

16. MAJOR ACCIDENTS AND NATURAL DISASTERS

16.1 Introduction

This section of the Environmental Impact Assessment Report (EIAR) describes the likely significant adverse effects on the environment arising from the vulnerability of the Proposed Development as detailed in Chapter 4 to risks of major accidents and/or natural disasters, as well as the potential of the Proposed Development itself to cause potential 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 or could cause;
- 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.

16.1.1 Statement of Authority

This section of the EIAR has been prepared by David Naughton and Órla Murphy and reviewed by Michael Watson, of MKO. David is an Environmental Scientist with over four years of consultancy experience with MKO and has been involved in a number of wind energy EIAR applications. David holds a BSc (Hons) in Environmental Science. Órla is a Project Environmental Scientist with over 6 years’ experience in the environmental sector where she has acted as Project Manager for a number of EIAR applications for wind energy developments, compiling numerous chapters including chapters on Population and Human Health. Órla holds a BSc. in Geography and MSc. in Environmental Protection and Management. Michael Watson is a Project Director with MKO; with over 20 years’ experience in the environmental sector. His project experience includes the management and productions of Environmental Impact Statements (EISs)/EIARs, particularly within the wind energy sector having acted as Project Director for c1 GW of onshore wind energy developments processed through the Irish planning system over the past 8 years.

16.2 Assessment Methodology

16.2.1 General

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

- Census of Ireland,
- Regional Planning Guidelines for the West Region 2010-2022,
- Regional Spatial and Economic Strategy (RSES), published by the Northern and Western Regional Assembly on 23 January 2020,
- Roscommon County Development Plan 2022 - 2028,
- Roscommon County Council Website, and
- Fáilte Ireland.

Major accidents or natural disasters are hazards which have the potential to affect the Proposed Development and lead to environmental effects directly and indirectly. 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 is considered in relation to the information required to be provided in the EIAR, i.e. population and human health, biodiversity, land, soil, water, air and climate and material assets, cultural heritage and the landscape.

16.2.2 Legislative Context

16.2.2.1 Legislation

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

- The vulnerability of the proposed Scheme to potential accidents and disasters
- The proposed Scheme's potential to cause major accidents or disasters which pose a risk to human health, cultural heritage and/ or the environment

The information relevant to major accidents and/or disasters to be included in the EIAR is set out in Section 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”.

16.2.2.2 Guidance Documents

The following guidance documents have been consulted in the preparation of this section:

- 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
- Roscommon County Council (2021) – Major Emergency Plan

16.2.3 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 16.3

16.2.4 Impact Assessment Methodology

16.2.4.1 Introduction

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 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 Seven Hills Wind Farm site. Ireland is a geologically stable country with a mild temperate climate. The potential natural disasters that may occur are therefore limited to issues such as flooding and fire and are described in the Sections below.

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.

The Proposed Development has low potential to cause natural disasters or major accidents. The site is relatively flat and is not a peatland site and 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 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. These are described in detail in the relevant EIAR assessment chapters (Refer to Chapters 5 to 14 for further detail).

16.2.4.2 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, operation and decommissioning 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

16.2.4.2.1 Risk Identification

Risks have been reviewed through the identification of reasonably foreseeable risks in consultation with relevant contributors to this EIAR. The identification of risks has focused on non-standard but plausible incidents that could occur at the Proposed Development during construction and operation.

In accordance with the European Commission EIAR Guidance, risks are identified in respect of the projects:

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

16.2.4.2.2 Risk Classification

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 16-1 defines the likelihood ratings that have been applied.

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

Table 16-1 Classification of Likelihood (Source: DoEHLG, 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 /

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

		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 consequence 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. Furthermore, the Roscommon County Council 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 16-2.

The consequence of a risk to/from the Proposed Development has been determined where one or more aspects of the consequence description are met, i.e. risks that have no consequence have been excluded from the assessment.

Table 16-2 Classification of Impact (Source: DoEHLG, 2010)

Ranking	Likelihood	Impact	Description	
1	Minor	Life, Health, Welfare	Small number of people affected; no fatalities and small number of minor injuries with first aid treatment.	
		Environment		
		Infrastructure		No contamination, localised effects <€0.5M
		Social		Minor localised disruption to community services or infrastructure (<6 hours).
2	Limited	Life, Health, Welfare	Single fatality; limited number of people affected; a few serious injuries with hospitalisation and medical treatment required.	
		Environment		
		Infrastructure		Localised displacement of a small number of people for 6-24 hours. Personal support satisfied through local arrangements.
		Social		Simple contamination, localised effects of short duration
			€0.5-3M	

Ranking	Likelihood	Impact	Description
			Normal community functioning with some inconvenience.
3	Serious	Life, Health, Welfare Environment Infrastructure Social	<p>Significant number of people in affected area impacted with multiple fatalities (<5), multiple serious or extensive injuries (20), significant hospitalisation.</p> <p>Large number of people displaced for 6-24 hours or possibly beyond; up to 500 evacuated.</p> <p>External resources required for personal support.</p> <p>Simple contamination, widespread effects or extended duration</p> <p>€3-10M</p> <p>Community only partially functioning, some services available.</p>
4	Very Serious	Life, Health, Welfare Environment Infrastructure Social	<p>5 to 50 fatalities, up to 100 serious injuries, up to 2000 evacuated</p> <p>Heavy contamination, localised effects or extended duration</p> <p>€10-25M</p> <p>Community functioning poorly, minimal services available</p>
5	Catastrophic	Life, Health, Welfare Environment Infrastructure Social	<p>Large numbers of people impacted with significant numbers of fatalities (>50), injuries in the hundreds, more than 2000 evacuated.</p> <p>Very heavy contamination, widespread effects of extended duration.</p> <p>>€25M</p> <p>Serious damage to infrastructure causing significant disruption to, or loss of, key services for prolonged period. Community unable to function without significant support.</p>

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 16-3) 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 16-3 Classification of Impact (Source: DoEHLG, 2010)

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

16.3 Baseline Conditions

The Major Emergency Plan prepared by Roscommon County Council (2021) outlines the following potential major emergency scenarios in County Roscommon:

1. Hazardous Sites Emergencies:
 - 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 are no SEVESO Sites within County Roscommon.**
2. Critical Infrastructure Emergencies:
 - M6 Motorway,
 - National Primary Route N6, N5 & N4,
 - Iarnród Éireann: The Inter-City service,
 - Shannon Waterway / Bridges over Shannon
3. Flooding/Severe weather/Pollution/Animal disease emergencies:
 - Roscommon County Council Functional Area.
4. Utility company emergencies:
 - Bord Gáis,
 - ESB,
 - Eircom.

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

Critical Infrastructure Emergencies

The Proposed Development will make use of the M6 Motorway for delivery of turbines and other infrastructure to the site. Potential impacts that may occur on the M6 could be caused by an accident during the delivery of the turbines or damage to infrastructure caused by severe weather, natural disaster, etc.

Severe Weather

The Proposed Development is located more than 50km east of the Atlantic Ocean and therefore is unlikely to be significantly impacted by low pressure systems or extreme wind speeds. Potential severe weather effects are however assessed below. As is standard practice, construction and decommissioning phase work will be paused in the event of a Status Red weather warning issued by Met Eireann. This mitigates significantly the potential for effects associated with severe weather events during these phases.

Flooding

As detailed in Chapter 9, no recurring flood incidents within the Proposed Development site were identified from OPW's indicative river and coastal flood map. There are several recurring flooding incidents surrounding the Proposed Development site, which relate to the turloughs in the surrounding lower-lying areas. The proposed turbines and other Wind Farm site infrastructure are topographically upgradient of these groundwater flood zones, with the closest point of infrastructure being T4. T4 is situated ~50m upgradient of the maximum flood extent of Gortaphuill turlough.

The available Preliminary Flood Risk Assessment (PFRA) mapping shows the extent of the indicative 100-year flood zone which relates to fluvial (i.e., river) and pluvial (i.e. rainfall) flood events. There are no 100-year fluvial flood zones mapped within the site. All proposed turbine locations, substation, construction compounds, met mast, borrow pits and access roads are located at least 50m away from streams and are outside of the fluvial indicative 100-year flood zone.

Surface water and groundwater flooding was investigated along the proposed grid route. Flooding along the grid route at the Cross River is identified. Fluvial flooding is mapped circa 200m north and south of the R362 road, however, it is not mapped along the road itself. There are no other areas of fluvial or pluvial flooding mapped along the grid route. The GSI Groundwater Flooding Data Viewer was consulted on areas prone to groundwater flooding. There are no areas of potential groundwater flooding mapped along the grid route.

The Justification Test, completed as part of the Flood Risk Assessment, concluded that the Proposed Development site, all key infrastructures including turbines and the proposed on-site substation and Grid Connection route are located within a low-risk area (Flood Zone C), and as such is appropriate from a flood risk perspective.

Therefore, there is low potential for either the impacts of flooding to affect the Proposed Development or for the Proposed Development to cause flooding.

Utility company emergencies

The Grid Connection will be installed in the local road network, where local utilities and services are currently in place. Installation of the Grid Connection will be undertaken by the developer and all services and utilities will be identified during construction.

16.3.2 Additional Risks

In addition, risks identified in the EIAR which are relevant to the Proposed Development are detailed below:

16.3.2.1 Traffic

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. 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)'.

16.3.2.2 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 Hydrology chapter as they are not related to either the vulnerability of the project to natural disasters or major accidents nor the potential for the project to cause natural disasters or accidents. Indirect impacts associated with major accidents and / or natural disasters on contamination are considered in this chapter.

16.4 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 16-1 and 16-2.

As outlined in Section 16.2.4.2.2, 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 i.e. pre-mitigation.

16.4.1.1 Likely Significant Effects

16.4.1.1.1 Do-Nothing Scenario

If the Proposed Development were not to proceed, the existing uses for the site of small-scale agricultural farming practices, would continue.

If the Proposed Development were not to proceed, the opportunity to capture a significant part of County Roscommon's and Ireland's valuable renewable energy resource would be lost, as would the opportunity to contribute to meeting Government and EU targets for the production and consumption of electricity from renewable resources and the reduction of greenhouse gas emissions.

The opportunity to generate local employment and investment would also be lost, and the local economy would continue to rely primarily on small-scale agriculture as the main source of income. It is likely that the trends of population decline and rural deprivation that have been recorded within the study area would continue in the absence of investment.

16.4.1.1.2 Identification 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. Seven risks specific to the construction of the Proposed Development have been identified and are presented in Table 16-4.

Table 16-4 Risk Register - Construction Phase

Risk ID	Potential Risk	Possible Cause
Potential vulnerability to disaster risks		
A	Critical Infrastructure Emergencies Risk of delivery of turbines and infrastructure to site.	Traffic accident during turbine delivery or extreme weather periods of heavy rainfall, taking into account climate change and strong winds
B	Severe Weather Risk to construction activity on site	Extreme weather- periods of heavy rainfall, taking into account climate change and strong winds
C	Flooding Risk of groundwater flooding in areas surrounding the site impacting the construction phase and leading to environmental emissions	Extreme weather- periods of heavy rainfall, taking into account climate change and strong winds
Potential to cause accidents and / or disasters.		
D	Utility emergencies Risk of construction activity along the Grid Connection route	Construction activity along grid and road network impacting on local services and utilities
E	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
F	Contamination Discharge or spillage of fuel, chemical solvents into watercourse or percolated to groundwater. Discharge due to HDD frack out on Grid Connection works area.	Accidental fuel spillage during delivery to site. Failure of fuel storage tank or tanks in plant and machinery and vehicles leading to uncontrolled emissions. Drainage and seepage water resulting from accident during infrastructure excavation;

		<p>Stockpiled excavated material becoming unstable and providing a point source of exposed sediment;</p> <p>Excavation works during the construction of the Proposed Development which may result in entrainment of sediment from the excavations during construction; and,</p> <p>Frack Out associated with HDD along Grid Connection route which may result in sediment release to surface water.</p>
G	Fire / Gas Explosion	<p>Equipment or infrastructure failure;</p> <p>Electrical problems; and</p> <p>Employee negligence.</p>

16.4.1.1.3 Identification of Effect During Operation

Four risks specific to the operation of the Proposed Development have been identified and are presented in Table 16-5.

Table 16-5 Risk Register – Operational Phase

Risk ID	Potential Risk	Possible Cause
Potential vulnerability to disaster risks		
H	<p>Severe Weather</p> <p>Risk to operational activity on site, blade or turbine damage</p>	<p>Extreme weather- periods of heavy rainfall, taking into account climate change and strong winds.</p>
I	<p>Contamination</p> <p>Discharge or spillage of fuel, chemical solvents, sewage or wastewater into watercourse or percolated to groundwater</p>	<p>A vehicular incident on the public road involving fuel, wastewater or sewage transportation in the operational phase.</p> <p>Spill or leak of oil during operational maintenance.</p>
Potential to cause accidents and / or disasters.		
J	Fire / Gas Explosion	<p>Equipment or infrastructure failure;</p> <p>Electrical problems; and</p> <p>Employee negligence.</p>

K	Collapse / damage to structures	Earthquake, extreme weather events; and Vehicular collisions due to driver negligence on public roads.
L	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

16.4.1.1.4 Identification of Effect During Decommissioning

Four risks specific to the decommissioning of the Proposed Development have been identified and are presented in Table 16-6.

Table 16-6 Risk Register – Decommissioning Phase

Risk ID	Potential Risk	Possible Cause
Potential vulnerability to disaster risks		
M	Severe Weather Risk to decommissioning activity on site leading to environmental emissions	Extreme weather- periods of heavy rainfall, taking into account climate change and strong winds.
N	Flooding of site Risk of groundwater flooding in areas surrounding the site impacting the decommissioning phase and leading to environmental emissions	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	Accidental fuel spillage during delivery to site. Failure of fuel storage tank or tanks in plant and machinery and vehicles leading to uncontrolled emissions.

These risks have been assessed in accordance with the relevant classification (Refer to Table 16-1 and Table 16-2) and the resulting risk analysis is given in Table 16-7.

The risk register is based upon possible risks associated the Proposed Development. As outlined in Section 16.2.4.2, 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.

16.4.1.1.5 Assessment of Effect – Summary

Table 16-7 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	Critical Infrastructure Emergencies	Extreme weather- periods of heavy rainfall, taking into account climate change and strong winds	Illness or loss of life;	1	The risk of traffic accident during turbine delivery severe weather conditions impacting the M6 is unlikely when considering the assessment in Chapter 10 (weather conditions recorded over the last 30 years within the area) and Chapter 14.1 – Traffic Assessment (turbine delivery occurring during the night, Garda patrolled, etc)	1	The risk of a traffic accident due to 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’.	1
B	Severe Weather	Extreme weather- periods of heavy rainfall, taking into account climate change	Illness or loss of life; 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 construction phase will result in a minor consequence in that ‘small number of people would be affected’ should a severe weather occur, with ‘no	2

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
		and strong winds			The works programme for the groundworks part of the construction phase of the project will take account of weather forecasts and predicted rainfall in particular and construction will be paused if required.		fatalities and a small number of minor injuries with first aid treatment'. Severe weather may cause increased mobilisation of sediment which will be controlled via the project design and mitigation measures.	
C	Flooding	Extreme weather-periods of heavy rainfall, taking into account climate change and strong winds	Illness or loss of life; Groundwater Flooding Flooding to surrounding properties Damage to, or depletion of aquatic habitats and species;	2	The risk of flooding is considered very unlikely when taking into account the baseline assessment in Chapter 9 of the EIAR and due to no recurring or historic flood incidents are recorded within the Wind Farm site or along the Grid Connection route.	1	The risk of flooding 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' Flooding has the potential to cause increased sediment mobilisation however flooding is not anticipated and should any flooding occur it would be 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)
D	Utility emergencies	Construction activity along road network during grid installation impacting on local services and utilities	Illness or loss of life; Disruption to services	2	The Grid Connection has been designed to take into consideration any services and utilities with the road network.	1	The risk of impact on utilities and services during the construction phase will 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'	2
E	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 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.	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)
F	<p>Contamination – Fuel storage and handling</p> <p>-General Construction</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>Works during the</p>	<p>Release of suspended solids to groundwater.</p> <p>Contamination of local drinking water supplies and groundwater aquifers.</p> <p>Groundwater and surface water emissions from construction activities including trench excavations and Directional Drilling (frack out)</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 mitigation measures as detailed in Chapter 8.</p> <p>Detailed mitigation measures and methodologies for the control of emissions from grid works including the potential for Frack Out as described in the EIAR. Standard and specific mitigation to prevent</p>	2	<p>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’ on environmental receptors through the use of bunded containment areas during construction.</p> <p>The majority of the grid is located in the existing road network which is of low value environmental receptor.</p> <p>HDD is planned for a limited number of locations and will be controlled to prevent significant environmental effects should frack out occur.</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)
		construction of the Proposed Development which may result in entrainment of sediment from the excavations or HDD; and,			accidents and indirect effects of accidents are included in the project design and will be implemented.		The potential residual environmental effects are described in detail in Chapter 8 which concludes that there will be no significant environmental effects.	
G	Fire / Gas Explosion	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	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' on people and environmental receptors due to the nature of the project and the lack of infrastructure or fuel storage during operation that would result in any such incident.	4

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
					risks of fire on site, and mitigation of the same during operation.		There will be 'normal community functioning' in the area with 'some inconvenience' The 'generic command, control & co-ordination systems' as well as the 'common elements of response' detailed in the Roscommon County Council Major Emergency Plan will work to reduce the consequence (both on people and the environment) of potential fire/explosions at the site.	
Operational Phase								
H	Severe Weather	Extreme weather-periods of heavy rainfall, taking into account climate change	Illness or loss of life;	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	2

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
		and strong winds					fatalities and a small number of minor injuries with first aid treatment’.	
I	Contamination	A vehicular incident on the public road or Proposed Development road network involving fuel, wastewater or sewage transportation in the operational phase.	Damage to, or depletion of aquatic habitats and species Contamination of local drinking water supplies and groundwater aquifers.	2	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	1	The risk of a fuel spillage or impact on surround 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. The potential residual environmental effects are described in detail in Chapter 8 which concludes that there will be no significant environmental effects.	2
J	Fire / Gas Explosion	Equipment or infrastructure failure;	Illness or loss of life; Damage to, or depletion of	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.	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)
		Fuel spillage/storage Electrical problems; and Employee negligence	habitats and species; and Impacts on ambient air quality.		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, and mitigation of the same during operation.		duration' on people and environmental receptors 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' The 'generic command, control & co-ordination systems' as well as the 'common elements of response' detailed in the Roscommon County Council Major Emergency Plan will work to reduce the consequence (both on people and the environment) of potential fire/explosions at the site.	
K	Collapse/ damage to structures	Earthquakes, extreme weather events; and	Injury or loss of life.	1	According to the Irish National Seismic Network (INSN), earthquakes measuring ~2 on the Richter Scale are "normal" in terms of seismicity in	1	The risk of infrastructure collapse during the operational phase will result in a minor consequence in that 'small number of people would be affected'	1

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
		Vehicular collisions due to driver negligence on public roads.			<p>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>		and no real likelihood of any impact on any environmental receptors.	
L	Traffic Incident	<p>Driver negligence or failure of vehicular operations on site roads.</p> <p>Traffic Management</p>	Injury or loss of life.	3	<p>A limited number of vehicles will be permitted on the site as part of the operation phase</p> <p>As such, it can be determined that there is some 'opportunity, reason or means' for a vehicle collision to occur on site,</p>	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)
		not implemented			'at some time.' An unlikely risk is therefore predicted.			
Decommissioning Phase								
M	Severe Weather	Extreme weather-periods of heavy rainfall, taking into account climate change and strong winds	Illness or loss of life; 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. Construction will be paused should a Status Red weather warning alert be issued by Met Eireann as is standard practice	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'. Decommissioning will not require significant excavations works. There is no real likelihood of any impact on any environmental receptors	2
N	Flooding	Extreme weather-periods of heavy rainfall, taking into	Illness or loss of life; Groundwater Flooding	2	The risk of flooding is considered very unlikely when taking into account the baseline assessment in Chapter 8 of the EIAR and	1	The risk of flooding during the decommissioning phase will result in a minor consequence in that 'small number of people would	2

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
		account climate change and strong winds	Flooding to surrounding properties Damage to, or depletion of aquatic habitats and species;		due to no recurring or historic flood incidents being recorded within the Wind Farm site or along the Grid Connection route.		be affected' should a severe weather occur, with 'no fatalities and a small number of minor injuries with first aid treatment'.	
O	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
P	Contamination	Fuel spillage during delivery to site.	Damage to, or depletion of aquatic habitats and species	2	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	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	4

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
		Failure of fuel storage tank or tanks in plant and machinery and vehicles.	Discharge to groundwater		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		limited number of people affected' with 'localised effects of short duration' through the use of bunded containment areas during operation. The potential residual environmental effects are described in detail in Chapter 8 which concludes that there will be no significant environmental effects.	

The risk assessment for each of the potential risks identified are consolidated in Table 16-8 which provides their ‘risk score.’ A corresponding risk matrix is provided in Table 16-9, which is colour coded in order to provide an indication of the critical nature of each risk. As outlined in Section 16.2.4.2, the red zone represents ‘high risk’ scenarios’, the amber zone represents ‘medium risk scenarios’ and the green zone represents ‘low risk scenarios’.

Table 16-8 Risk Scores

Risk ID	Potential Risk	Likelihood Rating	Consequence Rating	Risk Score
Construction Phase				
A	Critical Infrastructure Emergencies	1	1	1
B	Severe Weather	2	1	2
C	Flooding	2	1	2
D	Utility company emergencies	2	1	2
E	Traffic Incident	3	1	3
F	Contamination	2	2	4
G	Fire / Gas Explosion	2	2	4
Operational Phase				
H	Severe Weather	2	1	2
I	Contamination	2	1	2
J	Fire / Gas Explosion	2	2	4
K	Collapse/ damage to structures	1	1	1
L	Traffic Incident	3	1	3
Decommissioning Phase				
M	Severe Weather	2	1	2
N	Flooding	2	1	2
O	Traffic Incident	3	1	3
P	Contamination	2	2	4

Table 16-9 Risk Matrix

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

Table 16-9, presents the potential risks identified during the construction, operation and decommissioning of the Proposed Development all of 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.

16.4.1.2 Contamination During Construction and Decommissioning

There is a potential risk of contamination from site activities during the construction and decommissioning phases from potential release of hydrocarbons. The risk of contamination was given a risk score of 4 on a very precautionary basis. However, as outlined in Chapter 4 Section 4.3.10 and Chapter 9, Section 9.4.2, measures 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 and decommissioning phases.

The conclusions in the relevant chapters of the EIAR conclude that there will be no significant residual effects associated with this potential impact.

16.4.1.3 Fire/Explosion During Construction and Operation

There is a potential risk of fire/explosion at the Proposed Development site. However, as outlined in Section 16.2.1, 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, and mitigation of the same during operation.

Therefore, the risk of fire/explosion occurring at the Proposed Development resulting in a major accident and/or disaster was given a risk score of 4 on a very precautionary basis. 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.

16.4.2 Mitigation Measures

As outlined in Section 16.4.1, 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.

16.4.2.1 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 Construction and Environmental Management Plan (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 4-9 of this EIAR. Upon a grant of planning permission for the Proposed Development, the CEMP will be updated prior to the commencement of the development. 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 4-9 for an outline CEMP that sets out the minimum standards to be employed by the contractor.

16.4.2.2 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 2014, which will assist in the identification of any major risks of fire on site, and mitigation of the same during operation.

As outlined in Section 4.3.11 of the EIAR, a detailed Construction Environmental Management Plan (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 4-9 for an outline CEMP that sets out the minimum standards to be employed by the contractor.

16.4.3 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 above mitigation is implemented, and all mitigation detailed in the EIAR is implemented, there will not be significant residual effect(s) associated with the construction, operation and decommissioning of the Proposed Development.

16.4.4 Monitoring

16.4.4.1 Monitoring During Construction

As outlined in Section 4.3.11 of the EIAR, a detailed Construction Environmental Management Plan (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 4-9 for an outline CEMP that sets out the minimum standards to be employed by the contractor.

16.4.4.2 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.

16.4.4.3 Monitoring During Decommissioning

As outlined in Section 4.10 of the EIAR, a Decommissioning Plan has been prepared (Appendix 4-10) 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 detailed Construction Environmental Management Plan (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 4-9 for an outline CEMP that sets out the minimum standards to be employed by the contractor.

16.4.5 Assessment of Cumulative and In Combination Impacts

16.4.5.1 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 Seven Hills 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 and is not a peatland site and 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 below. There is no real likelihood of significant environmental effects cumulatively associated with the Proposed Developments potential to cause accidents or natural disasters.

16.4.5.2 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, Section 2.6 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 Chapter 2, Section 2.6, 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 landuses and projects existing or intended in the surrounding area.