of the Proposed Development location is shown in Figure 2.1, Volume IV.

A full description of the Proposed Development, including the TDR, is provided in Chapter 2 – Development Description.

	Air Quality & Climate	Noise & Vibration	Biodiversity	Ornithology	Soils, Geology and Hydrogeology	Hydrology and Water Quality & FRA	Population and Human Health	Shadow Flicker	Traffic & Transportation	Archaeological, Architectural & Cultural Heritage	Landscape & Visual Impact	Material Assets, Telecommunications and Aviation
Air Quality & Climate												
Noise & Vibration												
Biodiversity												
Ornithology												
Soils, Geology and Hydrogeology												
Hydrology and Water Quality & FRA												
Population and Human Health												
Shadow Flicker												
Traffic & Transportation												
Archaeological, Architectural & Cultural Heritage												

	Air Quality & Climate	Noise & Vibration	Biodiversity	Ornithology	Soils, Geology and Hydrogeology	Hydrology and Water Quality & FRA	Population and Human Health	Shadow Flicker	Traffic & Transportation	Archaeological, Architectural & Cultural Heritage	Landscape & Visual Impact	Material Assets, Telecommunications and Aviation
Landscape & Visual Impact												
Material Assets, Telecommunications and Aviation												

= interaction or inter-relationship = no interaction or inter-relationship

Figure 18-1: Matrix of Interaction Between key Environmental Aspects

Table 18-1: Description of Actions Between Key Environmental Aspects

INTERACTION	DESCRIPTION
Soils, Geology and Hydrogeology; Air Quality & Climate; Traffic & Transportation; Population & Human Health.	During the construction phase of the proposed project, there is potential for impact to human health and residential amenity as a result of construction activities. Dust arising from earthworks, tree felling, trench excavation, the construction of new and upgrade of existing access tracks, temporary storage of excavated materials, the movement of construction vehicles, loading and unloading of aggregates/materials, and the movement of material can result in the migration of dust. Dust emissions arise when particulate matter becomes airborne, making it available to be carried downwind from the source, which can lead to elevated PM10 and PM2.5 concentrations impacting air quality and potentially impacting human health at nearby dwellings. This is further exacerbated by the increase in traffic movements associated with the construction phase, which can spread dust along local roads. This potential impact is unlikely to occur at the Site due to the significant setback distance of the proposed construction works from nearby dwellings, which, in turn, will have necessary mitigation measures applied in accordance with the CEMP. Dust and air pollutants are considered to be a short-term, slight negative impact on air quality at nearby dwellings. Mitigation measures have been set out in Chapter 6: Population and Human Health, Chapter 7: Air Quality & Climate, Chapter 11: Soils, Geology & Hydrogeology, and Chapter 14: Traffic & Transportation to avoid the impact of dust on nearby residential properties. Mitigation measures that will be implemented in full include the use of graded aggregates on internal access roads, the use of a water bowser to spray work areas, the implementation of the CEMP, covering of loads that could cause a dust nuisance, revegetation of earthworks and exposed areas/soil stockpiles, and controlling the access and egress of construction vehicles with redirection to designated locations and wheel washing at main entrance/exit points. Further mitigation measures that will be implemented in full include the use of a specific haul route, diversions and speed limits to limit the spread of dust, as part of the Traffic Management Plan.
Soils, Geology and Hydrogeology; Air Quality & Climate; Biodiversity; Ornithology; Traffic & Transport.	Dust emissions associated with construction, maintenance and decommissioning works can impact air quality, plant species, and habitats within the vicinity of the works. The deposition of dust is considered to have a short-term slight to moderate reversible effect at a local scale in terms of vegetation effects due to a potential reduction in photosynthesis, and a short-term not significant reversible effect on the hydrological network at a local scale. Receptors located within the vicinity of local roads may experience potential dust soiling, while the significant setback of the main wind farm site from residential receptors will reduce the potential for dust impacts.

INTERACTION	DESCRIPTION
	Mitigation has been set out in Chapter 7: Air Quality & Climate, Chapter 9: Biodiversity, Chapter 10: Ornithology, Chapter 11: Soils, Geology and Hydrogeology, and Chapter 14: Traffic & Transportation to reduce potential soiling and vegetation effects, including the use of graded aggregates on internal access roads, the use of a water bowser to suppress dust migration on haul roads, provision of wheel washing facilities at site entrances, the implementation of a dust control plan as part of the Construction and Environmental Management Plan (CEMP), and the control of exhaust emissions from site vehicles through regular maintenance and checks. The revegetation of earthworks and exposed areas/soil stockpiles will occur as soon as practicable and loads that may cause dust will be covered during transport to minimise dust migration. The Traffic Management Plan includes measures to maintain road cleanliness and reduce the spread of dust to the public road network. A designated haul route will be used, and soils will be stored and managed in accordance with the Peat and Soil Management Plan to reduce dust and sediment migration. Measures including phased construction to limit exposed surfaces, temporary stockpile management, and restricting works during adverse weather conditions will further reduce the potential for dust-related impacts on biodiversity and air quality across the project area.
Noise & Vibration; Soils, Geology and Hydrogeology; Air Quality & Climate; Traffic & Transportation; Population & Human Health.	During the construction phase of the proposed Shancloon Wind Farm, there is potential for impact on human health and residential amenity as a result of construction activities. Dust emissions may arise from earthworks, tree felling activities, trench excavation, construction and upgrade of site access tracks, temporary storage of excavated materials, and the movement of construction vehicles and plant. Dust impacts may be exacerbated by the increase in traffic movements associated with the construction phase, which may spread dust along local roads. This potential impact is unlikely to occur across the Site due to the significant setback of the proposed turbines and infrastructure from nearby dwellings, while appropriate mitigation measures will be implemented via the CEMP. Construction activities will also generate noise and vibration associated with inter alia turbine foundation construction, cable trenching, delivery of turbine components, and substation construction. Predicted noise levels are determined with reference to 'British Standard 5228:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites'. While the predicted noise from the construction phase will generally remain below guideline limits, elevated noise levels may occur at some locations resulting in a temporary, significant localised impact. However, construction at any particular receptor is typically less than three days in duration and is considered temporary.

INTERACTION	DESCRIPTION
	Vibration levels associated with construction activities are predicted to be below the threshold of human perception at the nearest sensitive receptors, which are located over 720 m from the nearest turbine and over 400 m from the proposed substation. As such, construction vibration will not be perceptible, and there will be no associated building damage or human health impacts. The operational noise levels for the proposed Shancloon Wind Farm have been assessed in accordance with the Wind Energy Development Guidelines (2006) and the UK Institute of Acoustics' 'Good Practice Guide to the Application of ETSU-R-97', demonstrating compliance with daytime and night-time noise limits at all noise-sensitive locations surrounding the proposed development. The operational phase is therefore expected to result in a slight to moderate significance of effect for dwellings closest to the project, introducing a new source of noise into the soundscape with a long-term, moderate impact at the nearest receptors. Mitigation measures to reduce potential impacts have been set out in Chapter 7: Air Quality & Climate, Chapter 8: Noise & Vibration, Chapter 11: Soils, Geology and Hydrogeology, and Chapter 14: Traffic & Transportation. These measures include the operation of specific turbines under "quite modes", the use of effective exhaust silencers on all vehicles and plant, maintenance of plant in good condition, restricting construction activities to standard working hours where possible, the use of a designated haul route with speed restrictions to control dust spread, and implementation of a Dust Management Plan (DMP) as part of the Construction Environmental Management Plan (CEMP). Temporary barriers or screens will be installed during works where required to reduce noise levels, and site practices will include the use of water bowsers, wheel washing, road sweepers along the GCR, and dust suppression measures. The implementation of these mitigation measures will ensure that residual impacts are temporary, ranging between not significant and slight in significance, while maintaining air quality and residential amenity and protecting human health during the construction, operation, and decommissioning phases of the proposed Shancloon Wind Farm.
Hydrology and Water Quality & FRA; Soils, Geology and Hydrogeology; Biodiversity; Ornithology; Traffic & Transportation.	During the construction phase of the proposed project, there is potential to impact on water quality, aquatic biodiversity, and habitats as a result of excavation, trenching, earthworks, and tree felling. This can result in the deterioration of water quality due to sediment and pollution release to watercourses within the catchment. The potential for accidental spillage of hydrocarbons from refuelling activities and plant use, or from malfunctioning machinery, also has the potential to impact water quality and aquatic biodiversity.

INTERACTION	DESCRIPTION
	Excavation works, inappropriate management of excavated material, and overland flow during rainfall events may result in suspended solids reaching watercourses, increasing turbidity and potentially impacting water quality and aquatic ecology, including sensitive receptors in the catchment. Suspended solids may also be transported to watercourses by being carried from the construction site to the public road on the wheels of construction traffic. The use and subsequent release of cement-based products during excavation dewatering, cable trenching, and the installation of turbine foundations can lead to increased pH levels in receiving waters, which may cause ecological impacts. Potential release of hydrocarbons from plant and machinery, particularly during watercourse crossings, may also affect water quality. The potential for increased surface water runoff and increased flows from the site is assessed as low due to the limited infrastructure footprint and the use of permeable construction methods. Mitigation measures have been set out in Chapter 9: Biodiversity, Chapter 11: Soils, Geology and Hydrogeology, Chapter 12: Hydrology and Water Quality & FRA, and Chapter 14: Traffic & Transportation to reduce potential impacts on watercourses and biodiversity. These include the implementation of a Surface Water Management Plan (SWMP), incorporating the use of silt fencing, sediment traps, settlement ponds, and swales to manage suspended solids. Good practice pollution prevention measures will be implemented, including bunded refuelling areas and spill kits available on-site. Refuelling will take place in designated areas within the construction compound. Precast concrete structures will be used where possible, and cement leachate will be contained to prevent its release to watercourses. A strict 50 m watercourse buffer zone has been applied for the design layout, apart from specific crossings where mitigation measures, including timing restrictions and dry works areas, will be implemented. Construction activities will be scheduled to avoid adverse weather conditions to reduce the potential for runoff. Measures for controlling sediment and hydrocarbon runoff, as well as concrete leachate, will be applied to protect water quality. The Traffic Management Plan will include road cleanliness measures. Mitigation by design has reduced the number of watercourse crossings, and the use of existing roads will minimise impacts on water quality and hydrology. These measures will ensure the protection of aquatic and terrestrial habitats while maintaining water quality within the catchment.
Soils, Geology and Hydrogeology; Hydrology & Water Quality and FRA; Population & Human Health.	During the construction phase of the proposed project, there is potential for impact on water quality and human health as a result of earthworks activities. Excavation and earthworks, including turbine base construction, access track development, temporary compound preparation, and internal cabling, will involve the removal and movement of superficial deposits including peat and spoil. The erosion of exposed soils during construction activities may result in suspended solids and contaminants reaching surface water. Site clearance will require the use of heavy machinery, presenting potential for fuel and oil spills that could contaminate underlying soils and groundwater. Soil compaction from vehicle movements may reduce infiltration and increase surface runoff, leading to potential erosion of overburden deposits and creating new pathways for sediment-laden runoff.

INTERACTION	DESCRIPTION
	Excavation works associated with cable trenching and the construction of turbine foundations could create localised areas susceptible to erosion and water quality impacts. However, the potential for such effects is limited due to the layout design for the Site incorporating appropriate setback from drains and watercourses. Baseline assessments have determined that the site does not present significant susceptibility to landslides, and findings from walkover surveys indicate no evidence of ground instability at or adjacent to proposed infrastructure locations. Mitigation measures have been set out in Chapter 11: Soils, Geology and Hydrogeology and Chapter 12: Hydrology and Water Quality & FRA to avoid or reduce potential impacts on groundwater and surface water quality, including the implementation of a Surface Water Management Plan (SWMP) and associated mitigation measures such as silt fences, settlement ponds, swales, and interceptor ditches to manage surface water runoff and prevent sediment-laden discharges to receiving waters. Works will be programmed to avoid excavation during severe weather events where possible, and best practice methods including CIRIA guidance will be employed to control water pollution during construction. Refuelling and storage of fuels will be conducted in bunded designated areas within the temporary construction compounds, with emergency spill kits available on site. The CEMP (Construction Environmental Management Plan) will include protocols for the control of hydrocarbons, sediment runoff, and management of excavated material, ensuring best practice health and safety standards are maintained on-site during construction, minimising potential impacts on human health. Mitigation measures are also set out in Chapter 6: Population and Human Health and Chapter 14: Traffic & Transportation to reduce the potential for sediment and material migration onto public roads, including the implementation of a Traffic Management Plan, the use of road sweeping vehicles, and managing access routes to reduce soil compaction and the risk of contaminated runoff. Measures such as the re-vegetation of exposed areas and the management of temporary storage of excavated material will further reduce the potential for erosion and associated water quality impacts during construction. Following the implementation of these mitigation measures, the potential impacts on soils, hydrogeology, hydrology, and human health during the 24-month construction phase are expected to be temporary, localised, and of slight significance.
Hydrology & Water Quality; Biodiversity;	During the construction and decommissioning phases of the proposed project, the generation and accumulation of sanitary waste and material waste on-site have the potential to impact water quality and biodiversity if mishandled

INTERACTION	DESCRIPTION
Ornithology.	or disposed of inappropriately. Sanitary waste generated from the construction compound welfare facilities and waste arising from site activities will require careful management to avoid accidental spills or leaks, which could enter the drainage system and nearby watercourses within the Shancloon Site and Grid Connection Route (GCR), leading to potential impacts on water quality, aquatic habitats, and species of conservation concern. The Construction Environmental Management Plan (CEMP) (Appendix 2.1, Volume III) for the project, as set out in Chapter 9: Biodiversity, Chapter 10: Ornithology, and Chapter 12: Hydrology & Water Quality & FRA, outlines that all on-site waste will be securely stored in designated, bunded areas to prevent leakage. It will be removed from the site via a licensed waste disposal contractor for treatment at an authorised facility, in compliance with waste management legislation and best practice protocols. A sealed wastewater holding tank will be installed at the on-site substation compound for the collection of sanitary wastewater, which will be removed off-site by an authorised waste collector for disposal at a licensed wastewater treatment plant. Concrete washout water will be managed on-site using lined washout facilities, ensuring that no wash water enters the drainage system or nearby watercourses. Waste concrete slurry, washings and supernatant will be allowed to settle, dried, and subsequently removed to an authorised facility for disposal. Authorised waste management facilities identified within the region include T/A Walsh Complete Waste Management in Oranmore, Frank Mortimer Ltd. in Belclare, and Tuam Recycling Centre, ensuring all waste streams, including sanitary and construction-related waste, are disposed of in an environmentally responsible manner. All waste movements will be recorded, with records maintained by the site waste manager to ensure traceability and accountability during the project lifecycle. This aligns with the mitigation measures outlined in the relevant chapters to prevent contamination of surface water and groundwater, protecting aquatic habitats and maintaining biodiversity within and downstream of the site. Strict adherence to pollution prevention measures, including bunded storage of fuels and chemicals, spill response procedures, and implementation of a Surface Water Management Plan and Pollution Prevention Plan, will reduce the potential for negative impacts on water quality, supporting the protection of aquatic ecology, sensitive habitats, and compliance with the European Communities Environmental Objectives (Surface Waters) Regulations and the Water Framework Directive.
Population & Human Health; Biodiversity; Ornithology; Landscape and Visual Impact.	The construction phase of the proposed Shancloon Wind Farm will result in the felling of approximately 0.54 ha of coniferous forestry within the site, with all forestry removed subject to forest replanting provisions in accordance with forestry licensing requirements. The removal of forestry will result in a modest physical impact on the

INTERACTION	DESCRIPTION
	landscape, with a change in land use from commercial conifer plantation to renewable energy production, while maintaining the long-term productive use of the site for renewable energy. Mitigation measures will ensure the prevention of excessive visual impact or unnecessary land use or habitat alterations that could impact landscape character or biodiversity. As detailed in Chapter 16: Landscape and Visual Impact, the design has been informed by a landscape-led approach, utilising the natural screening provided by the local topography and vegetation to minimise potential visual impacts and preserve landscape character in the wider receiving environment. Biodiversity impacts are expected to be slight to imperceptible following mitigation. The Biodiversity Enhancement and Management Plan (BEMP) prepared for the project (Appendix 9.1, Volume III) provides additional enhancement measures, including woodland planting, peatland restoration, and habitat management, ensuring biodiversity net gain across the site. The Construction Environmental Management Plan (CEMP) (Appendix 2.1, Volume III) sets out measures to avoid undue impacts to adjacent land uses and sensitive habitats during construction, including pre-construction surveys, restrictions on tree felling to outside the bird breeding season where practicable, and the employment of an Ecological Clerk of Works (ECoW) to oversee the implementation of mitigation measures on-site during construction. Specific mitigation and enhancement measures include: • Avoidance of unnecessary vegetation clearance and minimisation of construction footprints. • Replanting and reinstatement of hedgerows and treelines where removed along the GCR and TDR. • Implementation of habitat enhancement measures, including management of wet grassland for Marsh Fritillary and the creation of woodland corridors to enhance bat foraging and commuting routes. • Measures to manage potential impacts on ornithological receptors through avoidance by design and timing of works to reduce disturbance during sensitive periods. Overall, following the implementation of mitigation and enhancement measures set out in Chapter 6: Population and Human Health, Chapter 9: Biodiversity, Chapter 10: Ornithology, and Chapter 16: Landscape and Visual Impact, impacts on biodiversity, ornithology, landscape, and visual amenity during construction will be slight and temporary,

INTERACTION	DESCRIPTION
	while impacts on material assets will be neutral due to the provision of replant lands elsewhere, supporting the delivery of a sustainable renewable energy project at Shancloon.
Soil, Geology and Hydrogeology; Noise & Vibration; Biodiversity; Ornithology; Hydrology & Water Quality and FRA.	During the construction phase of the proposed project, there is potential for impact to biodiversity, including ornithology, due to vegetation clearance, tree felling, soil movement, and machinery operation. These activities will generate noise, with the potential to disturb fauna, including birds and other wildlife, and to impact foraging and nesting habitats within the development footprint. Secondary habitat degradation may occur through a deterioration in water quality as a result of earthworks, the movement of soil, and runoff carrying suspended solids, hydrocarbons, and cementitious materials to adjacent watercourses. Noise associated with construction activities, including turbine foundation preparation, access track upgrades, substation construction, cable trenching, and turbine erection, has been assessed with reference to British Standard 5228:2009+A1:2014. The significant setback distance of turbines and construction areas from nearby sensitive receptors will minimise potential noise and vibration effects. While vibration from activities such as trenching and HGV movement is anticipated, these levels are expected to remain below thresholds for perceptibility at residential receptors and below levels that could cause structural damage to buildings. Potential impacts on ornithology are primarily associated with habitat alteration during construction, including the removal of conifer plantation and scrub, as well as temporary displacement of species during peak activity periods. However, these effects are anticipated to be slight and reversible following the implementation of mitigation measures. For bat species, no direct impacts on known roosts are anticipated, with the application of 50 m buffers around high-potential commuting and foraging habitats, and lighting controls will be implemented to minimise disturbance. Potential indirect impacts on aquatic ecology may arise from sediment runoff, hydrocarbon spills, and changes to water pH from concrete use, which could affect downstream habitats connected to the Lough Corrib SAC. However, the implementation of a comprehensive Surface Water Management Plan, combined with the HDD crossing, will reduce the likelihood of significant impacts on hydrology, water quality, and aquatic biodiversity. Mitigation measures have been set out in Chapter 8: Noise & Vibration, Chapter 9: Biodiversity, Chapter 10: Ornithology, Chapter 11: Soils, Geology and Hydrogeology, and Chapter 12: Hydrology & Water Quality & FRA to minimise potential impacts during construction. These include scheduling vegetation clearance outside of the bird breeding season (March-August) where possible, pre-construction surveys for protected mammals, and the

INTERACTION	DESCRIPTION
	presence of a Project Ecologist/Ecological Clerk of Works (ECoW) on site to oversee vegetation removal and ensure compliance with mitigation measures. Measures to reduce noise include the use of silencers on machinery, avoidance of idling near sensitive receptors, and temporary noise barriers where prolonged works occur near dwellings. Following implementation of mitigation measures, the potential impacts on biodiversity, ornithology, soils, water quality, and hydrology during the construction phase are anticipated to be temporary and not significant, maintaining the integrity of sensitive habitats and species while facilitating the delivery of renewable energy infrastructure at Shancloon.
Noise & Vibration; Landscape & Visual Impact; Shadow Flicker; Population & Human Health.	The proposed Shancloon Wind Farm has the potential to impact on residential amenity and human health as a result of a combination of noise, visual impact, and the effects of shadow flicker, as assessed in Chapter 6: Population and Human Health, Chapter 8: Noise & Vibration, Chapter 14 Shadow Flicker and Chapter 16: Landscape and Visual Impact. With regard to noise, construction noise and vibration will be managed to align with the guidance set out in BS 5228:2009+A1:2014 Code of Practice for Noise and Vibration Control, and mitigation will be implemented during construction, including limiting construction hours, maintaining plant and machinery, and using effective silencers on equipment. Operational noise from the wind farm will comply with the derived daytime and night-time noise limits in accordance with the Wind Energy Development Guidelines (2006), through the implementation of Quiet Modes at certain operating wind speeds, and no significant operational noise impacts are predicted at the nearest sensitive receptors. Substation noise has been assessed and will remain within acceptable thresholds under BS4142:2014+A1:2019. In relation to vibration, the assessment confirms that vibration-sensitive receptors are located at sufficient distances from the proposed turbines and on-site substation, ensuring that vibration from construction activities will not be perceptible and will not cause structural damage at residential properties. Regarding visual impact, the turbines will become a new feature in the landscape, with effects ranging from slight to moderate at closer viewpoints and reducing with distance. The overall landscape character will accommodate the development due to the presence of existing wind farms in the wider study area, with cumulative visual effects assessed as slight and long-term in nature. For shadow flicker, turbine control system will include automated shadow flicker control measures.

INTERACTION	DESCRIPTION
	Overall, the proposed development will be constructed and operated in accordance with mitigation measures set out in Chapter 6: Population and Human Health, Chapter 8: Noise & Vibration, Chapter 14 Shadow Flicker and Chapter 16: Landscape and Visual Impact to reduce the potential for adverse impacts on residential amenity and human health during all phases of the project lifecycle. With these measures in place, the potential impacts associated with noise, vibration, landscape, visual and shadow flicker will be controlled to remain within acceptable thresholds and will not result in significant negative effects on nearby receptors during the operational phase of the Shancloon Wind Farm.
Population and Human Health; Landscape and Visual Impact; Material Assets, Telecommunications and Aviation; Archaeological, Architectural & Cultural Heritage.	The operational phase of the proposed Shancloon Wind Farm has potential to impact on landscape character and cultural heritage, which may indirectly influence tourism and local amenity in the area. As outlined in Chapter 15: Cultural Heritage, the operational phase will result in a range of indirect, negative visual effects on the wider settings of recorded archaeological sites within the 2 km study area. These effects are assessed as ranging from imperceptible to slight in significance given that visual orientation is not towards the wind farm, with mitigation measures such as biodiversity enhancement planting (e.g., hedgerows and native woodland) assisting in integrating the development into the receiving environment and providing localised positive effects on biodiversity and visual screening. The Landscape and Visual Impact Assessment (Chapter 16) confirms that while the turbines will be a new element in the landscape, the magnitude of impact is expected to reduce with distance, transitioning from moderate within the immediate vicinity of the site to slight or imperceptible at greater distances, as the turbines become a proportionately smaller component of the wider landscape fabric. In terms of material assets, Chapter 17: Material Assets, Telecommunications and Aviation confirms that no significant impacts are predicted during operation on telecommunications infrastructure, aviation, or utility services in the area, with engagement and consultation with relevant stakeholders ensuring the protection of these assets. The provision of renewable electricity from the proposed development will contribute positively to national energy security and decarbonisation targets, representing a beneficial impact on material assets. The cumulative assessment in Chapters 15, 16, and 17 indicates that the proposed development, in combination with other existing and permitted projects in the area, will not result in significant cumulative effects on landscape, cultural heritage or material assets during the operational phase. Mitigation measures implemented include the strategic siting of turbines to minimise visual intrusion on sensitive receptors, maintaining appropriate setback distances from residential dwellings to preserve amenity, and the integration of the proposed development into the existing landform and landscape character of the Shancloon area. Measures to avoid and reduce potential impacts on cultural heritage include the implementation of advance

INTERACTION	DESCRIPTION
	archaeological investigations and continued consultation with statutory authorities prior to and during construction, as detailed in Chapter 15: Cultural Heritage. Following the implementation of mitigation measures, the operational phase of the proposed Shancloon Wind Farm is expected to have a slight to moderate negative long-term visual impact locally, reducing to imperceptible at greater distances, with no significant adverse effects predicted on cultural heritage or material assets, and providing a beneficial impact in terms of renewable energy generation and national energy security.
Soils, Geology and Hydrogeology; Hydrology & Water Quality; Population & Human Health; Biodiversity; Ornithology; Archaeology, Architectural & Cultural Heritage; Material Assets, Telecommunications and Aviation.	The potential susceptibility of the proposed project to major accidents and natural disasters has been considered in Chapter 6: Population and Human Health. This assessment evaluates the proposed development's vulnerability to major accidents and natural disasters, the potential adverse impacts on human health and the environment, the magnitude and likelihood of potential impacts, and the preparedness of the project in the event of an accident, disaster, or emergency. Events such as flooding, fire, and slope instability have potential to impact soils and geology, hydrological regimes, water quality, human health and safety of construction workers and the general public, material assets including property, roads, and infrastructure, as well as biodiversity and archaeological heritage. Slope stability has been considered in Chapter 11: Soils, Geology and Hydrogeology. The Project and proposed infrastructure locations are generally located within areas of 'Low' to 'Moderately Low' landslide susceptibility, with site reconnaissance, peat probing and geotechnical assessments indicating no evidence of instability within peat deposits and negligible risk of landslides across the site. Turbine locations, access roads, and the substation achieved a Factor of Safety above the required 1.3, confirming the site's satisfactory margin of safety for slope stability. Infrastructure has been located within areas of thinner peat and lower slope gradients where possible, and excavation activities will be monitored by suitably qualified personnel to manage risks. Flood risk has been assessed in Chapter 12: Hydrology and Water Quality & FRA. The proposed development site predominantly falls within Flood Zone 'C', indicating a low probability of fluvial flooding, with the exception of Turbine T07, which is within Flood Zones 'A' and 'B' but will be constructed with appropriate protection measures to ensure resilience against a 1 in 100 flood event. Site drainage measures, including swales, drainage channels, and settlement ponds, will ensure appropriate management of stormwater and high flows without uncontrolled discharge downstream, thus maintaining negligible flood risk. Safety measures have been incorporated into the design of the proposed development to manage potential fire risk, including turbine fire suppression systems, lightning protection systems, remotely monitored emergency response protocols, and staff training aligned with IWEA Health and Safety Guidelines. These measures will mitigate risks associated with fire and ensure rapid identification and control of any incidents should they occur.

INTERACTION	DESCRIPTION
	Material Assets, Telecommunications, and Aviation considerations have informed project design through the provision of setback distances from infrastructure and treelines, minimising potential impacts on property and maintaining aviation safety through the installation of aviation lighting on turbines, which will be routinely maintained with relevant details provided to the Irish Aviation Authority. In summary, the proposed Shancloon Wind Farm has been designed and will be managed to ensure that its potential susceptibility to major accidents and natural disasters remains negligible, ensuring no significant adverse effects on soils, water, human health, biodiversity, material assets, and heritage, in alignment with mitigation measures set out in Chapter 6: Population and Human Health; Chapter 11: Soils, Geology and Hydrogeology; Chapter 12: Hydrology and Water Quality & FRA; Chapter 9: Biodiversity; Chapter 10: Ornithology; Chapter 15: Archaeology, Architectural & Cultural Heritage; and Chapter 16: Material Assets, Telecommunications and Aviation.

18.2 Conclusions

The Proposed Development has potential to impact on various environmental aspects as detailed throughout this EIAR. As outlined in this Chapter, there are interactions and inter-relationships between these aspects as described above. The EIAR has considered these interactions and inter-relationships throughout the assessment, firstly through the design of the Proposed Development, to avoid impacts where possible and also in the definition of suitable mitigation measures to minimise potential impacts. It is therefore considered that the significant impacts associated with the interactions of environmental effects outlined in this chapter will be avoided due to the implementation of mitigation measures as detailed throughout this EIAR.

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