20 INTERACTIONS OF THE FOREGOING

20.1 INTRODUCTION

The foregoing topics in earlier chapters do not exist in isolation from each other and consequently, any impact on one element of the environment may also impact on another. The Irish Environmental Protection Agency have developed a simple matrix to show the key interactions and interrelationships between the environmental aspects of a development (**Table 20.1**). The interactions between impacts on different factors have been addressed as relevant throughout the EIAR (**Table 20.2**). The cumulative slight impact on a number of topics may result in a significant impact on another topic.

20.1.1 Impact Interactions

Where any potential negative impacts have been identified during the assessment process, these impacts have been avoided by embedded design mitigation or at a minimum, reduced by the proposed mitigation measures.

20.2 SUMMARY OF MITIGATION MEASURES

This Chapter summarises mitigation measures proposed elsewhere in the EIAR. Chapters 4 to 19 of the EIAR outline the findings of the assessment of the predicted effects of the Project on a topic-by-topic basis. The significance of these effects have been assessed using criteria defined in the topic chapters. In the context of The EPA Guidelines (2022), the significance of effects is categorised from imperceptible through to not significant, significant and profound with varying sub-categories.

20.2.1 Embedded Mitigation

Embedded mitigation includes design changes that were made to reduce or eliminate adverse effects, as well as normal good practice measures; these have avoided the majority of potentially significant effects. **Appendix 20.1** summarises mitigation measures for all technical assessment chapters.

The embedded mitigation measures applied to the Project, as outlined in **Chapter 2: Description of the Proposed Development** focus on integrating key design aspects to minimise environmental impacts. These measures include:

- Construction of five wind turbines, crane hardstands, and Turbine Foundations.
- Ensuring consistent turbine spacing to avoid outliers and excessive overlap, thus minimising visual disruption and maintaining a balanced, compact layout in key views.

- Development of new internal Access Roads, road upgrades, and associated drainage systems.
- Carefully considering the site's ground conditions and topography
- Respecting environmental constraints and adhering to buffer separations.
- Maximising separation distances from residential dwellings.
- Selecting turbines of an appropriate scale, considering the landscape context.
- Establishment of three permanent site entrances, with vegetation clearance for visibility splays.
- Installation of three Temporary Construction Compounds, including site offices, parking areas, and security fencing.
- Creation of two permanent spoil storage areas and a 36m meteorological mast.
- Implementation of a comprehensive site drainage network and biodiversity enhancement measures.
- Construction of a permanent 38kV substation with associated equipment, a Battery Energy Storage System (BESS) featuring four storage bays, and underground cabling.
- Ancillary works including forestry felling and installation of operational site signage.
- Construction of a new road at the R162/L-6274-0 junction to facilitate turbine delivery.
- Installation of a 12.65km underground cable to connect the Project to the national grid via the Dry bridge 110kV Substation.

20.2.2 Specific Mitigation Measures

In addition to mitigation proposed to address significant adverse effects (**Appendix 20.1**), certain chapters have also proposed further measures to reduce effects that were assessed as 'Not Significant' before mitigation.

Table 20.2 outlines interactions between environmental aspects. Technical assessments have assessed pathways, both direct and indirect that can magnify effects through the interaction or accumulation of effects. Effects have been cross-referenced between chapter topics. An outline of potential interactions between chapters/topics is presented in **Table 20.1**.

Table 20.1: Summary matrix of Interactions of Impacts during Construction, Operational and Decommissioning Phases (Source: Adapted from EIAR Guidelines, 2022)

	Population & Human Health		Planning Policy		Biodiversity		Bat Ecology		Ornithology		Soils & Geology		Hydrology and Hydrogeology		Noise		Landscape & Visual		Material Assets		Cultural Heritage		Traffic & Transportation		Shadow Flicker		Air And Climate		Major Accidents & Natural Disasters	
	Const & Decom	Oper	Const & Decom	Oper	Const & Decom	Oper	Const & Decom	Oper	Const & Decom	Oper	Const & Decom	Oper	Const & Decom	Oper	Const & Decom	Oper	Const & Decom	Oper	Const & Decom	Oper	Const & Decom	Oper	Const & Decom	Oper	Const & Decom	Oper	Const & Decom	Oper	Const & Decom	Oper
Population & Human Health																														
Planning Policy																														
Biodiversity																														
Bat Ecology																														
Ornithology																														
Soils & Geology																														
Hydrology and Hydrogeology																														
Noise																														
Landscape & Visual																														
Material Assets																														
Cultural Heritage																														
Traffic & Transportation																														
Shadow Flicker																														
Air And Climate																														
Major Accidents & Natural Disasters																														

Note: Const. = Construction phase; Oper = Operational phase Decom. = Decommissioning

Interaction or inter-relationship

No interaction or inter-relationship

Table 20.2: Interactions & Inter-relationships between Environmental Aspects of the Proposed Development

Interaction	Description
Population and Human Health & Hydrology and Hydrogeology	Impacts could be observed through flood risk polluting waters supply and also recreational fisheries; **Chapter 11: Hydrology and Hydrogeology** considers these aspects and concludes that there are **there are no impacts.**
Population and Human Health & Noise	The noise assessment inherently covers any interaction as the methodology used and limits applied are designed to protect health and amenity.
Population and Human Health & Landscape and Visual Amenity	The construction phase of the Project will see a temporary introduction of machinery and the erection of five turbines into a natural but already modified landscape. **Chapter 12: Landscape and Visual Amenity** assessed the landscape effects, the visual effects and the cumulative effects of the Project, including assessment from recreational scenic viewpoints, and was also informed by the findings of the Assessment. The interactions between the environmental aspects were carefully considered in the EIAR, particularly in the design of the turbine layout. Detailed zone of theoretical visibility maps (ZTVs), route screening analysis and photomontages were prepared to assess the level of impact. Based on the findings of the collective assessments it is considered that the Project will not give rise to any significant effects, either singly or in combination. Tourists to Ireland have become accustomed to the vision of turbines on the landscape and given the scenario where more windfarms will be built in Ireland in the future, the most widely held view is that this will not impact their likelihood to visit the area again.
Population and Human Health 1. Socio-economic & Material Assets: 2. Air Navigation 3. Telecommunications	1. The Project will provide opportunities for local suppliers to be engaged in the construction phase. This will be a minor beneficial impact. The Developer will seek to secure positive benefits for the local/regional economy by encouraging the use of local labour, manufacture and suppliers where possible. They will hold 'Meet the Developer' days prior to construction to allow local contractors to engage with the process and maximise opportunities. 2. Operating windfarms have the potential to cause a variety of adverse effects on aviation. Rotating wind turbine blades may have an impact on certain aviation operations, particularly those involving radar. The physical height of turbines can cause obstruction to aviation and the overall performance of communications, navigation and surveillance equipment. All structures over 150m in height are required to have lighting to warn aviation traffic. No significant impacts are predicted in terms of human beings and air navigation. In adherence to IAA Safety Regulations and ICAO Annex 15, aeronautical obstacle warning light schemes will be installed as requested by IAA, co-ordinates of ground and tip height elevations at each wind turbine location. 3. During operation, wind turbines have the potential to interfere with electromagnetic signals passing above the ground due to the nature and size of the windfarm. During the construction and Decommissioning phase activity, signals may be passed below ground via existing infrastructure. Impacts may include overground or underground communication cables, microwave links, telecommunication links, business radio and television reception. Mitigation measures were implemented in the design phase through mitigation by avoidance i.e., the known routes of the telecommunication links were plotted, and a buffer was applied to them, outside of which the proposed turbines were located. In the operational phase, all electrical components, equipment, apparatus and systems will be required by Irish and European law to comply with the EMC Directive 2014/30/EU. Compliance with this Directive will mean that the electromagnetic emissions from these devices will not cause interference to other equipment. Turbine and substation control electronics will be typical of any circuits used by industry or a conventional generating station.

Interaction	Description
	There is no potential for interference with the links from other windfarms in combination with the Project. The closest receptor, H374 is within 552m of the closest turbine (T05). No significant impacts are predicted on telecommunications or radio reception as a result of the Project.
Population and Human Health & Shadow Flicker	The shadow flicker assessment identified the potential for shadow flicker to affect between 227 No. out of 375 No. receptors within the shadow flicker study area. The assessment identified no significant effects, The Developer will adhere to the Draft Revised Wind Energy Development Guidelines (2019) provides for zero shadow flicker: The proposed method of mitigation will be used to eliminate all shadow flicker effects resulting in zero shadow flicker, allowing for approximately 60 seconds for the rotor to come to a stop. This will eliminate the potential for shadow flicker to affect any of the sensitive receptors within the Study Area. given that shadow flicker is unlikely to cause a nuisance to nearby inhabited dwellings. It also notes that the function to stop the turbine if required to do so, is available. The potential effects of the Project from shadow flicker are considered to be **neutral, imperceptible, long-term effects** overall with regards to shadow flicker. There are no predicted cumulative effects.
Population and Human Health & Air and Climate	Impacts on air quality during the construction and decommissioning phase may occur due to dust emissions from construction activities onsite and through increased traffic and associated exhaust emissions from construction traffic. These interactions have been considered as part of the EIAR, without significant effects being predicted and suitable mitigation measures provided to further reduce potential impacts. During the operational phase, the energy generated by the Project will offset energy and the associated emission of greenhouse gases from electricity-generating stations dependent on fossil fuels, thereby having a net positive effect on climate. In doing so, there will likely be reduced effects from climate change on human beings. The cumulative effect of the Project with other Irish renewable generation is considered to be a fundamental change in the climate effects of Ireland's energy supply, which is a **major, Positive effect,** that is **Significant** (beneficial) under the EIA Regulations and will contribute to Ireland's binding emission reduction targets.
Population and Human Health & Cultural Heritage	No predicted direct significant effects on the Cultural Heritage resource arising from the Proposed Development have been identified (**Chapter 15: Cultural Heritage**). However, there are some indirect negative and long-term Significant significance of effect on Standing Stone LH021[CO1] [KR2] -015---; Rokeby House and demesne (RPS Lhs018-018); Stonehouse (RPS Lhs021-006), Stonehouse cottage (RPS LHS021-005) and Piperstown House (RPS Lhs021-015). It is acknowledged that these indirect significant effects on landscape setting is reversible at Decommissioning stage of the Proposed Development.
Population and Human Health & Traffic and Transport	The construction and Decommissioning phase will give rise to traffic movements of abnormal loads and is likely to create some short-term inconvenience for road users. A **Traffic Management Plan** (TMP) will be in place and minimise disruption insofar as possible. Suitable mitigation measures to reduce dust emissions have been outlined in **Chapter 16: Traffic and Transportation.**
Population and Human Health & Major Accidents	A wind farm is not a recognised source of chemical pollution. Should a major accident or natural disaster occur, the potential sources of pollution onsite during both the construction and operational phases are limited. There is limited potential for significant natural disasters to occur at the Proposed Development site. Ireland is a geologically stable country with a mild temperate climate. The potential natural disasters that may occur are therefore limited to peat-slide, flooding and fire. In the highly unlikely event that the stability of peat is compromised, an Emergency Response Plan has been prepared and can be found in **Appendix 2.1: Construction Environmental Management Plan, Management Plan 1**.

Interaction	Description
Biodiversity, Ornithology, Bat Ecology & Aquatic Ecology	1. Sites of International Importance 1. Dundalk Bay SPA Dundalk Bay SPA is a large open bay, which includes extensive saltmarsh and intertidal sand/mudflat habitat which extends along approximately 16km of the coastline to the east of the Proposed Development. The site is designated for a number of non-breeding species (listed in **Table 8.7**) which use the site for foraging, loafing and roosting. Black-headed gull, common gull and herring gull were recorded frequently during baseline surveys with 251, 223 and 206 flights recorded for each species respectively during VPS surveys. As the Proposed Development is within the mean-max foraging range of all three SPA qualifying species, it is considered likely that there is connectivity between the SPA populations and the Proposed Development. The stated populations of each species within the SPA citation are as follows: • Black-headed gull – 6,643 individuals; • Common gull – 551 individuals; and • Herring gull – 754 individuals. The populations stated within the SPA citation are based on five-year mean peaks from 1995/96 – 1999/00. It is stated within the SPA supporting document (NPWS, 2011) that based on more recent site data from 2005/06 - 2009/10 the black-headed gull population has decreased to 4,833 individuals, the common gull population had increased to 973 individuals and the herring gull population had decreased to 505 individuals. However, it is stated within this document that this is based on I-WeBS data, and that gull species are not routinely counted during these surveys. Recent I-WeBS data shown in **Section 8.3.1.1** also shows considerable variation between years, which could be due to annual variation, or due to the lack of routine counting of gull species. For this reason, the SPA citation populations have been used during the assessment. There was very limited foraging activity recorded within 500m of the proposed site infrastructure, with three flocks of black-headed gull and three flocks of common gull (totalling counts of 283 black-headed gull individuals and 53 common gull individuals for each species) recorded during two years of survey. Full details are provided within the assessment of effects on each individual species in **Section 8.5.1**. To simplify the assessment, the potential species-level effects on black-headed gull, common gull and herring gull have not been duplicated here. Effects on these species in the context of the SPA population are outlined below. Due to the absence or very low activity within and adjacent to the Proposed Development by other qualifying species, all other species have been scoped-out of the assessment. Justification of this approach is provided within **Table 8.21**. **Potential Construction Effects** As stated in **Section 8.5.1**., there was no herring gull foraging activity recorded during baseline surveys, and very limited foraging activity by black-headed and common gull within 500m of the proposed site infrastructure. Accordingly, there would be no construction phase effects arising from habitat loss or displacement/disturbance for herring gull, and imperceptible and not significant effects arising from habitat loss or displacement/disturbance for black-headed gull and common gull.

Interaction	Description
	Potential Operational Effects As stated in **Section 8.5.1**., there was no herring gull foraging activity recorded during baseline surveys, and very limited foraging activity by black-headed and common gull. Accordingly, there would be no operational displacement/disturbance effects for herring gull, and imperceptible and not significant operational displacement/disturbance effects for black-headed gull and common gull. Due to the high flight activity within 500m of turbine locations, there is collision risk for black-headed gull, common gull and herring gull. Details are provided within **Section 8.5.1** for each species. In a worst-case scenario, the following annual collisions are predicted for each species: • Black-headed gull – 0.77 collisions per year (all during the non-breeding season), or one collision every 1.31 years; • Common gull – 0.66 collisions per year (0.53 collisions during the non-breeding season and 0.13 collisions during the breeding season), or one collision every 1.52 years; and • Herring gull – 0.48 collisions per year (0.23 collisions during the non-breeding season and 0.25 collisions during the breeding season), or one collision every 2.10 years. Given the distance between the SPA and the Proposed Development, which is within the mean-max foraging range (Woodward et al., 2019) for all three species, it is likely that there is connectivity between the Site and the SPA populations. It is considered likely that a proportion of birds recorded during VPS are associated with the SPA. Although each species was not recorded using habitats within 500m of the Proposed Development for regular foraging, commuting flights through the Proposed Development were recorded. It is likely that birds were recorded in flight when travelling between the SPA and foraging habitat in the wider area, or when moving between areas of suitable foraging habitat. Assuming that all flights recorded are associated with the SPA population, and therefore that all annual collision risk is attributed to the SPA population, then collision effects would be as outlined below for each species. A predicted 0.77 annual black-headed gull collisions would equate to approximately 0.01% of the Dundalk Bay SPA population (6,643 individuals as stated in the SPA citation) Due to the low number of collisions predicted in relation to the designated site population, it is considered that collision effects would be imperceptible and not significant. A predicted 0.66 annual common gull collisions would equate to approximately 0.12% of the Dundalk Bay SPA population (551 individuals). Due to the low number of collisions predicted in relation to the designated site population, it is considered that collision effects would be not significant. A predicted 0.48 annual herring gull collisions would equate to approximately 0.06% of the Dundalk Bay SPA population (754 individuals) Due to the low number of collisions predicted in relation to the designated site population, it is considered that collision effects would be imperceptible and not significant. It should be acknowledged that the predicted collision risk effects outlined above assume that all flights recorded during VPS were of birds associated with the Dundalk Bay SPA. However, as there is more than one SPA designated for these species within the stated mean-max foraging range of each species (Woodward et al., 2019), it is likely that some of the flights are associated with these further sites, and therefore the collision risk associated with the Dundalk

Interaction	Description
	Bay SPA would be reduced. Additionally, some flights recorded may have been associated with non-SPA birds. It should also be noted that the predicted collisions will be an overestimate due to the way that VPS data was collected and used for CRM. Flights recorded during VPS were given a flight height range and a flight duration, rather than splitting the flight into discrete height bands. For this reason, where a flight was recorded with a height range overlapped partially with the rotor swept height of a turbine, the entire flight duration was considered to have been at potential collision height and included in the model when calculating collision risk. It is likely that a proportion of the flight seconds included at collision height within the model were in fact above or below rotor height, and therefore the predicted collisions will have been overestimated. Further details on survey flights, and the CRM methodology are provided within **Section 8.2.5** and the relevant Technical Appendix. As gull species are not considered to exhibit macro-avoidance in relation to onshore wind developments, it is considered that barrier effects for these species would be imperceptible and not significant (Furness, 2019). 2. <u>North West Irish Sea SPA</u> North West Irish Sea SPA is a large marine site which extends along the coasts of counties Louth, Meath and Dublin to the east of the Proposed Development. The site covers a number of intertidal estuaries and bays, while it also extends offshore. The site is designated as it provides foraging and roosting habitat for non-breeding birds, as well as supporting foraging birds which breed at nearby SPAs. Black-headed gull, common gull and herring gull were recorded frequently during baseline surveys, 251, 223 and 206 flights recorded for each species during VPS surveys. As the Proposed Development is within the mean-max foraging range of all three SPA qualifying species, it is considered likely that there is connectivity between the SPA populations and the Proposed Development. The stated populations of each species, within the 2023 SPA citation are as follows: • Black-headed gull – 508 individuals; • Common gull – 2,866 individuals; and • Herring gull – 6,893 individuals. There was very limited foraging activity recorded within 500m of the proposed site infrastructure, with three flocks of black-headed gull and three flocks of common gull (totalling counts of 283 black-headed gull individuals and 53 common gull individuals for each species) recorded during two years of survey. Full details are provided within the assessment of effects on each individual species in **Section 8.5.1**. To simplify the assessment, the potential species-level effects on black-headed gull, common gull and herring gull have not been duplicated here. Effects on these species in the context of the SPA population are outlined below. Due to the absence or very low activity within and adjacent to the Proposed Development by other qualifying species, these have been scoped-out of the assessment. Justification of this approach is provided within **Table 8.21**. **<u>Potential Construction Effects</u>**

Interaction	Description
	As stated in **Section 8.5.1**., there was no herring gull foraging activity recorded during baseline surveys, and very limited foraging activity by black-headed and common gull within 500m of the proposed site infrastructure. Accordingly, there would be no construction phase effects arising from habitat loss or displacement/disturbance for herring gull, and imperceptible and not significant effects arising from habitat loss and displacement/disturbance to black-headed gull and common gull. **Potential Operational Effects** As stated in **Section 8.5.1**., there was no herring gull foraging activity was recorded during baseline surveys, and very limited foraging activity was black-headed and common gull observed. Accordingly, there would be no operational displacement/disturbance effects for herring gull, and imperceptible and not significant operational displacement/disturbance effects for black-headed gull and common gull. Due to the high flight activity within 500m of turbine locations, there is collision risk for black-headed gull, common gull and herring gull. Details are provided within **Section 8.5.1** for each species. In a worst-case scenario, the following annual collisions are predicted for each species: • Black-headed gull – 0.77 collisions per year, or one collision every 1.31 years; • Common gull – 0.66 collisions per year, or one collision every 1.52 years; and • Herring gull – 0.48 collisions per year, or one collision every 2.10 years Given the distance between the SPA and the Proposed Development, which is within the mean-max foraging range for all three species, it is likely that there is connectivity to the SPA. It is considered likely that a proportion of birds recorded during VPS are associated with the SPA. Although each species was not recorded using habitats within 500m of the Proposed Development for regular foraging, commuting flights through the Proposed Development were recorded. It is likely that birds were recorded in flight when travelling between the SPA and foraging habitat in the wider area, or when moving between areas of suitable foraging habitat. Assuming that all flights recorded are associated with the SPA population, and therefore that all annual collision risk is attributed to the SPA population, then collision effects would be as outlined below for each species. A predicted 0.77 annual black-headed gull collisions would equate to approximately 0.15% of the Dundalk Bay SPA population (508 individuals). Due to the low number of collisions predicted in relation to the designated site population, it is considered that collision effects would be not significant. A predicted 0.66 annual common gull collisions would equate to approximately 0.02% of the Dundalk Bay SPA population (2,866 individuals). Due to the low number of collisions predicted in relation to the designated site population, it is considered that collision effects would be imperceptible and not significant. A predicted 0.48 annual herring gull collisions would equate to approximately <0.01% of the Dundalk Bay SPA population (6,893 individuals). Due to the low number of collisions predicted in relation to the designated site population, it is considered that collision effects would be imperceptible and not significant. As stated in **Section 8.5.4.1**, the predicted collisions are likely overestimated due to the precautionary nature of the CRM methodology, and it is unlikely that all collisions would be attributed to the North West Irish Sea SPA populations.

Interaction	Description
	As gull species are not considered to exhibit macro-avoidance in relation to onshore wind developments, it is considered that barrier effects for these species would be imperceptible and not significant (Furness, 2019). 3. River Nanny Estuary and Shore SPA River Nanny Estuary and Shore SPA covers the estuary of the River Nanny and sections of the shoreline to the north and south of the estuary, totalling approximately 3km of coastline. The SPA also extends approximately 2km upstream of the river mouth. The site is designated for a number of non-breeding species (listed in **Table 8.21**) which roost and forage within the SPA boundary. Herring gull was recorded frequently during baseline surveys, with a total of 223 flights recorded during VPS. As the Proposed Development is within the mean-max foraging range of herring gull, it is considered likely that there is connectivity between the SPA populations and the Proposed Development. There were no records of foraging or roosting herring gull within 500m of the proposed site infrastructure during the two years of baseline surveys. The stated herring gull population for the site within the SPA citation is 609 individuals, which is based on five-year mean peak data from 1995/96 – 1999/00. It is stated within the SPA supporting document (NPWS, 2012) that based on more recent site data from 2005/06 - 2009/10 the herring gull population had decreased to 51 individuals. It is stated however that this is based on I-WeBS data, and that gull species are not routinely counted during these surveys. The document therefore states that caution should be taken when interpreting this data. Recent I-WeBS data shown in **Section 8.3.1.1** shows that the mean counts from 2019/20 and 2020/21 were 211 and 321 individuals respectively, which suggests that the 2005/06-2009/10 population may have been an underestimate, or that the population using the site has increased in recent years. Due to potential uncertainties, the SPA citation population has been used during the assessment. Full details are provided within the assessment of effects on herring gull in **Section 8.5.1**. To simplify the assessment, the potential species-level effects on herring gull have not been duplicated here. Effects on this species in the context of the SPA population are outlined below. Due to the absence or very low activity within and adjacent to the Proposed Development by other qualifying species, these have been scoped-out of the assessment. Justification of this approach is provided within **Table 8.21**. **Potential Construction Effects** As stated in **Section 8.5.1**., there was no herring gull foraging activity recorded during baseline surveys. Accordingly, there would be no construction phase effects arising from habitat loss or displacement/disturbance for herring gull. **Potential Operational Effects** As stated in **Section 8.5.1**., there was no herring gull foraging activity recorded during baseline surveys. Accordingly, there would be no operational displacement/disturbance effects for herring gull. Due to the high flight activity within 500m of turbine locations, there is collision risk for herring gull. Details are provided within **Section 8.5.1**. In a worst-case scenario, 0.48 herring gull collisions are predicted annually, or one collision every 2.10 years Given the distance between the SPA and the Proposed Development, which is within the mean-max foraging range for herring gull, it is likely that there is

Interaction	Description
	connectivity to the SPA. It is considered likely that a proportion of birds recorded during VPS are associated with the SPA. Although herring gull was not recorded using habitats within 500m of the Proposed Development for foraging, commuting flights through the Proposed Development were recorded. It is likely that birds were recorded in flight when travelling between the SPA and foraging habitat in the wider area, or when moving between areas of suitable foraging habitat. Assuming that all flights recorded are associated with the SPA population, and therefore that all annual collision risk is attributed to the SPA population, then a predicted 0.48 annual herring gull collisions would equate to approximately 0.08% of the SPA population (609 individuals) Due to the low number of collisions predicted in relation to the designated site population, it is considered that collision effects would be imperceptible. As stated in **Section 8.5.4.1**, the predicted collisions are likely overestimated due to the precautionary nature of the CRM methodology, and it is unlikely that all collisions would be attributed to the River Nanny Estuary and Shore SPA population. As gull species are not considered to exhibit macro-avoidance in relation to onshore wind developments, it is considered that barrier effects for herring gull would be imperceptible and not significant (Furness, 2019).
Biodiversity Ornithology, Bat Ecology, Aquatic Ecology & Hydrology and Hydrogeology	Contamination of surface water and groundwater could occur from many elements including wastewater sanitation contamination, hydrocarbon contamination, watercourse crossings construction, entrainment of suspended solids during earth works, increased entrainment of contaminants and other impacts arising due to localised stability issues, amongst other potential sources. Contamination of water quality could impact both flora and fauna including fisheries, otter, lizards and amphibians (loss of breeding ponds) amongst others. Lagoon-type sediment traps and plant filtration beds will be installed in watercourses to maintain water quality and prevent potential impacts on protected species located downstream such as the freshwater pearl mussel. These interactions have been considered as part of the EIAR, with suitable mitigation measures provided to minimise potential impacts.
Biodiversity, Ornithology, Bat Ecology, Aquatic Ecology & Soils and Geology	Potential impacts on biodiversity during the construction and Decommissioning phases may include disturbances to birds and mammals due to habitat loss or changes. The Project has been designed to avoid impacts on forestry and scrubland. The Clogherhead Formation, characterized by thickly bedded calcareous greywacke, along with grassland and woodland areas, will be considered in the planning process. Restoration efforts will be carried out in accordance with the Biodiversity Enhancement Management Plan (**Appendix 6.1**).
Biodiversity, Ornithology, Bat Ecology, Aquatic Ecology & Major Accidents	Potential impacts on biodiversity during the construction and Decommissioning phase could include disturbance to birds and mammals from loss / changes in habitat. The Project has been designed in accordance with the best practice measures described in detail in this EIAR and, as such, mitigation against the risk of major accidents and/or disasters is embedded through the design.
Ornithology & Noise	The ornithology assessment considers general disturbance to sensitive bird species, including that caused by the sources likely to occur during the construction and Decommissioning of the Project. The potential effects on birds from noise will not be significant and temporary in nature.
Ornithology & Major Accidents	Potential impacts on biodiversity during the construction and Decommissioning phase could include disturbance to birds from loss/ changes in habitat. The Project has been designed in accordance with the best practice measures described in detail in this EIAR and, as such, mitigation against the risk of major

Interaction	Description
	accidents and/or disasters is embedded through the design to ensure no such impacts will occur.
Soils and Geology, Hydrology and Hydrogeology & Landscape and Visual	The hydrogeological balance of the Proposed Development site could be impacted by the amount of earth materials excavated. Adopting good practices, planning ahead and real time monitoring in more sensitive (>1 m peat depth) areas will ensure that any excavations associated with the Project will have minimal impact. These interactions have been considered as part of the EIAR, with suitable mitigation measures provided to minimise potential impacts. Application of the mitigation measures will reduce the risk of stability issues and impacts on hydrology and hydrogeology arising at a localised scale.
Soils and Geology & Landscape and Visual & Major Accidents	The Project will inevitably lead to a residual impact on the soil and geological environment, specifically a change in ground conditions at the site. Natural materials such as subsoil, and bedrock will be replaced by concrete, subgrade, and surfacing materials. However, the careful design of the wind farm has minimized construction in areas with sensitive or soft soils, steep slopes, and other locations prone to ground instability.
Soils and Geology, Landscape and Visual & Archaeology and Cultural Heritage	The construction and Decommissioning phase pertaining to the Project will involve significant ground reduction and topsoil removal throughout the design layout footprint. Two of the recorded archaeological sites are located within the Red Line Boundary but all are sited outside the Proposed Development footprint. There is a possibility of encountering unrecorded archaeological finds/features throughout these areas, during the construction and Decommissioning phase and increasing the area of disturbed soil. If any sub-surface archaeological features are identified during archaeological monitoring they will be securely cordoned off, cleaned and recorded in situ. The National Monuments Service will then be notified and consulted to determine further appropriate mitigation measures, which may include preservation in situ (by avoidance) or preservation by record (archaeological excavation). These interactions were considered in the EIAR, both in the design of turbine layout and in the design of mitigation measures. Monitoring, including a watching brief in undisturbed portions of the footprint will be carried out. All records will be preserved where found. The operational phase will result in a range of indirect negative impacts of a visual nature on the wider setting of a number of recorded archaeological sites within the study area and the surrounding landscape which will range from not significant to moderate in significance. No predicted direct significant effects on the Cultural Heritage resource arising from the Proposed Development have been identified. There is predicted indirect, negative and long-term Very Significant significance of effect at operational stage on Standing Stones LH021-013---, LH021-014---. There is indirect negative and long-term Significant significance of effect on Standing Stone LH021-015---; Rokeby House and demesne (RPS Lhs018-018); Stonehouse (RPS Lhs021-006), Stonehouse cottage (RPS LHS021-005) and Piperstown House (RPS Lhs021-015). Furthermore, it is noted that there is a Significant cumulative impact on each of the three standing stones LH021-013---, LH021-014--- and LH021-015--- including their inherent grouping value. There are no mitigation measures to ameliorate these indirect operational stage impacts on setting, however it is noted that the duration of same is long-term and the effect is reversible following Decommissioning of the Wind Farm Site.
Soil and Geology & Major Accidents	The Project has been designed in accordance with the best practice measures described in detail in this EIAR and, as such, mitigation against the risk of major accidents and/or disasters is embedded through the design.

Interaction	Description
	The Project has been designed in accordance with the best practice measures described in detail in this EIAR and, as such, mitigation against the risk of major accidents and/or disasters is embedded through the design.
Hydrology & Biodiversity Ornithology, Bat Ecology & Aquatic Ecology	There is a potential for aquatic ecology to be impacted by a disturbance or contamination of watercourses during the construction period if the stated mitigation measures are not adhered to. However, the mitigation measures to protect watercourses outlined in **Chapter 9: Aquatic Ecology, Chapter 10: Soils and Geology** and **Chapter 11: Hydrology and Hydrogeology** will be strictly adhered to which includes monitoring of Proposed Development site water run-off during all phases of the Project.
Hydrology and Major Accidents and Natural Disasters	The Project will use the latest best practice guidance to ensure that flood risk within or downstream of the Proposed Development site is not increased as a function of the Project, i.e., a neutral impact at a minimum. The risk of the wind farm contributing to downstream flooding is very low, as the long-term plan for the site is to retain and slow down drainage water prior to release. Robust drainage measures on the site will include swales, silt traps, check dams, settlement ponds and buffered outfalls. This has been addressed **in Chapter 11: Hydrology and Hydrogeology.**
Noise & Traffic and Transportation	Traffic and Transportation will create noise onsite and along the Site Access Roads. Site contractors will be required to employ the best practicable means of reducing noise emissions from plant, machinery and activities, as advocated in BS 5228. Such potential effects are considered to be not significant.
Noise & Major Accidents and Natural Disasters	Alarms (e.g., for security, fire) will be sounded in cases of emergency. The maintenance of these alarms is essential and any faulty alarm causing nuisance alerts will be replaced accordingly. Incidents such as explosions in the substation buildings will have a noise impact. However, proper maintenance and operation will make this risk unlikely.
Landscape and Visual & Material Assets	The Irish Aviation Authority (IAA) has outlined criteria regarding tall structures and the installation of an aeronautical obstacle warning light scheme for the Project. This has been addressed in **Chapter 14: Material Assets.**
Material Assets & Major Accidents	The Project is not connected to or in the vicinity of any site regulated under the Control of Major Accident Hazards Involving Dangerous Substances Regulations (SEVESO sites), therefore no significant effects associated with major industrial accidents involving dangerous substances are anticipated. Any technical fault at the Project would not impact the local or national energy supply. The extremely low frequency (ELF) electric and magnetic fields (EMF) associated with the operation of the proposed cables fully comply with the international guidelines for ELF-EMF set by the International Commission on Non-Ionizing Radiation Protection (ICNIRP), a formal advisory agency to the World Health Organisation, as well as the EU guidelines for human exposure to EMF. Accordingly, there will be no operational impact on properties (residential or other uses), construction staff, operational & maintenance staff or recreational users of the site as the ICNIRP guidelines will not be exceeded at any distances even directly above the cables.
Traffic and Transport, Biodiversity Ornithology, Bat Ecology & Aquatic Ecology	During the construction phase, increased traffic could lead to increased sedimentation/pollution of watercourses as moving vehicles disrupt soil and emit pollutants. The interactions between these aspects were considered in the EIAR and mitigation has been embedded in the design of the Project. This assessment has identified no potentially significant residual effects on Fisheries from Traffic & Transportation from the Project.

Interaction	Description
Traffic and Transport & Major Accidents & Natural Disasters	The Project will utilise the existing road network during the construction phase. Construction related traffic will originate from the delivery of materials to site, removal of surplus excavated material from site and transport of employees to, from and throughout the Proposed Development site. The localised traffic disruptions will be mitigated through the use of industry standard traffic management measures. Please see **Chapter 16: Traffic and Transport** and **Appendix 2.1** for details.