16. INTERACTION OF EFFECTS

16.1 Introduction

The preceding Chapters 5 to 15 of this rEIAR identify the potential significant environmental effects that may have occurred and which are likely to occur into the future in terms of Population and Human Health, Biodiversity, Land, Soils and Geology, Hydrology and Hydrogeology, Air Quality, Climate, Noise and Vibration, Landscape and Visual, Cultural Heritage (Archaeological, Architectural and Cultural Heritage), Material Assets, and Vulnerability to/from Major Accidents and Natural Disasters as a result of the Project as described in Chapter 4 of this rEIAR. All of the potential significant effects of the Project have been outlined in the preceding chapters of this rEIAR. However, for any development with the potential for significant environmental effects there is also the potential for interaction between these potential significant effects. The result of interactive effects may exacerbate the magnitude of the effects or ameliorate them or have a neutral effect.

A matrix is presented in Table 16-1 below to identify potential interactions between the various aspects of the environment already assessed in this rEIAR. The matrix highlights the occurrence of potential positive or negative effects during the Peat Extraction Phase, Current Phase, and Remedial Phase. The matrix is symmetric, with each environmental component addressed in the chapters of this rEIAR being placed on both axes of a matrix, and therefore, each potential interaction is identified twice.

The potential for interaction of effects has been assessed as part of the Impact Assessment process. While the work on all parts of the rEIAR were not carried out by MKO, the entire project and all the work of all sub-consultants was managed and coordinated by the company. This rEIAR was edited and collated by MKO as an integrated report of findings from the impact assessment process, by all relevant experts, and effects that potentially interact have been assessed in detail in the individual chapters of the rEIAR above and summarised in Section 16.2 below. Where any potential negative impacts have been identified during the assessment process, these impacts have been avoided by design or reduced by the identified control measures and proposed mitigation, as presented throughout the rEIAR.

Table Key

No Interacting Effect:		**Positive Effect*:**	
Neutral Effect:		**Negative Effect*:**	

*Please note that, in the interest of clarity, any potential positive or negative interacting effect is identified in the matrix below, irrespective of significance of effects. For example, a negative interacting effect is identified when the effect is identified as significant as well as when an effect is identified as imperceptible. Section 16.2 below provides further clarity on the significance of interacting effects.

Table 16-1 Interaction Matrix: Potential for Interacting Impacts

	Phase	Population & Human Health	Biodiversity including Ornithology	Land, Soils & Geology	Water	Air Quality	Noise & Vibration	Landscape & Visual	Cultural Heritage	Material Assets	Climate	Major Accidents & Natural Disasters
Population & Human Health	PEP											
	CP											
	RP											
Biodiversity	PEP											
	CP											
	RP											
Land, Soils & Geology	PEP											
	CP											
	RP											
Water	PEP											
	CP											
	RP											
Air Quality	PEP											
	CP											
	RP											
	PEP											

	Phase	Population & Human Health	Biodiversity including Ornithology	Land, Soils & Geology	Water	Air Quality	Noise & Vibration	Landscape & Visual	Cultural Heritage	Material Assets	Climate	Major Accidents & Natural Disasters
Noise & Vibration	CP											
	RP											
Landscape & Visual	PEP											
	CP											
	RP											
Cultural Heritage	PEP											
	CP											
	RP											
Material Assets	PEP											
	CP											
	RP											
Climate	PEP											
	CP											
	RP											
Major Accidents	PEP											
	CP											

	Phase	Population & Human Health	Biodiversity including Ornithology	Land, Soils & Geology	Water	Air Quality	Noise & Vibration	Landscape & Visual	Cultural Heritage	Material Assets	Climate	Major Accidents & Natural Disasters
& Natural Disasters	RP											

16.1.1 Statement of Authority

This section of the rEIAR has been prepared by Ellen Costello and Natalia Stolarska, and reviewed by Sean Creedon, of MKO. Ellen Costello is a Senior Environmental Scientist with MKO with over four years of experience in private consultancy. Ellen holds a BSc (Hons) in Earth Science, and a MSc (Hons) in Climate Change: Integrated Environmental and Social Science Aspects where she focused her studies on renewable energy development in Europe and its implications on environment and society. Ellen's key strengths and expertise are Environmental Protection and Management, Environmental Impact Statements, Project Management, and GIS Mapping and Modelling. Since joining MKO, Ellen has been involved in a range of renewable energy infrastructure projects. In her role as a project manager, Ellen works with and co-ordinates large multidisciplinary teams including members from MKO's Environmental, Planning, Ecological and Ornithological departments as well as sub-contractors from various fields in the preparation and production of EIARs. Natalia Stolarska is a Graduate Environmental Scientist with MKO. Natalia holds a BSc in Earth and Ocean Science and an MSc in Environmental Leadership. Natalia's key strengths and areas of expertise are in drafting EIAR report chapters, environmental impact assessment screening reports, wind farm feasibility studies and QGIS mapping. Since joining MKO in September 2023, Natalia has been involved as a Graduate Environmental Scientist in a range of wind farm projects, assisting with field work, client briefing notes, constraints mapping and drafting EIAR chapters, with more projects in the pipeline.

Sean is an Associate Director in the Environment Team at MKO. He oversees a team of highly skilled environmental professionals working on EIAR for large-and medium scale Renewable Energy infrastructure. Sean has directed and overseen multiple renewable energy projects across wind, solar, battery and hydrogen as well as a range of thermal and other energy related developments. He has worked on the planning and environmental impact elements within all stages of wind farm project delivery. He is a member of the MKO senior management team responsible for developing the business, mentoring team members, fostering a positive culture and promoting continuous employee professional development. Sean has over 22 years' experience in program and project development, holds an MSc from NUI Galway and a Diploma in Project Management from Institute of Project Management Ireland.

16.2 Impact Interactions

16.2.1 Population and Human Health

Population and Human Health and Noise and Vibration

Peat Extraction Phase (July 1988 – June 2020)

The peat extraction activities and all ancillary works increased noise levels in the vicinity of the Application Site as a result of heavy machinery on site extracting peat, transporting it for processing and then removing it off site in trucks to various end users around the country. As such, a long-term, slight, negative, but not significant residual effect on population and human health due to increased noise levels has occurred. However, there are no records of noise complaints for the Peat Extraction Phase due to the implementation of noise limits set by the IPC Licence in 2000 (See Appendix 4-1 for details). Likewise, there have been no noise complaints or breaches of noise limits prior to 2000.

Current Phase (June 2020- Present Day)

A significant reduction in plant machinery and onsite staff vehicles across the site during the Current Phase means that there are less sources of noise. Peat extraction ceased at the Application Site in June 2020. Therefore, a short-term, imperceptible, negative and not significant residual effect on population and human health has occurred during the Current Phase.

Remedial Phase

The Remedial Phase will involve the use of an excavator to facilitate drainage blocking works at any one location for less than a day as part of the Cutaway Bog Decommissioning and Rehabilitation Plans. As such, a long term, imperceptible, negative and not significant residual effect on population and human health due to noise will occur. Please see Chapter 11: Noise and Vibration and Appendix 4-2 Cutaway Bog Decommissioning and Rehabilitation Plans for further details.

Population and Human Health and Air Quality and Climate

Peat Extraction Phase (July 1988 – June 2020)

Peat extraction activities and all ancillary works would have generated dust impacts at nearby properties within the vicinity of the Application Site, as identified in Chapter 9: Air Quality. Peat would have generated some dust emissions, particularly with the milling, harrowing, ridging and harvesting processes associated with milled peat extraction. Given the extensive control measures carried out at the Application Site prior to the IPC Licence combined with the dust monitoring and condition compliance since 2000, it is considered that emissions from the peat extraction activities and all ancillary works had a localised long-term, negative, imperceptible residual impact on population and human health due to air quality. Please see Chapter 9 Air Quality for further details.

A total of 2,703,053 tonnes of CO_2 was directly or indirectly removed over the July 1988 – June 2020 period through peat extraction. The removal of the carbon sink potential of the site and the subsequent release of CO_2 from the peat extraction activities and all ancillary works activities resulted in a long-term, negative significant residual effect population and human health due to climate. Please see Chapter 10 Climate for further details.

Current Phase (June 2020- Present Day)

Peat extraction ceased in June 2020 and since then, emissions are generated by staff vehicles and small and infrequent truck deliveries from the Application Site to end users around the country. As such, a short-term, imperceptible, negative residual effect on population and human health due to air quality and climate has occurred.

Remedial Phase

The Remedial Phase will involve the implementation of the Cutaway Bog Decommissioning and Rehabilitation Plans for each bog which aims to encourage the natural revegetation of the bogs and their eventual return to a carbon sink. As such, there will be a long term, imperceptible, neutral residual effect on population and human health due to air quality and climate. Please see Chapter 9 Air Quality and Chapter 10 Climate for further details.

Population and Human Health and Land, Soils and Geology

Peat Extraction Phase (July 1988 – June 2020)

Peat extraction activities by their very nature had a long term, significant, negative impact on peat and subsoils. The activities involved the permanent removal of peat from the Application Site resulting in a loss of peat depth at the Application Site. Accidental spillage during refuelling of machinery and plant (static and mobile) with petroleum hydrocarbons was a pollution risk during the Peat Extraction Phase. Furthermore, discharges from wastewater systems (septic tanks) at office buildings, and at welfare facilities, and workshops could potentially have caused surface water and groundwater contamination.

The potential for contamination of soils is considered to have had a short-term, imperceptible negative effect on population and human health during the Peat Extraction Phase.

Current Phase (June 2020- Present Day)

The Current Phase involves the removal of stockpiles from the site and environmental monitoring; no intrusive works are being carried out and therefore the potential for soil contamination and peat instability are considered unlikely. As such, a short-term, imperceptible and negative effect on population and human health due to land, soils and geology is associated with the Current Phase.

Remedial Phase

The Remedial Phase will involve minimal use of machinery to facilitate drain blocking. Impacts on Human Health through soil contamination during this phase is considered to be negative, imperceptible, short-term and unlikely. Once drain blocking is complete, these potential impacts are removed. Please see Chapter 7 Land, Soil and Geology for further details.

Population and Human Health and Water

Peat Extraction Phase (July 1988 – June 2020)

Groundwater tables were first lowered at the Application Site in the late 1940s by the construction of drains, drying the bogs out and rendering them unsuitable for bog vegetation. The bog drainage was already implemented prior the establishment of the nearest Public Water Scheme located 3km from the Application Site. Ongoing peat extraction activities and all ancillary works during the Peat Extraction Phase had a long term, imperceptible, negative residual effect on water quality. However, due to the nature of the peat extraction process, combined with the control measures and environmental monitoring implemented at the site, no water related impacts on human health have likely resulted from the Peat Extraction Phase. Please see Chapter 8 Hydrology and Hydrogeology for further details.

Current Phase (June 2020- Present Day)

Peat extraction has ceased since June 2020. The cessation of peat extraction at the onset of the Current Phase, and the continuation of all other activities (as described in Section 4.8 of Chapter 4 Description of Development) during the Current Phase have resulted in a short-term, imperceptible, negative residual effect on water quality. However, due to the cessation of peat extraction, combined with the control measures and environmental monitoring implemented at the site, no water related impacts on human health have likely resulted from the Current Phase. Please see Chapter 8 Hydrology and Hydrogeology for further details.

Remedial Phase

Following the implementation of the proposed Cutaway Bog and Decommissioning and Rehabilitation Plans, the bogs will be wetter, retain more water, re-colonise with vegetation slowly, and they will eventually become naturally functioning peatlands with much-reduced silt and nutrient output. As such, bog rehabilitation during the Remedial Phase will result in a long term, slight, positive residual effect on population and human health due to water quality. Please see Chapter 8 Hydrology and Hydrogeology for further details.

Population and Human Health and Archaeology and Cultural Heritage

Peat Extraction Phase (July 1988 – June 2020)

Bord na Móna (the Applicant) has a long-established history demonstrating its understanding, appreciation and commitment to the preservation and protection of Ireland's archaeological heritage for future generations. Since the 1940s, the Applicant has worked with the Commission of Public Works to ensure onsite best practise measures pertaining to the identification, handling and recording of potential archaeological finds. Since the 1980s, the Applicant has been working with the National Museum of

Ireland, the National Monuments Service and the relevant governmental departments overseeing heritage to ensure the appropriate handling of any potential archaeological finds across their bogs in order to preserve and protect Irelands material culture and heritage for posterity. Since 1998, Bord na Móna has a statutory duty under the *Turf Development Act 1998* (section 56) to afford appropriate protection for the environment and the archaeological heritage. At the same time Bord na Móna, the Minister for Arts, Heritage and the Gaeltacht and the National Museum of Ireland produced the *Agreed Principles for the Protection of Wetlands Archaeology in Bord na Móna Bogs* (1998) which set out 10 standards within which archaeology in the Bord na Móna peatlands were managed. The Applicant's peat extraction operations and potential for impact on archaeology at the Application Site has been governed by the 2012 Code of Practice agreed between the then Department of Arts, Heritage and the Gaeltacht, the National Museum of Ireland and Bord na Móna.

Since 1988, there has been one substantial find at the Application Site. Partial human remains consisting of a torso, head and upper arms were recovered at Bord na Móna's Ballivor Works in 2003. The peat extraction process had a direct negative effect on the human remains; however, the overall significance of effects is considered to be moderate as the remains have been retrieved, studied and are now on display in the National Museum of Ireland. In addition to the bog body, several finds identified by Bord na Móna employees at the Application Site prior to 1988 (such as a bronze bell, a leather shoe, a bronze sword, bronze spearhead), were issued to the National Museum for study and display as part of the Nations heritage. In 2005, the Ballivor Bog Group was selected to be part of the Archaeological Peatland Surveys of Ireland. The surveys were undertaken to facilitate the identification of any finds, features or deposits on either the peat fields, or along drain sections which would have led to mitigatory investigations and excavations in selected areas within the bog. No finds were discovered during these surveys.

Overall, it is possible that significant negative effects could have taken place to sub-surface finds and features, in particular, prior to 2005 where remains existed. This negative effect would have been mitigated by Peatland Surveys from 2005 onwards as well as the introduction of the 2011 Code of Practice. In this regard it is considered that that residual effects on sub-surface finds and features from 2005 to 2020 were Slight to Moderate while residual effects between 1998 and 2005 may have been Moderate to Significant.

Part of the Applicant 's permanent narrow gauge railway line within the townland of Grange More, is noted for its social and technical importance and was afforded protection status in 2004. This track was first laid down in the 1950s and facilitated the transport of extracted peat to the processing centre at the Ballivor Bog Works. This permanent track was not impacted by the peat extraction activities and all ancillary works and remains *insitu* to this day.

Please see Chapter 13 Archaeology and Cultural Heritage for further details.

Current Phase (June 2020- Present Day)

In terms of archaeology, architecture and cultural heritage, since peat extraction has ceased, it is considered that no direct effects would occur during the Current Phase. No direct effects as a result of removal of stockpiled peat, EPA monitoring activities, etc are identified. Since no effects were identified without the need for control measures, no residual effects will occur.

Remedial Phase

Remedial activities such as drain blocking or tracking over peat fields may have a negative effect on any sub-surface archaeological finds or features that may be present on or beneath the surface of the peat. This may result in a permanent, negative and significant effect. Since peat activities associated with the Applicant fall under the 2012 Archaeological Code of Practice, any potential effects may be dealt with in the same way as past peat extraction activities and all ancillary works. In this regard the potential residual effect on sub-surface archaeology, if present, may be Slight-Moderate.

There is no potential for the Remedial Phase to impact the permanent railway infrastructure in townland of Grange More.

Population and Human Health and Material Assets

Peat Extraction Phase (July 1988 – June 2020)

Peat extraction activities and all ancillary works at the Application Site would have generated additional traffic onto public roads through the delivery of peat from the Application Site to various end users around the country. Vehicles transporting peat had the potential to emit dust and soil roads. Rail passings of laden and unladen wagons were required to cross the public road network potentially impacting traffic flow and could have caused accidents. The addition of traffic on the road and potential for traffic disruption due to rail car passings during the Peat Extraction Phase is considered to have had a long term, imperceptible, negative residual effect.

The Peat Extraction Phase generated hazardous and non-hazardous waste which was removed from site by licenced contractors. Since 2000, the Application Site has been under IPC Licence which requires all waste to be measured, categorised, recycled and reused where possible and disposed via licenced facilities. The Peat Extraction Phase had a long-term slight negative residual impact on population and human health due to waste management. Please see Chapter 14 Material Assets for further details.

Current Phase (June 2020- Present Day)

Traffic volumes generated by the Current Phase are significantly lower than during the Peat Extraction Phase due to the cessation of peat extraction and therefore are considered to be a short-term, imperceptible, negative residual impact on local roads and road users.

Condition 7 of the IPC Licence which addresses waste management continues to be implemented by the Applicant across the Derrygreenagh Bog Group, in which the Application Site is located. The Current Phase has a short-term, slight negative residual impact on population and human health due to waste management. Please see Chapter 14 Material Assets for further details.

Remedial Phase

Bog rehabilitation during the Remedial Phase will result in a short term, negative, imperceptible, residual impact on local roads and road users.

Furthermore, waste will be limited to the general food and paper waste the environmental monitoring staff produce which will be taken off site by each member and recycled where possible. The residual effect of the Remedial Phase activities on waste management is considered to be a long term imperceptible negative effect. Please see Chapter 14 Material Assets for details.

Population and Human Health and Landscape and Visual

Peat Extraction Phase (July 1988 – June 2020)

A vast majority of the Application Site was subject to peat extraction in 1988 and the greatest landscape and visual effects had already occurred prior to the 1988 baseline. No significant landscape and visual effects occurred in these areas during the Peat Extraction Phase. The greatest landscape and visual effects during the Peat Extraction Phase occurred at the west of Bracklin Bog and east of Carranstown Bog where the lands were stripped, and industrial peat extraction occurred. Significant landscape effects occurred here where a substantial change occurred within the landscape; these drained peatlands of medium sensitivity transitioned to a landscape of bare cutover peat. Considering the absence of visibility of these peatlands from any high sensitivity visual receptors due to a high level of screening around the bogs, residual visual effects were deemed to be of moderate significance.

Current Phase (June 2020- Present Day)

Cessation of peat extraction activity in 2020 has enabled the landscape of the Application Site to continue to re-vegetate and to some degree mitigate landscape and visual effects over time. However, the landscape is still a degraded bare – cutover peat site of low sensitivity, and it is not a functioning wetland. Revegetation has caused both a slight degree of change to the landscape and slight degree of change to the visual aesthetic of the Application Site and surrounding visual amenity. Decommissioning activities are on-going causing slight landscape and visual effects to arise. On balance landscape and visual effects during the Current Phase are deemed to be not significant.

Remedial Phase

The primary activity of the Remedial Phase is to rewet cutover peatland in order to re-establish a naturally functioning wetland and peatland ecosystem. It is likely that the works required to decommission peat extraction infrastructure and implement the remedial phase will cause temporary, negative landscape and visual effects of imperceptible significance. With the implementation of the Cutaway Bog Decommissioning and Rehabilitation Plans, there will be a slight positive landscape and visual impact when compared to the 1988 baseline. Please see Chapter 12 Landscape and Visual Impact for details.

16.2.2 Biodiversity

Biodiversity and Land, Soils and Geology

Peat Extraction Phase (July 1988 – June 2020)

By July 1988, peat extraction and all ancillary activities were well established across all bogs except Lisclogher West and portions of Carranstown and the western portion of Bracklin. Continued extraction from July 1988 to June 2020 is considered to have had a long-term, slight, negative effect on cutaway habitats as they were already modified but were impeded from natural vegetation succession. The Peat Extraction Phase would have had a long-term, negative impact on habitat loss/degradation for fauna and bird species. No significant adverse impacts on Designated Sites due to the Peat Extraction Phase have been identified. Please see Chapter 6 Biodiversity for further detail.

Current Phase (June 2020- Present Day)

Due to the limited activities on site during the Current Phase, impacts on habitats, fauna, bird species and Designated Sites have been reduced. There has been no additional loss, degradation or fragmentation of habitat as a result of the Current Phase of the Project and therefore, there are no residual significant effects on any habitat are likely to have occurred during this period.

Remedial Phase

With the implementation of the Cutaway Bog Decommissioning and Rehabilitation Plans during the Remedial Phase, it is anticipated that the combination of natural recolonisation and rehabilitation measures e.g. drain blocking and cell bunding, will result in environmental stabilisation through vegetation development. Rehabilitating bogs formerly subject to industrial peat extraction will also in the longer-term support other ecosystem services such as such the development of new habitat to support biodiversity and local attenuation of water flows from the bog. The implementation of the proposed rehabilitation plans will have an overall long-term, significant, positive effect on habitats, fauna, birds, water quality and aquatic fauna. Chapter 6 Biodiversity and Chapter 7 Land Soil and Geology for details.

Biodiversity and Water

Peat Extraction Phase (July 1988 – June 2020)

It is likely that peat extraction activities and all ancillary works would have resulted in indirect effects on receptors within and downstream of the Application Site in the form of water pollution. Drainage and peat extraction could also have resulted in the potential for increased release of peat solids to watercourses within and downstream of the site due to the lowering of the water table and drying out of peat. In addition, the release of dissolved nutrients, principally ammonia, resulting from the rapid breakdown of organic matter within peat once exposed to air, could also have resulted in deterioration of water quality of watercourses within and downstream of the site. This effect has the potential to lead to long-term, negative biodiversity and ecological effects downstream.

Improved sediment control measures were installed at the site in the late 1990s and early 2000s. Since 2000, the Application Site has operated under IPC Licence and has been subject to the conditions of that licence which include emission limit values for suspended solids and other nutrients. It is considered that there has been a long-term, moderate, negative residual effect on biodiversity due to downstream surface water quality as a result of release of suspended solids during the Peat Extraction Phase.

Current Phase (June 2020- Present Day)

Following review of the Annual Environmental Reports included in Appendix 4-3, there has been no significant fuel spills or wastewater discharges during the Current Phase. No significant residual effects are likely to have occurred during this period.

Remedial Phase

Following the implementation of the Cutaway Bog Decommissioning and Rehabilitation Plans, the bogs will be wetter, through drain blocking measures and will recolonise with vegetation slowly, eventually become naturally functioning peatlands with much-reduced silt and nutrient output. As such the residual effects of the implementation of the rehabilitation plans is a long term, moderate positive effect on biodiversity due to downstream surface water hydrology and water quality and aquatic receptors. Please see Chapter 6 Biodiversity and Chapter 8 Hydrology and Hydrogeology for further details.

Biodiversity and Air Quality and Climate

Peat Extraction Phase (July 1988 – June 2020)

The Extraction Phase would have resulted in dust and CO_2 emissions into the atmosphere which can have an indirect long-term, negative impact on fauna, aquatic fauna and Designated Sites.

There was an overall medium risk of dust impacting vegetation within a section of the River Boyne and River Blackwater SAC to the direct north-east of the Application Site. Dust emissions from peat extraction activities and all ancillary works were long-term, localised, negative and imperceptible.

Since 2000, all operations have been licenced under IPC Licence and have been subject to the conditions of the IPC Licence including environmental monitoring of emissions to air and water. As part of the IPC Licence for the site a number of dust control measures were required to be implemented. In addition, dust monitoring was required to ensure dust emissions were not causing issue at nearby sensitive receptors.

As such, the peat extraction activities and all ancillary works had a long-term, localised, negative and imperceptible residual impact on biodiversity due to air quality and climate.

Current Phase (June 2020- Present Day)

Dust monitoring results available for the period 2000 – 2021 indicate there were no exceedances of the emission limit value of 350 mg/m^2/day at the monitoring location on site and therefore dust emissions were not causing a nuisance in the area. In addition, there is no history of complaints in relation to dust emissions. During the Current Phase, the potential for dust emission impacts on habitats, aquatic habitats and Designated Sites is reduced considerably due to the cessation of peat extraction. As peat extraction has ceased at the Application Site, carbon losses associated with peat removal and the subsequent impact to climate are not relevant to the Current Phase. Emissions from vehicles accessing the Application Site will be minimal in nature and will result in a short-term, negative and imperceptible impact to biodiversity due to air quality and climate.

Remedial Phase

With the implementation of the Cutaway Bog Decommissioning and Rehabilitation Plans, the bogs will be set on a pathway to potential formation of carbon sinks creating a long term positive impact on fauna, aquatic fauna. This is considered to be a long term, slight positive effect on biodiversity due to air and climate. Please see Chapter 9 Air Quality and Chapter 10 Climate for further details.

Biodiversity and Noise and Vibration

Peat Extraction Phase (July 1988 – June 2020)

Plant machinery and transport vehicles used during the Peat Extraction Phase would have given rise to noise emissions that could be a nuisance for fauna, thereby having a long term, slight, negative effect. Likewise, the laying down and regular movement of railway infrastructure could have had a long term, slight, negative effect on habitats and fauna due to noise and vibration.

Current Phase (June 2020- Present Day)

Noise, generated from plant use during the Current Phase are significantly reduced and are considered to have a negative, not significant and short-term impact on biodiversity.

Remedial Phase

Once the drain blocking measures listed within the Cutaway Bog Decommissioning and Rehabilitation Plans of the Remedial Phase have been completed, the removal of noise sources is considered to have a long-term, positive effect on fauna and bird species. There will be no requirement to move or use railway infrastructure during this phase. Please see Chapter 6 Biodiversity, Chapter 11 Noise and Vibration for details.

Biodiversity and Landscape and Visual

Peat Extraction Phase (July 1988 – June 2020)

By July 1988, the majority of the Application Site was cleared of vegetation and undergoing industrial peat extraction. Alteration to the drainage regimes had an impact on the wetland habitat and the species assemblages present, consequently resulting in very minor change to the ground cover of bogland habitat and therefore an indirect effect on the landscape as well. Significant landscape effects occurred here where a substantial change occurred to habitats; these drained peatlands of medium sensitivity transitioned to a landscape of bare cutover peat. Considering the absence of visibility of these peatlands from any high sensitivity visual receptors due to a high level of screening around the bogs, residual visual effects were deemed to be of Moderate significance.

Current Phase (June 2020- Present Day)

Since the cessation of peat extraction in June 2020, bog habitats have started to recover, particularly around the edges of the bogs. Revegetation has caused both a slight degree of change to the landscape and slight degree of change to the visual aesthetic of the Application Site and surrounding visual amenity. Revegetation has caused both a slight degree of change to the landscape and slight degree of change to the visual aesthetic of the Application Site and surrounding visual amenity. Decommissioning activities are on-going causing slight landscape and visual effects to arise. On balance landscape and visual effects during the Current Phase are deemed to be not significant.

Remedial Phase

The enhanced revegetation of the site associated with the implementation of the Cutaway Bog Decommissioning and Rehabilitation Plans will have a permanent, slight positive effect on habitats, landscape character and visual amenity of the site. Please see Chapter 12 Landscape and Visual Impact for details.

16.2.3 Land, Soils and Geology

Land, Soils and Geology and Water

Peat Extraction Phase (July 1988 – June 2020)

Drainage was inserted to varying degrees across all the bogs within the Application Site by 1988. After this, there would have only been minor annual changes in local bog hydrology and hydrogeology associated with the annual removal of peat and the deepening of drains, if required. The effect of continuing peat extraction activities until June 2020 would not have resulted in any major alteration of the local hydrogeological regime. Therefore, the residual effect of the Peat Extraction Phase has had a permanent, moderate, negative direct effect on the bog hydrogeology. Sediment control measures have been in place since 1983/1984 (i.e. before the 1988 baseline) and water quality discharge licence limits have been in place since 2000 in accordance with IPC licensing.

The available monitoring data indicate that the baseline water quality was reasonably good and has not changed significantly during the Peat Extraction Phase. The effect on surface water quantity in downstream surface watercourse are not likely to be significant. The drainage systems were designed to reduce runoff to greenfield runoff rates. The residual effect is considered to be indirect, long-term moderate and negative on downstream surface water quality and quantity.

Current Phase (June 2020- Present Day)

No significant effects on bog hydrogeology will have occurred during the Current Phase. By June 2020, all drainage infrastructure (field drains, main drains, silt ponds etc.) would have been in place across the Application Site for between 25 – 70 years. The hydrogeological regime would have been well established with field drains lowering the perched groundwater table in the adjacent former peat production fields. Therefore, the residual effect is a neutral, imperceptible, short-term, indirect, unlikely effect on bog hydrogeology.

No significant effects on downstream surface water hydrology will have occurred from the cessation of peat extraction in June 2020 to the present day. Therefore, the residual effect is a neutral, imperceptible, short-term, indirect, unlikely effect on downstream surface water hydrology.

Remedial Phase

With the implementation of the Cutaway Bog Decommissioning and Rehabilitation Plans during the Remedial Phase, the bogs will likely be wetter, they will retain more water and will recolonise with vegetation slowly. They will eventually become naturally functioning peatlands/wetlands with much-reduced silt and nutrient output. As such, the residual effects of the Remedial Phase are long-term

moderate, positive on local peat bog hydrology/hydrogeology, and long-term slight, positive on downstream receptors such as Designated Sites. Please see Chapter 8 Hydrology and Hydrogeology for further details.

Land, Soils and Geology and Archaeology and Cultural Heritage

Peat Extraction Phase (July 1988 – June 2020)

As discussed above, partial human remains consisting of a torso, head and upper arms were recovered at the Applicant's Ballivor Works in 2003. The peat extraction process had a direct negative effect on the human remains; however, the overall significance of effects is considered to be Moderate as the remains have been retrieved, studied and is now on display in the National Museum of Ireland. Overall, it is possible that significant negative effects could have taken place to sub-surface finds and features, in particular, prior to 2005 where remains existed. This negative effect would have been mitigated by Peatland Surveys from 2005 onwards as well as the introduction of the 2011 Code of Practice. In this regard it is considered that that residual effects on sub-surface finds and features from 2005 to 2020 were Slight to Moderate while residual effects between 1998 and 2005 may have been Moderate to Significant. Please see Chapter 13 Archaeology and Cultural Heritage for further details.

Part of the Applicant's permanent narrow gauge railway line within the townland of Grange More, is noted for its social and technical importance and was afforded protection status in 2004. This track was first laid down in the 1950s and facilitated the transport of extracted peat to the processing centre at the Ballivor Works. This permanent track was not impacted by the peat extraction activities and all ancillary works and remains *insitu* to this day.

Current Phase (June 2020- Present Day)

In terms of archaeology, architecture and cultural heritage, since peat extraction has ceased, it is considered that no direct effects would occur during the Current Phase. No direct effects as a result of removal of stockpiled peat, EPA monitoring activities, etc are identified. Since no effects were identified without the need for control measures, no residual effects will occur.

Remedial Phase

Remedial activities such as drain blocking or tracking over peat fields may have a negative effect on any sub-surface archaeological finds or features that may be present on or beneath the surface of the peat. This may result in a permanent, negative and significant effect. Since peat activities associated with the Applicant fall under the 2012 Archaeological Code of Practice, any potential effects may be dealt with in the same way as past peat extraction activities and all ancillary works. In this regard the potential residual effect on sub-surface archaeology, if present, may be Slight-Moderate.

There is no potential for the Remedial Phase to impact the permanent railway infrastructure in townland of Grange More.

Please see Chapter 13 Archaeology and Cultural Heritage for further details.

Land, Soils and Geology and Landscape and Visual

Peat Extraction Phase (July 1988 – June 2020)

As discussed above, significant landscape effects occurred here where a substantial change occurred within the landscape; these drained peatlands of medium sensitivity transitioned to a landscape of bare cutover peat.

Current Phase (June 2020- Present Day)

Cessation of peat extraction activity in June 2020 has enabled the landscape of the Application Site to continue to re-vegetate and to some degree mitigate landscape and visual effects over time. However, the landscape is still a degraded bare – cutover peat site of low sensitivity, and it is not a functioning wetland. Revegetation has caused both a 'Slight' degree of change to the landscape and 'Slight' degree of change to the visual aesthetic of the Application Site and surrounding visual amenity. Decommissioning activities are on-going causing 'Slight' landscape and visual effects to arise. On balance landscape and visual effects during the 'Current Phase' are deemed to be 'Not Significant'.

Remedial Phase

The primary activity of the Remedial Phase is to rewet cutover peatland in order to re-establish a naturally functioning wetland and peatland ecosystem. It is likely that the works required to decommission peat extraction infrastructure and implement the remedial phase will cause temporary, negative landscape and visual effects of 'Imperceptible' significance. With the implementation of the Cutaway Bog Decommissioning and Rehabilitation Plans, there will be a 'Slight Positive' landscape and visual impact when compared to the 1988 baseline. Please see Chapter 12 Landscape and Visual Impact for details.

Land, Soils & Geology and Air Quality and Climate

Peat Extraction Phase (July 1988 – June 2020)

Control measures implemented through the IPC Licence in 2000 specifically pertain to preventing the erosion of exposed peat by both wind and water and therefore aim to protect air quality during the Peat Extraction Phase. As such the residual effect is permanent, moderate, negative on air quality and climate due to peat subsoils at the Application Site.

Current Phase (June 2020- Present Day)

With the implementation of the dust control measures stipulated withing the IPC licence for the Application Site, dust emissions associated with the Current Phase will be imperceptible. As such, a short term, imperceptible negative effect occurs on land soils and geology due to air quality and climate. Please see Chapter 9 Air Quality and Chapter 10 Climate for details.

Remedial Phase

The Remedial Phase involves implementation of the Cutaway Bog Decommissioning and Rehabilitation Plans. The primary activities will involve re-vegetation of the Application Site, drain blocking and re-wetting of the bogs where possible which will aid in restoring the carbon store function and promote the carbon sink potential of the land. Ongoing monitoring of the Application Site will continue to ensure stabilisation of the Application Site and complete re-vegetation. Residual impacts to air quality and climate during the Remedial Phase will be short-term, neutral and imperceptible. Please see Chapter 9 Air Quality and Chapter 10 Climate for details.

16.2.4 Vulnerability to Natural Disasters

As described in Chapter 15 of the rEIAR, major accidents or natural disasters are hazards which have the potential to affect any stage the Project and can lead to environmental effects both directly and indirectly. These include accidents during the Peat Extraction Phase, Current Phase and Remedial Phase caused by events such as operational failure and/or natural hazards. The assessment of the potential for significant accidents or disasters is conducted in connection with the information that must be included in the rEIAR. This includes aspects such as population and human health, biodiversity, land and soil, hydrology and hydrogeology, air quality, climate, material assets, cultural heritage and the landscape. The risk of a major accident and/or disaster during the Peat Extraction Phase, Current

Phase and Remedial Phase is considered 'low' in accordance with the '*Guide to Risk Assessment in Major Emergency Management*' (DoEHLG, 2010).

When all control and mitigation measures detailed in the rEIAR are implemented, the residual effect(s) associated with the Extraction Phase, Current Phase and Remedial Phases at the Application Site are not significant. Please see Chapter 15 for details.

16.3 Residual Impacts

Where any potential interactive negative effects have been identified in the above, a full suite of appropriate control measures and mitigation measures has already been included in the relevant sections (Chapters 5 – 15) of the EIAR and are detailed in Chapter 17 of this rEIAR. The implementation of control and mitigation measures have been reduced, will reduce or remove the potential for their effects. Information on potential residual impacts and the significant of effects, is also presented in each relevant chapter.