16. INTERACTION OF THE FOREGOING

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 Description of the Proposed Development of this rEIAR. All of the potential significant residual 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 residual 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	Hydrology and Hydrogeology	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											
Hydrology and Hydrogeology	PEP											
	CP											
	RP											
Air Quality	PEP											
	CP											
	RP											
	PEP											

	Phase	Population & Human Health	Biodiversity including Ornithology	Land, Soils & Geology	Hydrology and Hydrogeology	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	Hydrology and Hydrogeology	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 Susan Doran and reviewed by Ellen Costello and Sean Creedon, all of MKO. Susan Doran is an Environmental Scientist with MKO with over 3 years' experience in consultancy and conservation. Susan holds BSc (Hons) in Ecology and Environmental Biology from University College Cork. Prior to her role as Environmental Scientist, Susan was an Ornithologist and Coordinator for the MKO Ornithology Team. Susan has been involved with several large-scale onshore wind farms as assistant Project Manager through the EIA process.

Ellen Costello is a Senior Environmental Scientist with MKO with over 5 years' 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 large scale infrastructure projects including that of housing, tourism and recreation, renewable energy infrastructure and substitute consent applications for peat extraction. In her role as a senior 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.

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 23 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 Biodiversity

Peat Extraction Phase (July 1988 – June 2020)

There is no interacting effect between Population & Human Health and Biodiversity for the Peat Extraction Phase.

Current Phase (June 2020- Present Day)

There is no interacting effect between Population & Human Health and Biodiversity for the Current Phase

Remedial Phase

The Remedial Phase will involve minimal use of machinery to facilitate drain blocking as part of the implementation of the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan. Residual effects on biodiversity during this phase are considered to be positive and significant at the

local to county scale as a result of the improved habitats and biodiversity, and subsequent water quality which is addressed below in Section 16.2.2. This will result in a long-term slight positive residual effect on human health.

Please see Chapter 6 Biodiversity for further details.

Population and Human Health and Land, Soils and Geology

Peat Extraction Phase (July 1988 – June 2020)

Peat extraction by its very nature (i.e. the removal of peat from the Application Site) had a permanent, moderate, negative residual effect on peat and subsoils. Peat extraction involved the permanent removal of peat from the Application Site resulting in a reduction in peat depth. 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, though was regularly monitored and inspected after the commencement of IPC Licence P0500-01 in 2000.

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

Please see Chapter 7 Land, Soils and Geology for further details.

Current Phase (June 2020- Present Day)

The Current Phase involves the removal of stockpiles from the site (which was completed in 2024) 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 residual effect on population and human health due to effects on land, soils and geology is associated with the Current Phase.

Please see Chapter 7 Land, Soils and Geology for further details.

Remedial Phase

The Remedial Phase will involve minimal use of machinery to facilitate drain blocking. Impacts on human health could arise as a result of soil contamination due to machinery use during this phase. The residual effect of this is considered to be negative, imperceptible, long-term and unlikely. Once the use of machinery ceases on site, these potential impacts are removed.

Please see Chapter 7 Land, Soils and Geology for further details.

Population and Human Health and Hydrology and Hydrogeology

Peat Extraction Phase (July 1988 – June 2020)

There is no interacting effect between Population & Human Health and Hydrology and Hydrogeology for the Peat Extraction Phase.

Current Phase (June 2020- Present Day)

There is no interacting effect between Population & Human Health and Hydrology and Hydrogeology for the Current Phase

Remedial Phase

Following the implementation of the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan, the Application Site will be wetter, retain more water, re-colonise with vegetation slowly, and will eventually become naturally functioning peatland with reduced silt and nutrient output in surface and groundwaters. 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 improved water quality. Please see Chapter 8 Hydrology and Hydrogeology for further details.

Population and Human Health and Air Quality and Climate

Peat Extraction Phase (July 1988 – June 2020)

Peat extraction and ancillary activities would have generated dust impacts at nearby properties within the vicinity of the Application Site, as identified in Chapter 9: Air Quality. Dust emissions would have arisen during the milling, harrowing, ridging and harvesting processes associated with milled peat extraction. Given the extensive control measures implemented at the Application Site prior to the commencement of the IPC Licence combined with the implementation of IPC Licence conditions since 2000, it is considered that impacts on air arising from peat extraction and ancillary activities during the Peat Extraction Phase had a localised long-term, negative, imperceptible residual effect on population and human health. Please see Chapter 9 Air Quality for further details.

Long-term monitoring of NO_2, PM_{10} and PM_{25} at nearby monitoring stations or comparative locations indicate there were no exceedances to the daily or annual thresholds of NO_2, PM_{10} and $PM_{2.5}$. Please see Chapter 9 Air Quality for details. A total of 524,512 tCO_2 was directly or indirectly removed over the 1988 – 2020 period through peat extraction and ancillary activities. Please see Chapter 10 Climate for details. Over this 32-year period there was on average16,392 tonnes of CO_2 per annum removed from Lemanaghan bog. Annually this equates to 0.006% of Ireland's 2021 – 2025 carbon budget of 295 $MtCO_2e$ or 0.01% of Ireland's more stringent 2030 – 2035 carbon budget of 151 $MtCO_2e$.

The removal of the carbon sink potential of the site due to the removal of peat, and the subsequent release of CO_2 and Greenhouse Gasses (GHG) from peat extraction and ancillary activities during the Peat Extraction Phase 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)

Decommissioning and monitoring (as described in Section 4.8 of Chapter 4 Description of the Proposed Development) during the Current Phase have resulted in a short-term, imperceptible, negative residual effect on population and human health due to exhaust emissions, dust pollution and GHG release from onsite maintenance and monitoring activities .

Remedial Phase

The Remedial Phase will involve the implementation of the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan for the Application Site which aims to encourage the natural revegetation of the Application Site and its 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 Noise and Vibration

Peat Extraction Phase (July 1988 – June 2020)

Noise emissions arose during peat extraction and ancillary activities during the Peat Extraction Phase as a result of machinery on site extracting peat, transporting it for processing and then removing it off site via internal private rail to various end users around the country. Notably, there are no records of noise complaints during the Peat Extraction Phase. Therefore, a long term, not significant, negative residual effect on population and human health has occurred during the Peat Extraction Phase due to noise and vibration.

Current Phase (June 2020- Present Day)

A significant reduction in plant machinery and onsite staff vehicles across the site during the Current Phase when compared with the Peat Extraction Phase means that there are less sources of noise and vibration than during the Peat Extraction Phase. Peat extraction ceased at the Application Site in June 2020. Therefore, a short-term, not significant, negative effect on population and human health as a result of noise and vibration from plant machinery 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 Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan. As such, a short-term, imperceptible, and negative residual effect on population and human health due to noise will occur.

See Chapter 11 Noise and Vibration and Appendix 4-2 Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan for further 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 North of the Application Site 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 bog, visual residual effects on population were deemed to be negative, not significant and long-term. In the few highly localised instances where the northern area of the bog was visible from a very small number of residential receptors in the townland of Cooldorragh, residual visual effects are considered to have a negative, moderate and long term residual effect on population.

Current Phase (June 2020- Present Day)

Cessation of peat extraction 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, 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' positive landscape and visual effects to arise. On balance, the

positive landscape and visual residual effects during the Current Phase are deemed to have a positive, direct, not significant and short-term effect on population and human health during the Current Phase.

Remedial Phase

The primary activity objective of the Remedial Phase is to re-wet cutover peatland in order to re-establish a naturally functioning wetland and peatland ecosystem. This will require low level, intermittent groundworks for activities such as blocking existing drainage.

As the bogland is re-wetted and the peatland ecosystem re-establishes as a result of works in the Remedial Phase there will be a positive change to the landscape of the Application Site. The visual aesthetic of the Application Site has changed since cessation of peat extraction in 2020. This is primarily attributed to the large areas of bare cutover peat which have been allowed to revegetate, consequently changing the visual aesthetic to a landscape of a more natural and wild nature. The intention of the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan is to continue to encourage this process and ensure that it is successful. This recolonisation of vegetation is expected to gradually improve the visual aesthetics and landscape quality of the Application Site. The residual effect on visual amenity of the Application Site is therefore considered to be positive, long-term, not significant effect on population during the Remedial Phase. No effects are envisioned to occur on human health as a result of landscape and visual effects

Population and Human Health and Archaeology and Cultural Heritage

Peat Extraction Phase (July 1988 – June 2020)

Bord na Móna 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.

Overall, it is possible that significant negative effects could have taken place to sub-surface archaeological finds and features, in particular, prior to 1993 when the Peatland Surveys commenced. This negative effect was mitigated, however, by the Peatland Surveys 1993-4 and any associated excavations which were conducted as part of the mitigation phase of that work. Subsequently, the introduction of the 2012 Code of Practice served as a mitigatory factor in the discovery of archaeological finds and features as well as their recording and excavation where required. In this regard it is considered that residual effects on sub-surface finds and features from 1993 to 2020 were a direct slight - moderate negative permanent effect, while effects between 1988 and 1993 may have been direct, moderate – significant, negative, permanent effects at a local scale, and there is some interaction of this negative residual effect on cultural heritage assets and population. No effects are envisioned to occur on human health as a result cultural heritage effects.

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

Current Phase (June 2020- Present Day)

There is no interacting effect between Population & Human Health and Cultural Heritage for the Current Phase

Remedial Phase

There is no interacting effect between Population & Human Health and Cultural Heritage for the Remedial Phase

Population and Human Health and Material Assets

Peat Extraction Phase (July 1988 – June 2020)

Peat extraction and ancillary activities at the Application Site would have generated rail traffic which interacted with the public road network at a total of 2 no level crossings within the Application Site. Locomotives and wagons 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 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 on population and human health. 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.

Impacts arising from traffic, transport and Material Assets during the Peat Extraction Phase had a long-term slight negative residual effect 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 higher than during the Peat Extraction Phase due to the removal of stockpiled peat moving to HGVs from rail movements during this phase, therefore are considered to be have a short-term, imperceptible, negative effect on population and human health.

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

Remedial Phase

During the Remedial Phase, ecologists, engineers and site operatives will oversee and undertake the process of rehabilitation including drain blocking which requires 1-2 HGVs at the Application Site for the first 2 years of the Remedial Phase. These HGVs will not utilise the public road network; they will cross the road once in the morning and once in the evening to track back to the Works where they will be stored but will not contribute to traffic flow numbers. It is estimated that 1-2 LGVs will travel to and from the Application Site each day for the first two years. After that, just 1-2 LGVs will be required to visit the Application Site each month to inspect the progress of the remedial measures. As such, the Remedial Phase will result in a short term, negative, imperceptible, effect 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 on population and human health. Please see Chapter 14 Material Assets 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 ancillary activities were well established across the Application Site. Continued peat extraction from July 1988 to June 2020 is considered to have had a negative, long-term, not significant residual effect on cutaway bog habitats as while they were already modified, natural vegetation succession was impeded due to peat extraction.

The continued peat extraction and land take resulting in negative residual effects on land, soils and geology during the Peat Extraction Phase would have had a long-term, negative residual effect on habitat loss/degradation for fauna and bird species.

No significant adverse impacts on Designated Sites due to the same effects on land, soils and geology Peat Extraction Phase have been identified. Please see Chapter 6 Biodiversity for further detail.

Current Phase

There is no interacting effect between Biodiversity and Land, Soils & Geology for the Current Phase.

Remedial Phase

With the implementation of the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan during the Remedial Phase, it is anticipated that the combination of natural recolonisation and rehabilitation measures e.g. drain blocking, will result in environmental stabilisation through vegetation development. Rehabilitating a bog 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 Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan will have an overall long-term, significant, positive effect on habitats, fauna, birds, water quality and aquatic fauna due to effects on land soils and geology. Chapter 6 Biodiversity and Chapter 7 Land, Soils and Geology for details.

Biodiversity and Hydrology and Hydrogeology

Peat Extraction Phase (July 1988 – June 2020)

It is likely that peat extraction and ancillary activities would have resulted in indirect effects on receptors within and downstream of the Application Site in the form of water pollution during the Peat Extraction Phase. 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, moderate negative biodiversity and ecological effects downstream.

Bord na Móna did not record (in annual AER submissions to the EPA) the occurrence of any major significant fuel spills and/or wastewater discharges. In addition, extensive control measures have been implemented since 2000 as part of the IPC Licence which mitigate against the possibility of any surface or ground water contamination which has potential to effect biodiversity 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 effect on biodiversity due to downstream surface and ground water quality as a result of release of suspended solids, leakages or spills during the Peat Extraction Phase.The potential for the peat extraction and ancillary activity to impact the hydrology of the River Shannon Callows SAC/pNHA and the Middle Shannon Callows SPA has been reduced as the bog drainage regime was already in place at the time of the SAC and SPA designation. Proven and effective control measures have also been implemented to limit the runoff from the Application Site to original greenfield runoff rates. The Application Site has also been operating under IPC Licence conditions since May 2000. The residual effect is imperceptible, long-term, negative, indirect likely effect on the hydrology (flows and water quality) of the Shannon Callows SAC/pNHA and the Middle Shannon Callows SPA.

Current Phase

There is no interacting effect between Biodiversity and Hydrology and Hydrogeology for the Current Phase.

Remedial Phase

Following the implementation of the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan, the bog 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 in surface and ground waters. As such the effects of the implementation of the rehabilitation plan 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 Peat Extraction Phase would have resulted in dust and CO_2 emissions into the atmosphere which can have an indirect long-term, negative effect on fauna, aquatic fauna and Designated Sites. There was an overall medium risk of dust impacting vegetation. 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. The theoretical precautionary effect of traffic emissions associated with peat extraction and ancillary activities during the Peat Extraction Phase on biodiversity was long-term, localised, negative and imperceptible.

As such, the peat extraction and ancillary activities had a long-term, localised, negative and slight effect on biodiversity due to air quality..

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 locations nearby to the Application 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. During this 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 residual effect on biodiversity due to exhaust emissions, dust pollution and GHG release from onsite maintenance and monitoring activities. **Remedial Phase**

With the implementation of the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan, the Application Site will be set on a pathway to potential formation of a carbon sink creating a long term positive significant effect on habitats, and a long term indirect positive effect on fauna, and 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 short term, not significant, negative effect.

Current Phase (June 2020- Present Day)

Noise and vibration generated from plant machinery during peat stockpile removal during the Current Phase is significantly reduced compared to the Peat Extraction Phase and is considered to have a negative, not significant and short-term residual effect on biodiversity.

Remedial Phase

Once the drain blocking measures listed within the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan 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. 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 a change to the ground cover of bogland habitat and therefore an indirect effect on the landscape as well. As the changes would only be an addition to the existing trend of peat extraction in the area, it is considered that Residual Landscape effects arising from changes that occurred to habitats were 'Negative', 'Long-term' and 'Slight' for the majority of the Application Site. The visibility appraisal in Chapter 12 Landscape and Visual determined that views towards the Application Site from most locations are limited due to generally flat nature of the surrounding landscape, and visual screening occurring from mature vegetation along field boundaries and roadsides existent within the agricultural landscape surrounding the Application Site. As the changes would only be an addition to the existing trend of peat extraction in the area arising from

changes that occurred to habitats, it is considered that the overall residual visual effects were 'Negative', 'Not Significant' and 'Long-term' due to the negative effects on biodiversity.

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 bog. 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 positive, not significant and long-term as a result of improved biodiversity.

Remedial Phase

As the bogland is re-wetted and the peatland ecosystem re-establishes as a result of works in the Remedial Phase there will be a positive change to the landscape of the Application Site. The visual aesthetic of the Application Site has changed since cessation of peat extraction in 2020. This is primarily attributed to the large areas of bare cutover peat which have been allowed to revegetate, consequently changing the visual aesthetic to a landscape of a more natural and wild nature. The landscape and visual effects are 'Positive', 'Long-term' and 'Not Significant' due to the positive effects on biodiversity. .

Please see Chapter 12 Landscape and Visual for details.

Biodiversity and Archaeology and Cultural Heritage

There is no interacting effects between Biodiversity and Archaeology and Cultural heritage during the Peat Extraction Phase, Current Phase or Remedial Phase of the Project.

Biodiversity and Material Assets

There is no interacting effects between Biodiversity and Archaeology and Material Assets during the Peat Extraction Phase, Current Phase or Remedial Phase of the Project.

16.2.3 Land, Soils and Geology

Land, Soils and Geology and Hydrology and Hydrogeology

Peat Extraction Phase (July 1988 – June 2020)

Drainage was inserted across the Application Site by 1988. After this time, 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 until June 2020 would not have resulted in any major alteration of the local hydrogeological regime. Therefore, the effect of the Peat Extraction Phase has had a permanent, moderate, negative, direct, long-term likely residual 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 high 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 effect is considered to be indirect, long-term imperceptible and negative on downstream surface water quality and quantity as a result of land use.

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 across the majority of the site. Therefore, the 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 effect is a neutral, imperceptible, short-term, indirect, unlikely effect on downstream surface water hydrology as a result of land use.

Remedial Phase

With the implementation of the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan during the Remedial Phase, the Application Site 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 in surface and ground waters. As such, the effects of the Remedial Phase are moderate, positive, direct, long-term on local peat bog hydrology/hydrogeology, and moderate, positive, indirect, long-term effect on downstream receptors such as Designated Sites as a result of land use.

Please see Chapter 8 Hydrology and Hydrogeology for further details.

Land, Soils & Geology and Air Quality and Climate

Peat Extraction Phase (July 1988 – June 2020)

The Peat Extraction Phase would have resulted in dust and CO_2 emissions into the atmosphere. The milling, harrowing, ridging and harvesting processes would have generated some dust emissions. 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 long-term, moderate, negative on air quality and climate due to land use at the Application Site.

Long-term monitoring of NO_2, PM_{10} and PM_{25} at nearby monitoring stations or comparative locations indicate there were no exceedances to the daily or annual thresholds of NO_2, PM_{10} and $PM_{2.5}$. Please see Chapter 9 Air Quality for details. A total of 524,512 tCO_2 was directly or indirectly removed over the 1988 – 2020 period through peat extraction and ancillary activities. Please see Chapter 10 Climate for details. Over this 32-year period there was on average16,392 tonnes of CO_2 per annum removed from Lemanaghan bog. Annually this equates to 0.006% of Ireland's 2021 – 2025 carbon budget of 295 $MtCO_2e$ or 0.01% of Ireland's more stringent 2030 – 2035 carbon budget of 151 $MtCO_2e$.

The removal of the carbon sink potential of the site and the subsequent release of CO_2 and GHG from the peat extraction and ancillary activities resulted in a long-term, negative significant effect on Air Quality and Climate due to effects on land soils and geology.

Please see Chapter 9 Air Quality and Chapter 10 Climate for details.

Current Phase (June 2020- Present Day)

During the Current Phase (June 2020 to present day), the activity on the Application Site is reduced due to the cessation of the peat extraction. With the implementation of the dust control measures associated with the IPC Licence for the Application Site, dust emissions associated with the Current

Phase will be imperceptible. As such, there is a short term, imperceptible negative effect occurs on air quality arising from land soils and geology.

As peat extraction ceased in June 2020, carbon losses and GHG's associated with peat extraction and the subsequent impact to climate are not relevant to this phase. However, the degraded bogs will continue to act as sources of these GHG until they are either rewetted/revegetated, the peat is removed or all the remaining peat has oxidised. As such there is a short-term, negative and significant negative effect on climate arising from strong interaction with land soils and geology.

Please see Chapter 9 Air Quality and Chapter 10 Climate for details.

Remedial Phase

The Remedial Phase involves implementation of the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan. The primary activities will involve re-vegetation of the Application Site, drain blocking and re-wetting of the Application Site where possible.

There are minimal works involved in the Remedial Phase that have the potential to impact air quality. The effect on air quality from dust emissions will be short-term, negative and imperceptible. Emissions from site machinery and vehicles accessing the site during the Remedial Phase will result in a long-term, neutral and imperceptible effect to air quality due to the low volume of vehicles involved

The implementation of the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan 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. Impacts to climate during the Remedial Phase will be long-term, negative and not significant due to changes in land use.

Please see Chapter 9 Air Quality and Chapter 10 Climate for details.

Land, Soils and Geology and Landscape and Visual

Peat Extraction Phase (July 1988 – June 2020)

As discussed above, 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, resulting in a negative, long-term and slight effect on Landscape and Visual as a result of land use of the Application Site during the Peat Extraction Phase.

Current Phase (June 2020- Present Day)

Cessation of peat extraction 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, 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. On-going decommissioning activities, cause a 'Slight' magnitude of change. Landscape and visual effects during the Current Phase are deemed to be 'Neutral, 'Direct', 'Not Significant' and 'Short-term' as a result of the land use of the Application Site.

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 Draft Bord na Móna Cutaway Bog

Decommissioning and Rehabilitation Plan will cause temporary, negative landscape and visual effects of 'Imperceptible' significance. With the implementation of the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan, there will be a ''Positive', 'Not Significant' and ''Long term' effect on Landscape and Visual as a result of the proposed land use of the Application Site

Please see Chapter 12 Landscape and Visual for details.

Land, Soils and Geology and Archaeology and Cultural Heritage

Peat Extraction Phase (July 1988 – June 2020)

Overall, it is possible that significant negative effects could have taken place to sub-surface archaeological finds and features, in particular, prior to 1993 when the Peatland Surveys commenced. This negative effect was mitigated, however, by the Peatland Surveys 1993-4 and any associated excavations which were carried out as part of the mitigation phase of that work. Subsequently, the introduction of the 2012 Code of Practice served as a mitigatory factor in the discovery of archaeological finds and features as well as their recording and excavation where required.

It is noted that the Peat Extraction Phase from 1988-1993 contributed to the corpus of archaeological finds from peatland environments and to knowledge regarding objects from the Application Site. However, the archaeological objects present within the Application Site may or have been damaged/destroyed by the Peat Extraction Phase in particular from 1988 until 1993 prior to the implementation of the 1993 Peatland Surveys. In this regard the Peat Extraction Phase from 1988 to 1993 may have had a direct, significant, negative and permanent effect on such archaeological objects, if present as a result of land use.

In this regard it is considered that the land use during the Current Phase effects on sub-surface finds and features from 1993 to 2020 were a direct slight - moderate negative permanent effect, while effects between 1988 and 1993 may have been direct moderate – significant, negative, permanent effects.

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

Current Phase (June 2020- Present Day)

There is no interacting effect between Land, Soils and Geology and Cultural Heritage for the Current Phase.

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 on archaeological objects. 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 and ancillary activities. In this regard the potential residual effect on sub-surface archaeology, if present, may be Slight-Moderate, negative, unlikely and permanent as a result of the land use in the Remedial Phase .

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

16.2.4 Material Assets

Material Assets and Hydrology and Hydrogeology

Peat Extraction Phase (July 1988 – June 2020)

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 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. No significant fuel spills or wastewater discharges have been recorded since 2000 when the IPC Licence took effect. It is considered that there has been an imperceptible, long-term, negative, indirect, unlikely effect on downstream surface and ground water quality as a result of spills or wastewater discharges during the Peat Extraction Phase.

Please see Chapter 8 Hydrology and Hydrogeology for further details.

Current Phase (June 2020- Present Day)

Condition 7 of the IPC Licence which addresses waste management continues to be implemented by the Applicant across the Application Site. The Current Phase has a negative, imperceptible, short-term, indirect, unlikely effect on downstream surface and ground water quality as a result of spills or wastewater discharges.

Please see Chapter 8 Hydrology and Hydrogeology for further details.

Remedial Phase

The use and storage of hydrocarbons and small volumes of chemicals is a standard risk associated with all industrial sites. Proven and effective measures to mitigate the risk of spills and leaks will be implemented during the Remedial Phase of the Project. It is considered that the effect to be negative, imperceptible, direct, short-term, unlikely effect on surface and groundwater quality.

Please see Chapter 8 Hydrology and Hydrogeology for further details.

Material Assets and Air & Climate

Peat Extraction Phase (July 1988 – June 2020)

The Peat Extraction Phase would have resulted in dust and CO_2 emissions into the atmosphere via the traffic and rail movements. This can have an indirect long-term, negative imperceptible effect on air quality and the climate. There was an overall medium risk of dust soiling impacts. Dust emissions from peat extraction and ancillary activities 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 and ancillary activities during the Peat Extraction Phase had a long-term, localised, negative and imperceptible effect on air quality and climate as a result of traffic and transport.

No other material assets had an interacting effect with air quality and climate during the Peat Extraction Phase.

Please see Chapter 9 Air Quality, Chapter 10 Climate and Chapter 14 Material Assets for further details

Current Phase (June 2020- Present Day)

Dust monitoring results available for the period 2020 – 2021 indicate there were no exceedances of the emission limit value of 350 mg/m^2/day at the monitoring locations nearby to the Application 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. During this phase, the potential for dust emission is reduced considerably due to the cessation of peat extraction. As peat extraction has ceased at the Application Site, carbon losses associated with peat extraction 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 effect to air quality and climate.

No other material assets had an interacting effect with air quality and climate during the Current Phase.

Please see Chapter 9 Air Quality and Chapter 10 Climate and Chapter 14 Material Assets for further details

Remedial Phase

With the implementation of the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan, the Application Site will be set on a pathway to potential formation of carbon sinks creating a long term positive effect on air quality and climate. Impacts from vehicle emissions will be long-term, neutral and imperceptible due to the low number of vehicles required for the works.

No other material assets had an interacting effect with air quality and climate during the Remedial Phase.

Please see Chapter 9 Air Quality and Chapter 10 Climate for further details.

Material Assets and Noise & Vibration

Peat Extraction Phase (July 1988 – June 2020)

Use of plant machinery and tractors, and rail movements arising from the Project during the Peat Extraction Phase would have given rise to noise emissions and vibrations thereby having a long term, slight, negative residual effect. Likewise, the laying down and regular movement of railway infrastructure within the Application Site could have had a long term, slight, negative, not significant residual effect on noise and vibration.

Please see Chapter 11 Noise and Vibration for details.

Current Phase (June 2020- Present Day)

Use of plant machinery and tractors, and rail movements arising from the Project during the Current Phase are significantly reduced from the Peat Extraction Phase and are considered to have a negative, not significant and short-term residual effect on noise and vibration.

Please see Chapter 11 Noise and Vibration for details.

Remedial Phase

The main activity associated with the Remedial Phase comprises the blocking of drains across all bogs and involves a limited amount of machinery. Once the drain blocking measures listed within the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan of the Remedial Phase have been completed, the removal of noise sources is considered to have a neutral, imperceptible, and long-term residual effect on noise and vibration.

Please see Chapter 11 Noise and Vibration for details.

16.2.5 Vulnerability to Natural Disasters

As described in Chapter 15 Vulnerability to Major Accidents and Natural Disasters 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 risk', aside from bog fires (Industrial Accident – Fire) in the Peat Extraction Phase which was determined as 'medium risk' 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 Peat Extraction Phase, Current Phase and Remedial Phases at the Application Site are not significant. Please see Chapter 15 Vulnerability to Major Accidents and Natural Disasters for details.

16.3 Control and Mitigation Measures

Where any potential interactive negative effects have been identified 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 Schedule of Mitigation and Monitoring Measures of this rEIAR. The implementation of control and mitigation measures will reduce or remove the potential for negative effects. Information on potential residual effects and the statement of significance of effect, are also presented in each relevant chapter.