

15. VULNERABILITY OF THE PROJECT TO MAJOR ACCIDENTS AND NATURAL DISASTERS

15.1 Introduction

This section of the Environmental Impact Assessment Report (EIAR) describes the likely significant effects on the environment arising from the vulnerability of the proposed Ballivor Wind Farm project (the “Proposed Development”) as detailed in Chapter 4 to risks of major accidents and/or natural disasters. It has been completed in accordance with the guidance set out by the Environmental Protection Agency (EPA) in ‘Guidelines on Information to be contained in Environmental Impact Statements’ (EPA, 2022) and the European Commission in relation to Environmental Impact Assessment of Projects (Directive 2011/92/EU, as amended by 2014/52/EU), namely ‘Guidance on the preparation of the Environmental Impact Assessment Report’.

The assessment of the vulnerability of the Proposed Development to major accidents and natural disasters, as well as the risk of the Proposed Development itself causing accidents or disasters is carried out in compliance with the EIA Directive (2014/52/EU) which states the need to assess:

“the expected significant adverse effects of the project on the environment deriving from the vulnerability of the project to risks of major accidents and/or natural disasters which are relevant to the project concerned.”

The objective of this assessment is to ensure that appropriate precautionary actions are taken for those projects.

“because of their vulnerability to major accidents and/or natural disasters, are likely to have significant adverse effects on the environment”.

Based on the requirements of the EIA Directive, this chapter seeks to determine:

- The relevant major accidents and/or natural disasters, if any, that the Proposed Development could be vulnerable to;
- The potential for these major accidents and/or natural disasters to result in likely significant adverse environmental effect(s); and
- The measures that are in place, or need to be in place, to prevent or mitigate the likely significant adverse effects of such events on the environment.

The full description of the Proposed Development is provided in Chapter 4 of this EIAR.

15.1.1 Statement of Authority

This section of the EIAR has been prepared by Daire O’Shaughnessy and reviewed by Karen Mulryan and Michael Watson. Daire is an Environmental Scientist with over 3 years’ experience in private consultancy undertaking environmental site assessments, surveys and producing impact assessments for Environmental impact Assessment Reports for SID projects including wind energy developments. Michael Watson is Project Director and head of the Environment Team in MKO. Karen is an Environmental Scientist with MKO with over 6 years’ experience in the private consultancy sector. Karen holds a BA and a MSc in archaeology. Karen has experience in conduction watching briefs, surveys and desk based assessments for wind farms, solar farms, energy storage facilities, grid routes, mixed use and residential developments. Karen current role involves coordinating Environmental Impact Assessment

Reports and site work renewable energy developments. Michael has over 20 years' experience in the environmental sector. Following the completion of his Master's Degree in Environmental Resource Management, Geography, from National University of Ireland, Maynooth he worked for the Geological Survey of Ireland and then a prominent private environmental & hydrogeological consultancy prior to joining MKO in 2014. Michael's professional experience includes managing Environmental Impact Assessments, EPA License applications, hydrogeological assessments, environmental due diligence, risk assessments and general environmental assessments on behalf of clients in the wind farm, waste management, public sector, commercial and industrial sectors nationally. Michael's key strengths include project strategy advice for a wide range and scale of projects, project management and liaising with the relevant local authorities, Environmental Protection Agency (EPA) and statutory consultees as well as coordinating the project teams and sub-contractors. Michael is a key member of the MKO senior management team and as head of the Environment Team has responsibilities to mentor various grades of team members, foster a positive and promote continuous professional development for employees. Michael also has a Bachelor of Arts Degree in Geography and Economics from NUI Maynooth, is a Member of IEMA, a Chartered Environmentalist (CEnv) and Professional Geologist (PGeo).

15.2 Assessment Methodology

15.2.1 General

The following sources of information and literature pertinent to the area were used in the preparation of this section:

- > Census of Ireland 2016;
- > Regional Planning Guidelines for the Midland Region 2010-2022;
- > Regional Spatial and Economic Strategy (RSES) 2020-2032, published by the Northern and Western Regional Assembly on 23 January 2020;
- > Meath County Development Plan 2021 – 2027;
- > Westmeath County Development Plan 2021 – 2027;
- > Meath County Council Website;
- > Westmeath County Council Website;
- > European Commission. (2017). *Environmental Impact Assessment of Projects – Guidance on the preparation of Environmental Impact Assessment Reports*
- > Environmental Protection Agency. (2022). *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*
- > Department of Environment, Heritage and Local Government (2010) *A Guide to Risk Assessment in Major Emergency Management*
- > Environmental Protection Agency (2014) *Guidance on Assessing and Costing Environmental Liabilities*
- > Department of Defence (2020) *A National Risk Assessment for Ireland*
- > Meath County Council – Major Emergency Plan
- > Westmeath County Council – Major Emergency Plan
- > *Health Service Authority advice for Health and Safety in the Renewable Sector. Available at: https://www.hsa.ie/eng/your_industry/renewable_energy/*
- > *National Risk Assessment: Overview of Strategic Risks. <https://www.gov.ie/pdf/?file=https://assets.gov.ie/220847/1291534a-9b27-4c05-92ed-d3bd21adc89a.pdf#page=null>*

Major accidents or natural disasters are hazards which have the potential to affect the Proposed Development and consequently have potential impacts on the environment. These include accidents during construction and operation caused by operational failure and/or natural hazards. The assessment of the risk of major accidents and/or disaster considers all factors defined in the EIA Directive that have been considered in this EIAR, i.e., population and human health, biodiversity, land, soil (peat stability), water, air and climate and material assets, cultural heritage and the landscape.

15.2.2 Legislative Context

15.2.2.1 Legislation

An assessment of the following key elements was undertaken in accordance with the EIA Directive (2014/52/EU):

- The vulnerability of the proposed project to potential accidents and disasters
- The proposed project's potential to cause major accidents or disasters which pose a risk to the environment.

The information relevant to major accidents and/or disasters to be included in the EIAR is set out in paragraph 8 of Annex IV of the EIA Directive as follows:

“(8) A description of the expected significant adverse effects of the project on the environment deriving from the vulnerability of the project to risks of major accidents and/or disasters which are relevant to the project concerned. Relevant information available and obtained through risk assessments pursuant to Union legislation such as Directive 2012/18/EU of the European Parliament and of the Council or Council Directive 2009/71/Euratom or relevant assessments carried out pursuant to national legislation may be used for this purpose provided that the requirements of this Directive are met. Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies”.

15.2.3 Categorisation of the Baseline Environment

A desk-study has been completed to establish the baseline environment for which the proposed risk assessment is being carried out. This will influence both the likelihood and the impact of a major accident or natural disaster. Local and regional context has been established prior to undertaking the risk assessment to develop an understanding of the vulnerability and resilience of the area to emergency situations.

Further detail on the baseline environment is provided in Section 15.3.

15.2.4 Impact Assessment Methodology

15.2.4.1 Introduction

This assessment is focused on an understanding that the Proposed Development will be designed, built and operated in line with the methodologies and measures prescribed in this EIAR. Therefore, the overall vulnerability of the Proposed Development to risks of major accidents and natural disasters is considered low. Current EIA practice already includes an assessment of some potential accidents and disaster scenarios such as pollution incidents to ground and watercourses as well as assessment of flooding events and peat instability. These are described in detail in the relevant EIAR assessment chapters (Refer to Chapters 5 to 14 for further detail).

A wind farm is not a recognised source of pollution. It is not subject to Industrial Emissions Directive regulation or any other Environmental Protection Agency environmental regulatory consent. Should a major accident or natural disaster occur, the potential sources of pollution onsite during the construction, operational and decommissioning phases are limited and of low environmental risk. Sources with the potential to cause significant environmental pollution and associated negative effects such as bulk storage of hydrocarbons or chemicals, storage of wastes, management of flammable materials etc. are limited and so there is an inherent low level of environmental risk associated with major accident or natural disaster impacting the Proposed Development and causing environmental damage. The supporting Construction

and Environment Management Plan (CEMP) details the environmental management, mitigation and monitoring measures to prevent and minimise impacts of the construction phase of the Proposed Development on environmental receptors such as air and water quality, noise emissions and ecological and archaeological receptors.

Major industrial accidents involving dangerous substances pose a significant threat to humans and the environment; such accidents can give rise to serious injury to people or serious damage to the environment, both on and off the site of the accident. The Wind Farm site is not regulated or connected to or close to any site regulated under the Control of Major Accident Hazards Involving Dangerous Substances Regulations i.e. SEVESO sites and so there are no potential effects from this source. Mitigation and monitoring measures to avoid the resale of fuels and hazardous materials at the site during the construction phase are detailed in the CEMP.

The Proposed Development has low potential to cause natural disasters or major accidents. The site is relatively flat and so there is low risk for peat failure. Any risks associated with flooding, impacts on infrastructure, accidents etc are addressed in the Sections below.

Current EIA practice already includes an assessment of some potential accidents and disaster scenarios such as pollution incidents to ground and watercourses as well as assessment of flooding events and peat instability. These are described in detail in the relevant EIAR assessment chapters (Refer to Chapters 5 to 14 for further detail).

15.2.4.2 Site-Specific Risk Assessment Methodology

A site-specific risk assessment identifies and quantifies risks focusing on unplanned, but possible and plausible events occurring during the construction and operation of the Proposed Development. The approach to identifying and quantifying risks associated with the Proposed Development by means of a site-specific risk assessment is derived from the EPA 'Guidance on Assessing and Costing Environmental Liabilities' document¹. The following steps were taken as part of the site-specific risk assessment:

- Risk identification
- Risk classification, likelihood and consequence; and
- Risk evaluation

15.2.4.2.1 Risk Identification

Risks have been reviewed through the identification of reasonably foreseeable risks in consultation with relevant contributors to this EIAR (refer to *Statements of Authority* in Chapters 5 to 14 of this EIAR). The identification of risks has focused on rare but 'plausible incidents' that could occur at or as a result of the Proposed Development during construction and operation.

In accordance with the European Commission. (2017). Environmental Impact Assessment of Projects – Guidance on the preparation of Environmental Impact Assessment Reports, risks are identified in respect of the projects:

1. Potential to cause accidents and/or disasters,
2. Vulnerability to potential disaster/accident

15.2.4.2.2 Risk Classification

¹ EPA (2014) *Guidance on assessing and costing environmental liabilities*. Available at https://www.epa.ie/publications/compliance-enforcement/licensees/reporting/financial-provisions/EPA_OEE-Guidance-and-Assessing-WEB.pdf

Classification of Likelihood

After identifying the potential risks, the likelihood of occurrence of each risk has been assessed. An analysis of safety procedures and proposed environmental controls was considered when estimating likelihood of identified potential risks occurring. Table 15-1 defines the classification of likelihood ratings, sourced from the DoEHLG *Guide to Risk Assessment in Major Emergency Management*, that have been applied.

The approach adopted has assumed a ‘risk likelihood’ where one or more aspects of the likelihood description are met.

Table 15-1 Classification of Likelihood (Source: DoEHLG Guide to Risk Assessment in Major Emergency Management , 2010)

Ranking	Likelihood	Description
1	Extremely Unlikely	May occur only in exceptional circumstances; once every 500 or more years
2	Very Unlikely	Is not expected to occur; and/or no recorded incidents or anecdotal evidence; and/or very few incidents in associated organisations, facilities or communities; and / or little opportunity, reason or means to occur; may occur once every 100-500 years.
3	Unlikely	May occur at some time; and /or few, infrequent, random recorded incidents or little anecdotal evidence; some incidents in associated or comparable organisation’s worldwide; some opportunity, reason or means to occur; may occur once per 10-100 years.
4	Likely	Likely to or may occur; regular recorded incidents and strong anecdotal evidence and will probably occur once per 1-10 years
5	Very Likely	Very likely to occur; high level of recorded incidents and/or strong anecdotal evidence. Will probably occur more than once a year.

Classification of Consequence

The Impact rating assigned to each risk has assumed that all proposed mitigation measures and/or safety procedures have failed to prevent the major accident and/or disaster. Further the Meath County Council Major Emergency Plan and Westmeath Major Emergency Plan will work to reduce the consequence of any major accident or disaster. The consequence of the impact if the event occurs has been assigned as described in Table 15-2.

The impact of a risk from the Proposed Development has been determined where one or more aspects of the description are met.

Table 15-2 Classification of Impact (Source: DoEHLG, Guide to Risk Assessment in Major Emergency Management 2010)

Ranking	Likelihood	Impact	Description
1	Minor	Life, Health, Welfare Environment Infrastructure Social	Small number of people affected; no fatalities and small number of minor injuries with first aid treatment. No contamination, localised effects <€0.5M Minor localised disruption to community services or infrastructure (<6 hours).
2	Limited	Life, Health, Welfare Environment Infrastructure Social	Single fatality; limited number of people affected; a few serious injuries with hospitalisation and medical treatment required. Localised displacement of a small number of people for 6-24 hours. Personal support satisfied through local arrangements. Simple contamination, localised effects of short duration €0.5-3M Normal community functioning with some inconvenience.
3	Serious	Life, Health, Welfare Environment Infrastructure Social	Significant number of people in affected area impacted with multiple fatalities (<5), multiple serious or extensive injuries (20), significant hospitalisation. Large number of people displaced for 6-24 hours or possibly beyond; up to 500 evacuated. External resources required for personal support. Simple contamination, widespread effects or extended duration €3-10M Community only partially functioning, some services available.
4	Very Serious	Life, Health, Welfare Environment Infrastructure Social	5 to 50 fatalities, up to 100 serious injuries, up to 2000 evacuated. Heavy contamination, localised effects or extended duration €10-25M

			Community functioning poorly, minimal services available
5	Catastrophic	Life, Health, Welfare Environment Infrastructure Social	Large numbers of people impacted with significant numbers of fatalities (>50), injuries in the hundreds, more than 2000 evacuated. Very heavy contamination, widespread effects of extended duration. >€25M Serious damage to infrastructure causing significant disruption to, or loss of, key services for prolonged period. Community unable to function without significant support.

Risk Evaluation

Once classified, the likelihood and consequence ratings have been multiplied to establish a ‘risk score’ to support the evaluation of risks by means of a risk matrix.

The risk matrix sourced from the DoEHLG *Guide to Risk Assessment in Major Emergency Management* (and as outlined in Table 15-3) indicates the critical nature of each risk. This risk matrix has therefore been applied to evaluate each of the risks associated with the Proposed Development. The risk matrix is colour coded to provide a broad indication of the critical nature of each risk:

- The red zone represents ‘high risk scenarios’;
- The amber zone represents ‘medium risk scenarios’; and
- The green zone represents ‘low risk scenarios.’

Table 15-3 Classification of Impact (Source: DoEHLG, 2010)

		Consequence Rating				
		1. Minor	2. Limited	3. Serious	4. Very Serious	5. Catastrophic
Likelihood Rating	5. Very Likely	Green	Amber	Red	Red	Red
	4. Likely	Green	Amber	Amber	Red	Red
	3. Unlikely	Green	Green	Amber	Amber	Red
	2. Very Unlikely	Green	Green	Green	Amber	Amber
	1. Extremely Unlikely	Green	Green	Green	Green	Green

Baseline Environment

The Major Emergency Plans prepared by Westmeath and Meath County Councils outlines the following potential major emergency scenarios.

The risks which are most relevant to this assessment are described below:

1. Urban Flooding/ Flooding:
 - Applicable to urban areas within the functional area of Meath and Westmeath County Council.

2. Aircraft Collision/Loss:
 - Relevant to all air strips or aircraft within the functional area of Meath and Westmeath County Council

3. Water Contamination
 - Meath and Westmeath County Council Functional Area:

4. Fire/Major Crowd Safety and Civil Disorder
 - Meath and Westmeath County Council Functional Area

5. Major Road Traffic Accident/ Loss of Critical Infrastructure
 - M1, M3, M4 and M6 Motorway,
 - National Primary Routes – N2, N3, N4, N6, N51, N52, N55, N62
 - Iarnród Eireann
 - Shannon Waterway and associated bridges

6. Natural Gas Explosion along the main Dublin-Galway Gas Line
 - Applicable to sections of the line within the functional area of Meath and Westmeath County Council

7. Major Chemical incidents at industrial premises within the functional area of Offaly and Westmeath County Council:
 - The European Communities Control of Major Accident Hazards Involving Dangerous Substance Regulations, 2000, applies to sites where certain quantities of specified dangerous substances are present. These sites (SEVESO Sites) are classified as upper tier and lower tier. At present, there is one lower tier SEVESO Site within County Westmeath and two lower tier SEVESO sites within the functional area of Meath County Council. There is one Upper Tier establishments within the functional area of Meath County Council.

The risks which are most relevant to this assessment are described below.

15.3.1 Urban Flooding/Flooding

As detailed in Chapter 9 Water, no recurring or historic flood incidents are recorded within the Wind Farm site or along the Grid Connection route.

No recurring flood incidents within the Proposed Development boundary or immediately downstream were identified from OPW's Flood Hazard Mapping. The nearest location for recorded historical flood events is at Clonycavan, 300m east of the Proposed Development site.

Where complete, the CFRAM² Study OPW Flood Risk Assessment Maps are now the primary reference for flood risk planning in Ireland and supersede the PFRAM maps. CFRAM mapping is available for the area of the Proposed Development and Ballivor to the southeast.

No areas of the Proposed Development site are within a zone mapped as being either low (0.1% AEP²), medium (1% AEP) or high (10% AEP) probability of fluvial flooding. The closest mapped flood extent is 300m east of the site.

Based on the information gained through the flood identification process, the majority of the site is mapped within Flood Zone C and areas in the northwest of Lisclogher Bog are mapped within Fluvial Flood Zone A. All Proposed Development locations (with the exception of watercourse crossing) are at least 300m from a watercourse.

The overall risk of flooding posed at the development site is estimated to be low, and all proposed infrastructure will be located at or above Flood Zone C elevations.

A low risk would typically relate to the probability of being impacted by a 1000-year flood (*i.e.*, the majority of the Proposed Development footprint located in fluvial Flood Zone C). The flooding risk at the Wind Farm Site has an estimated AEP of <0.1%.

CFRAM mapping includes modelled flood levels for the 10-year and 100-year flood events. These levels, modelled near Ballivor village, range from 64.19 – 65.34m OD and are well above the current outfall pipe elevations of the Proposed Development site (67.97 – 79.13m OD). Therefore, the risk of fluvial flooding along the Ballivor River, located to the east of the site, backing up into the site drainage network is very low.

The proposed substation infrastructure is particularly sensitive to flooding. A site-specific flood analysis has been completed for the substation location. Conservative volumetric analysis has determined the peak flood levels at the proposed substation location site for 100-yr and 1000-yr rainfall events to be 74.3 and 74.6m OD respectively. The primary control in the analysis is the expanse of the bog in Carranstown West which needs to fill with pluvial flood water before the substation site can flood. It is therefore recommended to give the substation a floor level of >74.9m OD (74.6m OD + 0.3m freeboard). At this elevation the risk of flooding at the substation site is negligible.

The risk of the wind farm contributing to downstream flooding is also very low, as the long-term plan is to implement Bord na Móna's Decommissioning and Rehabilitation Plans (Appendix 6-6) at the Wind Farm Site. In addition to this, the Peatland Climate Action Scheme (PCAS) peatland rehabilitation will be undertaken at selected bogs across the Bord na Móna bog group with Carranstown East already complete and Bracklin West commencing (PCAS) in 2023. The scheme is a form of enhanced and accelerated peatland rehabilitation and stabilisation which also comprises drain blocking measures to encourage bog rewetting. These plans aim to stabilise and rehabilitate the peat bogs by placing the existing peatland environments on a path towards naturally functioning peatlands. With the

² CFRAM is Catchment Flood Risk Assessment and Management. The national CFRAM programme commenced in Ireland in 2011, and is managed by the OPW. The CFRAM Programme is central to the medium to long-term strategy for the reduction and management of flood risk in Ireland.

² AEP is the annual exceedance probability.

implementation of the rehabilitation plans and PCAS, surface water runoff from the Ballivor Bog Group will be reduced, thereby decreasing the downstream flood risk. Furthermore the Proposed Development will be constructed with its own drainage system which will provide additional surface water attenuation. The cumulative effect of the Proposed Development and the Decommissioning and Rehabilitation Plans is that there will be a reduced risk of fluvial flooding downstream of the proposed site. The overall risk of flooding posed at the proposed site is assessed to be low, and all proposed infrastructure will be located at or above Flood Zone C elevations. Please refer to the Chapter 9 Water of this EIAR for further details.

15.3.2 Aircraft Collision/Loss:

The Proposed Development will not utilise air strips or aircraft for the delivery of turbine components. Delivery of turbines and their associated components will be via the national and local road network.

The Proposed Development has the potential to affect aviation due to the erection of manmade structure in excess of 45 metres that may constitute an obstacle to air navigation. These impacts are addressed in detail in Chapter 14 of this EIAR: Material Assets. The scoping response from the Irish Aviation Authority (IAA) set out lighting requirements for turbines. These requirements will be complied with for the Proposed Development, and appropriate lighting will be installed on the turbines to ensure high visibility and to reduce the likelihood of collision. Any further details will be agreed in advance of construction with the IAA. The coordinates and elevations for built turbines will be supplied to the IAA, as is standard practice for wind farm developments.

The Grid Connection will not affect any air strips of or aircraft during both its construction or operational phase.

15.3.3 Water Contamination

The Proposed Development has the potential to cause contamination and pollution of groundwater and surface water from potential release of hydrocarbons, earthworks and excavations on Site. These impacts are addressed in detail in the Chapter 9 of this EIAR. The release of wastewater at the Wind Farm Site and along the Grid Connection underground electrical cabling route can pose a risk to down gradient groundwater wells, groundwater quality and surface water quality. Proven and effective methods to mitigate against these potential impacts have been outlined in Chapter 9 of this EIAR which will break the potential pathways between any source and receptor. Indirect impacts associated with major accidents and/or natural disasters on contamination are considered further in Section 15.4.

15.3.4 Fire / Major Crowd Safety and Civil Disorder

Bog fires can naturally occur due to dry weather conditions. Although rare, these fires can occur in extreme dry weather events which lead to the spontaneous ignition of peat (particularly if the water table has been lowered), bog scrub and heathers and in rarer occurrences, peat stockpiles can ignite. Additionally, bog fires can occur through the spread of fire from adjacent landholdings into the bog sites.

Since 2000, it has been a condition of the IPC licenses that fires are reported to the EPA in the Annual Environmental Reports A bog fire occurred at Lislogher-West (adjacent to the Wind Farm Site) and Lislogher in 2008. These fires occurred due to dry weather conditions. In both cases, the EPA was contacted, and corrective measures were put in place and the fires were brought under control. No Bord na Móna staff or third parties were involved in the outbreak of the fire and the fires were contained by Bord na Móna staff within the site boundary.

During the historical peat activities onsite, there was an increased potential for outbreak due to the presence of vehicles on site and the regular use of locomotives throughout the bogs. However, peat

extraction ceased in June 2020 and site activities today comprise onsite management and environmental monitoring, wind measurement and the removal of existing peat stockpiles from the bogs as required under IPC licence. Therefore, the potential for human-related fire outbreak at the site has decreased significantly.

It is a condition of the IPC licence that the licensee produce draft Cutaway Bog Decommissioning and Rehabilitation Plans (Appendix 6-6). These plans describe the peatland rehabilitation measures that will be implemented, upon agreement with the EPA, across all bogs to facilitate the environmental stabilisation of the bogs. The main rehabilitation measure involves the rewetting of the bogs via drain blocking which will raise the water levels of the bogs and encourage the natural recolonisation of bog vegetation.

In addition to the IPC rehabilitation plans, the selected Bord na Móna lands are included in the Peatland Climate Action Scheme (PCAS). This enhanced peatland rewetting rehabilitation scheme is administered by the Department of Environment, Climate and Communications (DECC), the EPA and the NPWS. This scheme has been completed at Carranstown East and is due to commence at Bracklin West in 2023.

Both the IPC and PCAS peatland rehabilitation schemes will result in the restoration of the water levels and bog skin (vegetation top layer), and ultimately facilitate the restoration of the bogs natural carbon sink function. Additionally, the rewetting and recolonisation of bog habitats reduce the potential for fire outbreak, whether through auto-ignition or by human interference.

Furthermore, both the IPC and PCAS peatland rehabilitation schemes can be, and have been, successfully implemented at wind farm sites e.g. Cloncreen Wind Farm and Mount Lucas Wind Farm. Wind Farm infrastructure at former industrial peat extraction sites such as at the proposed Ballivor Wind Farm site, Cloncreen and Mount Lucas, take up generally 3-5% of the sites area with the remaining land used for rehabilitation. As such, peatland rehabilitation in the form of bog rewetting and renewable energy infrastructure can and do operate harmoniously onsite while both actively contributing to carbon offsetting, which in turn can contribute to regional and national carbon reduction goals.

During construction of the Proposed Development, all staff will be made aware of and adhere to the Health & Safety Authority’s ‘Guidelines on the Procurement, Design and Management Requirements of the Safety, Health and Welfare at Work (Construction) Regulations 2013’. This will encompass the use of all necessary Personal Protective Equipment and adherence to the site Health and Safety Plan. An Emergency Response Plan (ERP) which will be prepared prior to the construction phase and implemented and adhered to on site. The ERP provides details of procedures to be adopted in the event of an emergency in terms of site health and safety and environmental protection. Please see Chapter 4 Description and Appendix 4-3 CEMP for details.

15.3.5 **Major Road Traffic Accident/ Severe Weather and Loss of Critical Transport Infrastructure**

The Proposed Development will utilise the existing road network during the construction phase. Construction related traffic will originate from the delivery of materials to Site and transport of employees to, from and throughout the Site.

It is proposed that large wind turbine components will be delivered to the site of the Proposed Development, under Garda escort.

Potential impacts that may occur on the identified road networks could be caused by an accident during the delivery of the turbines, collisions onsite and offsite with vehicles involved in construction and operation of Proposed Development, and damage to critical transport infrastructure caused by extreme weather i.e. periods of heavy rainfall, taking into account climate change and strong winds.

As detailed in Section 14.1 Traffic and Transport in Chapter 14 of this EIAR: Material Assets, the localised traffic disruptions as a result of other proposed works will be mitigated through the use of industry

standard traffic management measures. These traffic management measures will be designed in accordance with the Department of Transport's 'Guidance for the Control and Management of Traffic at Roadworks – Second Edition (2010)'.

15.3.6 Loss of Critical Infrastructure

EirGrid operates and develops Ireland's electricity grid. This includes interconnecting to neighbouring grids and running the wholesale electricity market. The grid safely brings power from generators such as wind farms to the ESB network that supplies homes and business in Ireland. It also brings power directly to large energy users. There are two types of electricity generation: synchronous generation and non-synchronous generation. Synchronous generation produces the same amount of electricity all the time e.g., fossil fuels. Non-synchronous generation produces a varying amounts of electricity depending on the energy available. Eirgrid operate the grid from National Control Centres (NCCs) in Dublin and Belfast, matching electricity production to customer demand, switching from synchronous to non-synchronous where required to ensure no power outages. Therefore, any technical fault at the Proposed Development would not impact the local or national energy supply.

The Proposed Development will connect to the national grid through an onsite 110kV substation which will be situated under the existing Mullingar-Corduff 110 kV transmission line.

15.3.7 Natural Gas Explosion

There are no gas pipelines located within or adjacent to the Wind Farm Site.

15.4 Risk Assessment

This section outlines the possible risks associated with the Proposed Development for the construction, operation and decommissioning phases.

These risks have been assessed in accordance with the relevant classification as outlined in Table 15-1 and Table 15-2.

As outlined above, the consequence rating assigned to each potential risk assumes that all proposed mitigation measures and safety procedures have failed to prevent the major accident and/or disaster.

15.4.1 Likely Significant Effects and Mitigation Measures

15.4.1.1.1 Do-Nothing Scenario

If the Proposed Development were not to proceed, the site would continue to be managed under the requirements of the relevant IPC licence and therefore the ongoing site management and environmental monitoring, peat stockpile removal (due to be completed by 2024), and wind measurement would continue. In addition, if the Proposed Development were not to proceed, the implementation of peatland rehabilitation plans as required under IPC License would occur. Likewise, the PCAS scheme in adjacent Bogs (where selected) would continue to be implemented. These land uses and activities will also continue if the Proposed Development does proceed.

If the Proposed Development were not to proceed, the potential for fire outbreak whether through auto-ignition or by human interference would still be reduced due to the IPC and PCAS peatland rehabilitation schemes due to the restoration of the water levels and vegetation both of which reduce the potential for fire outbreak.

If the Proposed Development were not to proceed, the carbon savings as a result of the proposed Ballivor Wind Farm combined with the rehabilitated peatlands would be lost as would the contribution to the national goal of achieving a climate neutral Ireland by 2050 as set out in the Climate Action and Low Carbon Development (Amendment) Act 2021.

If the Proposed Development were not to proceed, road safety works to address the current visual impediment along the R156 may not be addressed in the near future.

15.4.1.1.2 Assessment of Effects During Construction

A risk register has been developed which contains all potentially relevant risks identified during the construction phase of the Proposed Development. Six risks specific to the construction of the Proposed Development have been identified and are presented in Table 15-5.

Table 15-4 Risk Register - Construction Phase

Risk ID	Potential Risk	Possible Cause
Potential vulnerability to disaster risks		
A	Severe Weather Risk to construction activity on site	Extreme weather- periods of heavy rainfall, taking into account climate change and strong winds

B	<p>Flooding</p> <p>High levels of surface water on site</p>	<p>Extreme weather- periods of heavy rainfall, taking into account climate change and strong winds</p>
C	<p>Peat Stability</p> <p>Movement of peat within the site during construction</p>	<p>Mismanagement of excavated material on site</p> <p>Severe weather conditions- storm, flooding</p>
<p>Potential to cause accidents and / or disasters.</p>		
D	<p>Traffic Incident</p> <p>Collisions onsite and offsite with vehicles involved in construction of Proposed Development</p>	<p>Driver negligence or failure of vehicular operations on site roads.</p> <p>Traffic Management Plan not implemented</p>
E	<p>Contamination</p> <p>Discharge or spillage of fuel, chemical solvents into watercourse or percolated to groundwater</p>	<p>Fuel spillage during delivery to site.</p> <p>Failure of fuel storage tank or tanks in plant and machinery and vehicles.</p> <p>Drainage and seepage water resulting from infrastructure excavation;</p> <p>Stockpiled excavated material providing a point source of exposed sediment;</p> <p>Construction of the Proposed Development cable trench resulting in entrainment of sediment from the excavations during construction; and,</p> <p>Erosion of sediment from emplaced site drainage channels.</p>
F	<p>Industrial Accident- Fire</p>	<p>Equipment or infrastructure failure;</p> <p>Electrical problems; and</p> <p>Employee negligence.</p>

Bog Fires

As discussed in section 15.3.4, fires can occur on industrial peatlands where the water tables have been lowered i.e. drained for production, through human interference (improper use or accidents involving machinery, fuels, locomotives), autoignition of scrub and spread of fires into bogs from adjacent lands.

During the construction phase, the mitigation measures outlined below in 15.4.3 will be adhered and all best practise measures and mitigation as detailed in the accompanying CEMP will be implemented.

15.4.1.1.3 Assessment of Effect During Operation

Six risks specific to the operation of the Proposed Development have been identified and are presented in Table 15-6.

Table 15-5 Risk Register – Operational Phase

Risk ID	Potential Risk	Possible Cause
Potential vulnerability to disaster risks		
G	Contamination Discharge or spillage of fuel, chemical solvents, sewage or wastewater into watercourse or percolated to groundwater	A vehicular incident on the public road involving fuel, wastewater or sewage transportation in the operational phase.
Potential to cause accidents and / or disasters.		
H	Industrial Accident - Fire /	Equipment or infrastructure failure; Electrical problems; and Employee negligence. Petrochemical Fires causing personal injury, structural damage and forest fires.
I	Collapse/ damage to structures	Earthquakes; and Vehicular collisions due to driver negligence on public roads.
J	Traffic Incident Collisions onsite and offsite with vehicles involved in operation of Proposed Development	Driver negligence or failure of vehicular operations on site roads. Traffic Management not implemented
K	Loss of Critical Infrastructure	Electrical fault at substation bay

Bog Fires

During the operational phase, the peatland rehabilitation measures as required under IPC licence will be implemented at all bogs. Furthermore, the PCAS rehabilitation measures have been implemented at Carranstown East and will be completed at Bracklin West by the end of 2023. These rehabilitation measures comprise the rewetting of the bogs through drainage blocking which will subsequently encourage the recolonisation of bog vegetation at the site. the restoration of the natural conditions will continue over the lifetime of the operational phase. An indirect benefit of the peatland rehabilitation measures as the potential for fire outbreak is considerably reduced.

As discussed in section 15.3.4, fires can occur on industrial peatlands where the water tables have been lowered i.e. drained for production, through human interference (improper use or accidents involving machinery, fuels, locomotives), autoignition of scrub and spread of fires into bogs from adjacent lands.

In addition to the above, the monitoring measures are outlined below in 15.4.3 will be adhered and all best practise measures and monitoring as detailed in the accompanying CEMP will be implemented.

15.4.1.1.4 Assessment of Effect During Decommissioning

Four risks specific to the decommissioning of the Proposed Development have been identified and are presented in Table 15-7.

Table 15-6 Risk Register – Decommissioning Phase

Risk ID	Potential Risk	Possible Cause
Potential vulnerability to disaster risks		
M	Severe Weather Risk to decommissioning activity on site	Extreme weather- periods of heavy rainfall, taking into account climate change and strong winds
N	Flooding of site High levels of surface water on site	Extreme weather- periods of heavy rainfall, taking into account climate change and strong winds
Potential to cause accidents and / or disasters.		
O	Traffic Incident Collisions onsite and offsite with vehicles involved in construction of Proposed Development	Driver negligence or failure of vehicular operations on site roads. Traffic Management not implemented
P	Contamination Discharge or spillage of fuel, chemical solvents into watercourse or percolated to groundwater	Fuel spillage during delivery to site. Failure of fuel storage tank or tanks in plant and machinery and vehicles. Drainage and seepage water resulting from infrastructure excavation; Erosion of sediment from emplaced site drainage channels.
Q	Industrial Accident - Fire	Fires causing personal injury, structural damage and forest fires.
R	Loss of Critical Infrastructure	Electrical fault at substation bay

Bog Fires

The potential for bog fires during the decommissioning phase is considered to be lower than the risk during the construction phase as some infrastructure e.g. substation will remain insitu and some elements of the construction phase e.g. borrow pits will not be required and therefore the associated construction vehicles will not be needed. More specifically however, the results of the peatland rehabilitation measures will likely be fully realised at the end of the 30-year operational phase and therefore the potential for bog fires during the decommissioning phase will be reduced further. All mitigation measures are outlined below in 15.5.2 will be adhered and all best practise measures and monitoring as detailed in the accompanying CEMP will be implemented.

15.4.2 Risk Assessment Summary

These risks have been assessed in accordance with the relevant classification (Refer to Table 15-1 and Table 15-2) and the resulting risk analysis is given in Table 15-6.

The risk register is based upon possible risks associated the Proposed Development. As outlined in Section 15.2.4.2, the consequence rating assigned to each potential risk assumes that all proposed mitigation measures and safety procedures have failed to prevent the major accident and/or disaster.

15.4.2.1.1 Assessment of Effect – Summary

Table 15-7 Risk Assessment

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
Construction Phase								
A	Severe Weather	Extreme weather-periods of heavy rainfall, taking into account climate change and strong winds	Illness or loss of life; Sedimentation of nearby watercourse Damage to, or depletion of aquatic habitats and species;	3	The risk of severe weather is unlikely when considering the assessment in Chapter 10 and weather conditions recorded over the last 30 years within the area.	1	The risk of severe weather conditions during the construction phase will result in a minor consequence in that ‘small number of people would be affected’ should a severe weather occur, with ‘no fatalities and a small number of minor injuries with first aid treatment’. No contamination, localised effects.	3
B	Flooding	Extreme weather-periods of heavy rainfall, taking into account climate	Illness or loss of life; Sedimentation of nearby watercourse	2	The risk of flooding is considered very unlikely when taking into account the baseline assessment in Chapter 9 of the EIAR	1	The risk of flooding during the construction phase will result in a minor consequence in that ‘small number of	2

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
		change and strong winds	Damage to, or depletion of aquatic habitats and species;		and due to no recurring or historic flood incidents being recorded within the Wind Farm site or along the Grid Connection route.		people would be affected' should a severe weather occur, with 'no fatalities and a small number of minor injuries with first aid treatment'. No contamination of environment (e.g. watercourses), localised effects.	
C	Peat Stability	Mismanagement of excavated material on site Extreme weather conditions	Movement of peat within the site; Sedimentation of nearby watercourse; Damage to, or depletion of aquatic habitats and species;	2	The Proposed Development has been designed to minimise the potential for peat instability and failure. Refer to Appendix 8-1: Geotechnical and Peat Stability Assessment Report	2	The risk of peat instability during the construction phase will result in a limited consequence in that there would be 'a limited number of people affected' with 'localised effects of short duration'. Simple contamination of environment (e.g. watercourses), localised effects of short duration.	2
D	Traffic Incident	Driver negligence or failure of	Injury or loss of life.	3	A limited number of vehicles will be	1	A minor consequence is predicted. Having	3

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
		vehicular operations on site roads. Traffic Management not implemented or not adhered			permitted on the site as part of the construction phase. As such, it can be determined that there is some ‘opportunity, reason or means’ for a vehicle collision to occur on site, ‘at some time.’ An unlikely risk is therefore predicted.		regard to on-site speed limits and vehicular movements, a ‘small number of people would be affected’ should a vehicular collision occur, with ‘no fatalities and small number of minor injuries with first aid treatment.’	
E	Contamination	Fuel spillage during delivery to site. Failure of fuel storage tank or tanks in plant and machinery and vehicles. Drainage and seepage water resulting from infrastructure excavation;	Damage to, or depletion of aquatic habitats and species Release of suspended solids to surface watercourses and could result in an increase in the suspended sediment load, resulting in increased turbidity which in turn could affect the water quality and fish stocks of downstream water bodies	2	As outlined in Chapter 4 and the CEMP Appendix 4-3, fuel will be stored on-site but in a bunded area to ensure containment and prevent spillages of fuel. No fuels, chemicals or solvents will be stored outside of the confines of the site. Setback distances from sensitive hydrological features means that adequate room is maintained for the	2	The risk of a fuel spillage or impact on surround drainage during the construction will result in a limited consequence in that there would be ‘a limited number of people affected’ with ‘localised effects of short duration’ through the use of bunded containment areas and proposed drainage mitigation measures during construction.	4

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
		<p>Stockpiled excavated material providing a point source of exposed sediment;</p> <p>Construction of the Proposed Development resulting in entrainment of sediment from the excavations during construction; and,</p> <p>Erosion of sediment from emplaced site drainage channels</p>			proposed drainage mitigation measures as detailed in Chapter 9 Water.		Simple contamination of environment (e.g. watercourses), localised effects of short duration.	
F	Industrial Accident -Fire	<p>Equipment or infrastructure failure;</p> <p>Fuel spillage/storage</p>	<p>Illness or loss of life;</p> <p>Damage to, or depletion of habitats and species; and</p>	2	As outlined in Chapter 4 Description and Appendix 4-3 CEMP, fuel will not be stored on-site post construction therefore fuel is not	2	Should a fire/explosion occur at the site, a limited consequence in that there would be ‘a limited number of people affected’ with ‘localised effects of short	4

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
		Electrical problems; and Employee negligence	Impacts on ambient air quality.		considered to be a significant fire risk. In accordance with Chapter 19 of the Safety, Health and Welfare at Work Act 2005 (the 2005 Act), the development shall be subject to a fire safety risk assessment which would assist in the identification of any major risks of fire on site.		duration' due to the nature of the project and the lack of infrastructure or fuel storage during operation that would result in any such incident. There will be 'normal community functioning' in the area with 'some inconvenience'. Simple contamination of environment (e.g. watercourses), localised effects of short duration.	
X1	Bog Fire (excluding human interference covered in F above)	Spontaneous Spread from neighbouring lands	Illness or loss of life; Damage to, or depletion of habitats and species; and Impacts on ambient air quality.	1	Spontaneous bog fires/bog fire spread is rare (2 small, contained fire occurrences in 23 years). Best Practise measures as detailed in the CEMP will be implemented during the construction phase.	1	Bog fires caused by autoignition or due to spread from neighbouring lands tend to be small in nature and can be contained much more easily than fires caused by explosion. Negligible contamination of environment (e.g.	2

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
							watercourses), localised effects of temporary duration.	
Operational Phase								
G	Contamination	A vehicular incident, refuelling incident, wastewater or sewage transportation in the operational phase.	Damage to, or depletion of aquatic habitats and species Release of suspended solids to surface watercourses and could result in an increase in the suspended sediment load, resulting in increased turbidity which in turn could affect the water quality and fish stocks of downstream water bodies	2	As outlined in Chapter 4 Description and Appendix 4-3 CEMP, fuel will be stored on-site but in a bunded area to ensure containment and prevent spillages of fuel. No fuels, chemicals or solvents will be stored outside of the confines of the site. Setback distances from sensitive hydrological features means that adequate room is maintained for the proposed drainage measures as detailed in Chapter 8	2	The risk of a fuel spillage or impact on surrounding drainage during the operational stage will result in a limited consequence in that there would be ‘a limited number of people affected’ with ‘localised effects of short duration’ through the use of bunded containment areas during operation. Simple contamination of environment (e.g. watercourses), localised effects of short duration.	4

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
H	Industrial Accident - Fire	Equipment or infrastructure failure; Fuel spillage/storage Electrical problems; and Employee negligence	Illness or loss of life; Damage to, or depletion of habitats and species; and Impacts on ambient air quality.	2	As outlined in Chapter 4, fuel will not be stored on-site post construction therefore fuel is not considered to be a significant fire risk. In accordance with Chapter 19 of the Safety, Health and Welfare at Work Act 2005 (the 2005 Act), the development shall be subject to a fire safety risk assessment which would assist in the identification of any major risks of fire on site.	2	Should a fire/explosion occur at the site, a limited consequence in that there would be ‘a limited number of people affected’ with ‘localised effects of short duration’ due to the nature of the project and the lack of infrastructure or fuel storage during operation that would result in any such incident. There will be ‘normal community functioning’ in the area with ‘some inconvenience’. Simple contamination of environment (e.g. watercourses), localised effects of short duration.	4
I	Collapse/ damage to structures	Landslide/ Earthquake; and	Injury or loss of life. Movement of peat within the site;	2	According to the Irish National Seismic Network (INSN), earthquakes measuring	1	The risk of infrastructure collapse or damage to structures during the construction phase will	1

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
		<p>Extreme weather conditions such as flooding and storms.</p> <p>Vehicular collisions due to driver negligence</p> <p>Mismanagement of excavated material on site</p>	<p>Sedimentation of nearby watercourse;</p> <p>Damage to, or depletion of aquatic habitats and species;</p>		<p>~2 on the Richter Scale are “normal” in terms of seismicity in Ireland. These are known as microearthquakes; they are not commonly felt by people and are generally recorded only on local seismographs. As such, buildings in Ireland are extremely unlikely to be damaged or collapse due to seismic activity.</p> <p>Having regard to public speed limits within the site, it is not predicted that any collision of vehicles and any infrastructure would result in significant damage/collapse.</p> <p>The Proposed Development has been designed to take into account any issues on peat or spoil stability</p>		<p>result in a minor consequence in that ‘small number of people would be affected, with ‘no fatalities and a small number of minor injuries with first aid treatment’.</p> <p>No contamination of environment (e.g. watercourses), localised effects.</p>	

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
J	Traffic Incident	Driver negligence or failure of vehicular operations on site roads. Traffic Management not implemented	Injury or loss of life.	3	A limited number of vehicles will be permitted on the site as part of the operation phase. As such, it can be determined that there is some ‘opportunity, reason or means’ for a vehicle collision to occur on site, ‘at some time.’ An unlikely risk is therefore predicted.	1	A minor consequence is predicted. Having regard to on-site speed limits and vehicular movements, a ‘small number of people would be affected’ should a vehicular collision occur, with ‘no fatalities and small number of minor injuries with first aid treatment.’	3
K	Loss of Critical Infrastructure	Equipment or infrastructure failure; Electrical problems; and Employee negligence Landslide/ Earthquake; and	Injury or loss of life	1	Eirgrid operate the grid from National Control Centres matching electricity production to customer demand, switching from synchronous to non-synchronous where required to ensure no power outages. The Proposed Development will be	2	Should a power failure occur at the proposed 110kV substation, it will result in a limited number of people affected- localised effects of short duration.	2

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
		Extreme weather conditions such as flooding and storms.			connected to a single bay at the proposed 110kV substation, and any shortages or failures will not impact other connections to the same substation			
X2	Bog Fire (excluding human interference covered in H above)	Spontaneous Spread from neighbouring lands	Illness or loss of life; Damage to, or depletion of habitats and species; and Impacts on ambient air quality.	1	Peatland rehabilitation measures in the form of bog rewetting reduce the potential for bog fires considerably. Spontaneous bog fires/bog fire spread is rare (2 small, contained fire occurrences in 23 years). Best Practise measures as detailed in the CEMP will be implemented during the operational phase.	1	Peatland rehabilitation measures in the form of bog rewetting reduce the potential for bog fires considerably. Bog fires caused by autoignition or due to spread from neighbouring lands tend to be small in nature and can be contained much more easily than fires caused by explosion. Negligible contamination of environment (e.g. watercourses), localised	2

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
							effects of temporary duration.	
Decommissioning Phase								
L	Severe Weather	Extreme weather-periods of heavy rainfall, taking into account climate change and strong winds	Illness or loss of life; Sedimentation of nearby watercourse Damage to, or depletion of aquatic habitats and species;	2	The risk of severe weather is unlikely when considering the assessment in Chapter 10 and weather conditions recorded over the last 30 years within the area.	1	The risk of severe weather conditions during the decommissioning phase will result in a minor consequence in that 'small number of people would be affected' should a severe weather occur, with 'no fatalities and a small number of minor injuries with first aid treatment'. No contamination of environment (e.g. watercourses), localised effects.	2
M	Flooding	Extreme weather-periods of heavy rainfall, taking into account climate	Illness or loss of life; Sedimentation of nearby watercourse	2	The risk of flooding is considered very unlikely when taking into account the baseline assessment in Chapter 8 of the EIAR	1	The risk of flooding during the decommissioning phase will result in a minor consequence in that	2

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
		change and strong winds	Damage to, or depletion of aquatic habitats and species;		and due to no recurring or historic flood incidents are recorded within the Wind Farm site or along the Grid Connection route.		‘small number of people would be affected’ should a severe weather occur, with ‘no fatalities and a small number of minor injuries with first aid treatment’. No contamination of environment (e.g. watercourses), localised effects.	
N	Traffic Incident	Driver negligence or failure of vehicular operations on site roads. Traffic Management not implemented	Injury or loss of life.	3	A limited number of vehicles will be permitted on the site as part of the decommissioning phase. As such, it can be determined that there is some ‘opportunity, reason or means’ for a vehicle collision to occur on site, ‘at some time.’ An unlikely risk is therefore predicted.	1	A minor consequence is predicted. Having regard to on-site speed limits and vehicular movements, a ‘small number of people would be affected’ should a vehicular collision occur, with ‘no fatalities and small number of minor injuries with first aid treatment.’	3

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
O	Contamination	<p>Fuel spillage during delivery to site.</p> <p>Failure of fuel storage tank or tanks in plant and machinery and vehicles.</p> <p>Drainage and seepage water resulting from infrastructure removal;</p> <p>Erosion of sediment from site drainage channels.</p>	<p>Damage to, or depletion of aquatic habitats and species</p> <p>Release of suspended solids to surface watercourses and could result in an increase in the suspended sediment load, resulting in increased turbidity which in turn could affect the water quality and fish stocks of downstream water bodies</p>	2	<p>As outlined in Chapter 4, fuel will be stored on-site but in a bunded area to ensure containment and prevent spillages of fuel. No fuels, chemicals or solvents will be stored outside of the confines of the site.</p> <p>Setback distances from sensitive hydrological features means that adequate room is maintained for the proposed drainage measures as detailed in Chapter 8</p>	2	<p>The risk of a fuel spillage or impact on surrounding drainage during the operational stage will result in a limited consequence in that there would be ‘a limited number of people affected’ with ‘localised effects of short duration’ through the use of bunded containment areas during operation.</p> <p>Simple contamination of environment (e.g. watercourses), localised effects of short duration.</p>	4
P	Industrial Accident- Fire	<p>Equipment or infrastructure failure;</p> <p>Fuel spillage/storage</p>	<p>Injury or loss of life</p> <p>Structural damage</p> <p>Forest fires</p> <p>Air Pollution</p>	2	<p>As outlined in Chapter 4, fuel will not be stored on-site post construction therefore fuel is not considered to be a significant fire risk.</p>	2	<p>Should a fire/explosion occur at the site, a limited consequence in that there would be ‘a limited number of people affected’ with ‘localised effects of short duration’ due to the</p>	4

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
		Electrical problems; and Employee negligence	Damage to, or depletion of habitats and species Contamination		In accordance with Chapter 19 of the Safety, Health and Welfare at Work Act 2005 (the 2005 Act), the development shall be subject to a fire safety risk assessment which would assist in the identification of any major risks of fire on site.		nature of the project and the lack of infrastructure or fuel storage during operation that would result in any such incident. There will be 'normal community functioning' in the area with 'some inconvenience'. Simple contamination of environment (e.g. watercourses), localised effects of short duration.	
Q	Loss of Critical Infrastructure	Equipment or infrastructure failure; Electrical problems; and Employee negligence Landslide/ Earthquake; and	Injury or loss of life	1	Eirgrid operate the grid from National Control Centres matching electricity production to customer demand, switching from synchronous to non-synchronous where required to ensure no power outages. The Proposed Development will be	2	Should a power failure occur at the proposed 110kV substation, it will result in a limited number of people affected- localised effects of short duration.	2

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
		Extreme weather conditions such as flooding and storms.			connected to a single bay at the proposed 110kV substation, and any shortages or failures will not impact other connections to the same substation			
X3	Bog Fire (excluding human interference covered in P above)	Spontaneous Spread from neighbouring lands	Illness or loss of life; Damage to, or depletion of habitats and species; and Impacts on ambient air quality.	1	Peatland rehabilitation measures in the form of bog rewetting reduce the potential for bog fires considerably. Spontaneous bog fires/bog fire spread is rare (2 small, contained fire occurrences in 23 years). Best Practise measures as detailed in the CEMP will be implemented during the decommissioning phase.	1	Peatland rehabilitation measures in the form of bog rewetting reduce the potential for bog fires considerably. Bog fires caused by autoignition or due to spread from neighbouring lands tend to be small in nature and can be contained much more easily than fires caused by explosion. Negligible contamination of environment (e.g. watercourses), localised effects of temporary duration.	2

The risk assessment for each of the potential risks identified are consolidated in Table 15-9 which provides their ‘risk score.’ A corresponding risk matrix is provided in Table 15-10, which is colour coded in order to provide an indication of the critical nature of each risk. As outlined in Section 15.2.4.2, the red zone represents ‘high risk’ scenarios’, the amber zone represents ‘medium risk scenarios and the green zone represents ‘low risk scenarios.

Table 15-8 Risk Scores

Risk ID	Potential Risk	Likelihood Rating	Consequence Rating	Risk Score
Construction Phase				
A	Severe Weather	2	1	2
B	Flooding	2	1	2
C	Peat Stability	1	2	2
D	Traffic Incident	3	1	3
E	Contamination	2	2	4
F	Industrial Accident	2	2	4
Operational Phase				
G	Contamination	2	2	4
H	Industrial Accident	2	2	4
I	Collapse/ damage to structures	2	1	1
J	Traffic Incident	2	1	2
K	Loss of Critical Infrastructure	1	2	2
Decommissioning Phase				
L	Severe Weather	2	1	2
M	Flooding	2	1	2
N	Traffic Incident	3	1	3
O	Contamination	2	2	4
P	Industrial Accident	2	2	4
Q	Loss of Critical Infrastructure	1	2	2

Table 15-9 Risk Matrix

		Consequence Rating				
		1. Minor	2. Limited	3. Serious	4. Very Serious	5. Catastrophic
Likelihood Rating	5. Very Likely					
	4. Likely					
	3. Unlikely	D,N				
	2. Very Unlikely	A,I,L,J,M	B,E,F,G,H,O,P			
	1. Extremely Unlikely		C,K,Q			

Table 15-10, presents the potential risks identified during the construction, operation and decommissioning of the Proposed Development all or which can be classified as ‘low risk scenarios.’

The scenario with the highest risk score in terms of a major accident and/or natural disaster during the construction, operation and decommissioning phase of the Proposed Development is identified below:

Peat Stability During Construction

There is a potential risk of peat instability during the construction of the proposed development. The risk of peat instability was given a risk score of 2. The risk of peat instability has been minimised through the careful design of the Proposed Development as well as the flat landscape on which the site is located and will be further limited through the implementation of the best practice construction control measures outlined in Appendix 8-1 of the EIAR.

The risk of peat instability is ‘very unlikely’ to occur and will have ‘limited’ consequences should it do so, representing a ‘low-risk scenario’ during the construction phase.

Contamination During Construction, Operation and Decommissioning

There is a potential risk of contamination from site activities during the construction, operation and decommissioning phases from potential release of hydrocarbons. The risk of contamination was given a risk score of 4. However, as outlined in Chapter 4, measures are proposed and will be put in place to reduce the risk of accidental spillage and contamination of pollution risk to groundwater, surface water and associated ecosystems, and to terrestrial ecology.

The risk of contamination is ‘very unlikely’ to occur and will have ‘limited’ consequences should it do so, representing a ‘low-risk scenario’ during the construction, operation and decommissioning phases.

Industrial Accident-Fire During Construction, Operation and Decommissioning

There is a potential risk of fire/explosion at the Proposed Development site. However, as outlined in Section 15.2.4, the scope of this assessment has been based on the understanding that the Proposed Development will be designed, built and operated in line with current best practice. Further, in accordance with Chapter 19 of the Safety, Health and Welfare at Work Acts 2005 to 2014, the Proposed Development shall be subject to a fire safety risk assessment which will assist in the identification of any major risks of fire on site.

Therefore, the risk of fire occurring at the Proposed Development resulting in a major accident and/or disaster was given a risk score of 4. This indicates a scenario that is ‘very unlikely’ to occur and having ‘limited’ consequences should it do so, representing a ‘low-risk scenario’ during the operational phase.

15.4.3 Mitigation Measures

As outlined in Section 15.4.1, the scenario with the highest risk score in terms of the occurrence of major accident and/or disaster during construction was identified as ‘Contamination’ of the Proposed Development site and risk of ‘Fire/Explosion’ during operation.

The Proposed Development will be designed and built in line with current best practice and, as such, mitigation against the risk of major accidents and/or disasters will be embedded through the design. In accordance with the provision of the European Commission ‘*Guidance on the preparation of Environmental Impact Assessment Reports*’, a Risk Management Plan will be prepared and implemented on site to ensure an effective response to disasters or the risk of accidents. The plan will include sufficient preparedness and emergency planning measures.

15.4.3.1 Mitigation – Contamination During Construction, Operation and Decommissioning

Potential effects associated with contamination during construction, operation and decommissioning are addressed fully in Chapter 9 Hydrology. The mitigation measures outlined in Chapter 9 to protect environmental receptors as well as the procedures and measures described in the CEMP will ensure that the risk from these sources is low.

A CEMP has been prepared for the Proposed Development and is included in Appendix 4-3 of this EIAR. The above Major Accidents and Natural Disaster Risk Assessment forms the basis of the Emergency Response Plan (ERP) which is contained within the CEMP. The ERP will require updating and submissions from the contractor/PSCS and suppliers as the project progresses. The Contractor for the Proposed Development will ensure that potential risks of major accident and/or disaster are identified, avoided and mitigated, as necessary. Refer to Appendix 4-3 for the CEMP that sets out the minimum standards to be employed by the contractor.

15.4.3.2 Mitigation – Fire/Explosion During Operation

The Proposed Development will also be subject to a fire safety risk assessment in accordance with Chapter 19 of the Safety, Health and Welfare at Work Acts 2005 to 2021, which will assist in the identification of any major risks of fire on site, and mitigation of the same during operation. The ERP includes a hazard identification procedures and mitigation measures the Site Supervisor/Construction Manager will carry out in case of a fire/explosion at the site. Refer to Appendix 4-3 for an outline CEMP that sets out the minimum standards to be employed by the contractor.

15.4.4 Residual Effects

The risk of a major accident and/or disaster during the construction of the Proposed Development is considered ‘low’ in accordance with the ‘*Guide to Risk Assessment in Major Emergency Management*’ (DoEHLG, 2010).

It is considered that when the mitigation and monitoring measures outlined in the CEMP are implemented and adhered to there will not be significant residual effect(s) associated with the construction, operation and decommissioning of the Proposed Development.

15.4.5 Monitoring

15.4.5.1 Monitoring During Construction

A CEMP will be prepared prior to the commencement of any works. The CEMP will be a live document maintained by the contractor that will work to ensure that potential risks of major accident and/or disaster are identified, avoided and mitigated, as necessary. Refer to Appendix 4-3 for the CEMP that sets out the minimum standards to be employed by the contractor.

15.4.5.2 Monitoring During Operation

The operator of the Proposed Development will continue to assess the risk of major accidents and/or disasters on site on an on-going basis during operation.

The maintenance programme, record of reported incidents, as well as general site activities will be monitored on an on-going basis to ensure risk of major accidents does not increase over time.

15.4.5.3 Monitoring During Decommissioning

A Decommissioning Plan has been prepared (Appendix 4-5) the detail of which will be agreed with the local authority prior to any decommissioning. The Decommissioning Plan will be updated prior to the end of the operational period in line with decommissioning methodologies that may exist at the time and will be agreed with the competent authority at that time.

A CEMP has been prepared for the Proposed Development. The CEMP contains an Emergency Response Plan which will be maintained and updated by the contractor to ensure that potential risks of major accident and/or disaster are identified, avoided and mitigated, as necessary. Refer to Appendix 4-3 for an outline CEMP that sets out the minimum standards to be employed by the contractor.

15.4.6 Assessment of Cumulative Effects and In Combination Impacts

15.4.6.1 Cumulative Impact Assessment

All elements of the Proposed Development were assessed in order to identify any cumulative effects.

A wind farm including all of its various components including the Grid Connection works, substation, roads, turbines etc is not a recognised source of pollution. It is not subject to Industrial Emissions Directive regulation or any other Environmental Protection Agency environmental regulatory consent. Should a major accident or natural disaster occur the potential sources of pollution onsite during the construction, operational and decommissioning phases are limited and of low environmental risk. Sources of pollution with the potential to cause significant environmental pollution and associated negative effects such as bulk storage of hydrocarbons or chemicals, storage of wastes, management of flammable materials etc. are limited and so there is an inherent low level of environmental risk associated with major accident or natural disaster impacting the Proposed Development and causing environmental damage.

There is low potential for significant natural disasters to occur at the proposed Ballivor Wind Farm site. Ireland is a geologically stable country with a mild temperate climate. The potential natural disasters that may occur are therefore limited and these have been assessed in the context of the whole project, cumulatively in this chapter and in the wider EIAR.

Major industrial accidents involving dangerous substances pose a significant threat to humans and the environment; such accidents can give rise to serious injury to people or serious damage to the

environment, both on and off the site of the accident. The Wind Farm site is not regulated or connected to or close to any site regulated under the Control of Major Accident Hazards Involving Dangerous Substances Regulations i.e. SEVESO sites and so there are no potential effects from this source. There is no real likelihood of significant environmental effects cumulatively associated with major accidents.

The Proposed Development has low potential to cause natural disasters or major accidents. The site is relatively flat so there is low/no potential for peat slides or landslides. Any risks associated with flooding, impacts on infrastructure, accidents etc are addressed in the Sections above. There is no real likelihood of significant environmental effects cumulatively associated with the Proposed Developments potential to cause accidents or natural disasters.

As mentioned, bog fires are a rare occurrence but can occur on peatlands due to spread, human interference and autoignition. The implementation of peatland rehabilitation under IPC and PCAS schemes can reduce the potential for this to occur due to the rewetting measures which raise the water table and encourage a bog skin reformation on the site. As the Proposed Development only takes up approximately 1.8% of the wind farm site, there is a reduced potential for a fire outbreak as over 98% of the site will undergo bog rewetting measures.

15.4.6.2 In Combination Impact Assessment

A search in relation to plans and projects that may have the potential to result in a cumulative impact with the project on the environment was carried out as part of the EIAR. The Proposed Development has been considered, in combination with plans and the projects set out in Chapter 2 of the EIAR.

Following a detailed assessment of the potential for any further impact when considered in combination with any or all of the plans and projects set out in set out in Chapter 2, the Proposed Development, with mitigation measures in place, was found to have no potential for significant in-combination or cumulative effects associated with the potential for the project to be impacted by major accidents or natural disasters or the Proposed Developments potential to cause major accidents or natural disasters. This is based on the low risk associated with the Proposed Development described in this Chapter of the EIAR and a review of the nature of the surrounding land uses and projects existing or intended in the surrounding area.