Planning and Environmental Consultants

Environmental Impact Assessment Report

Seskin Renewables Wind Farm

Chapter 16 – Major Accidents and Natural Disasters

DOCUMENT DETAILS

Client:	**Seskin Renewable Energy Ltd**
Project Title:	**Seskin Renewables Wind Farm**
Project Number:	**231103**
Document Title:	**Environmental Impact Assessment Report**
Document File Name:	**Ch. 16 Major Accidents & Natural Disasters - F - 2025.06.24 - 231103**
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Rev	Status	Date	Author(s)	Approved By
01	Final	24/06/2025	ER	EM

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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/or natural disasters, as well as the risk of the Proposed Development itself causing major accidents and/ or natural 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 the Proposed Development.

> *"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.

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

As detailed in Section 1.1.1 in Chapter 1, for the purposes of this EIAR, the various project components are described and assessed using the following references: 'Proposed Development'.

16.1.1 Statement of Authority

This section of the EIAR has been prepared by Edward Ryan, and reviewed by Eoin McCarthy, all of whom are Environmental Scientists with MKO.

Edward is an Environmental Scientist with a B.Sc. (Hons) in Environmental Science from the University of Limerick and a M.Sc. (hons) in Environmental Systems from Atlantic Technological University: ATU (formally GMIT). Edward is an Environmental Scientist with over 4 years of consultancy experience.

Eoin McCarthy holds a BSc. (Env.) in Environmental Science and is a Project Director with 14 years' experience in the consultancy sector. His project experience includes a significant range of energy infrastructure, tourism, waste permit, flood relief scheme and quarrying projects in addition he has been involved in the project management of the production of EIARs for almost 1GW worth of wind energy projects.

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 2016; 2022
- Regional Planning Guidelines for the South-East Region 2010-2022
- Regional Planning Guidelines for the Midland Region 2010-2022
- Regional Spatial and Economic Strategy (RSES) 2019-2031, adopted by the Eastern and Midland Regional Assembly (EMRA) in June 2019 and published by the Southern Regional Assembly (SRA) on 31st January 2020.
- Laois County Development Plan 2021-2027
- Kilkenny City and County Development Plan 2021-2027
- Laois County Council Website, Kilkenny 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 or indirectly. These include accidents during construction, operation and decommissioning of the Proposed Development caused by operational failure and/or natural hazards. The assessment of the risk of major accidents and/or natural disaster is considered in relation to the information required to be provided in the EIAR, i.e. population and human health, biodiversity, soils, water, air, climate, material assets and cultural heritage.

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 Development to potential accidents and disasters
- The Proposed Development 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 Protect Agency (2014) Guidance on Assessing and Costing Environmental Liabilities
- Department of Defence (2020) A National Risk Assessment for Ireland
- Laois County Council Major Emergency Plan Version No. 12, (2021)
- Fire and Emergency Operations Plan (2022-2026) - Kilkenny County Council Fire and Rescue Service

On a regional scale, Kilkenny falls under the South-East Major Emergency Region (MEM). County Laois has it's own Major Emergency Plan for the county.

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 Development. 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 Proposed Development 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. As detailed in Section 8.4.6 in Chapter 8 of this EIAR, the EPA published soil map (www.epa.ie) and the GSI subsoil mapping (www.gsi.ie) shows the mapped distribution of subsoil deposits around the Proposed Wind Farm. Mainly basic, deep, well-drained mineral soils (BminDW) is the dominant soil type mapped at the Proposed Wind Farm site. There is no peat mapped at or locally to the Proposed Wind Farm site. The east of the Proposed Wind Farm is mapped by the GSI as being underlain by gravels derived from Limestones. The north, south and west of the Proposed Wind Farm site is mapped as being underlain by till derived from Namurian sandstones and shales with some areas of bedrock outcrop or subcrop. Due to the absence of peat and the absence of any significant karst features, there is a low risk of a landslide occurring.

The Proposed Grid Connection Route is located predominantly within the public road network. Soils along the Proposed Grid Connection underground cabling route are broadly mapped as basic, shallow, well-drained mineral soils (BMinSW) (www.gsi.ie).

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 16 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'* document[1]. 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, operation and decommissioning.

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

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

[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*

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 / 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 Laois County Council Major Emergency Plan (2021), and the Kilkenny County Council Fire and Rescue Service Fire and Emergency Operations Plan 2022-2026, 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 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

Ranking	Likelihood	Impact	Description
			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 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

Kilkenny County Council falls under the South-East Major Emergency Region (MEM) and Laois County Council falls under its own Major Emergency Plan.

The Major Emergency Plan prepared by Laois County Council (2021) considers the following potential major emergency scenarios in the county (Laois).

1. **Severe Weather/ Flooding** – Includes Storms/Severe Gales, Severe Ice and Cold, Flooding, and Heatwaves/Droughts. Within Laois County Council Functional Areas
2. **Large Forest Fires** – Laois County Council Functional Areas
3. **Water Contamination** – Laois County Council Functional Areas
4. **Aircraft Collision Mid Air** – Laois County Council Functional Areas
5. **Multiple Vehicle RTC/Transportation Incident Involving Hazardous Materials** – M7 and M8 motorways, National Primary Routes, Iarnród Éireann; There are currently 1 no. SEVESO sites in Laois County Council's functional area.
6. **Rail Crash/Incident** – Laois County Council Functional Areas
7. **Industrial Fire/Explosion/Hazmat Industrial Accident** – Laois County Council Functional Areas
8. **Structural Fail/Collapse of Bridge** – Laois County Council Functional Areas
9. **Gas Pipeline Explosion** – Applicable to sections of the line that reach Co. Laois.
10. **Bacteria/Protozoan/Chemicals get into the water supply or food chain and cause pollution to people / Pandemic caused by communicable disease such as influenza or animal viral spread such as Avian Flu/Ebola** – Laois County Council Functional Areas
11. **Terrorism** – Laois County Council Functional Areas

The Major Emergency Plan prepared for County Kilkenny (2019) outlines the following potential major emergency scenario in the county (Kilkenny):

1. **Severe Weather/Urban Flooding** – Applicable to urban areas within the functional areas of Kilkenny County Council.
2. **Aircraft Collision / Loss** – Kilkenny County Council Functional Areas
3. **Water Contamination** – Kilkenny County Council Functional Areas
4. **Fire / Major Crowd Safety and Civil Disorder** – Kilkenny County Council Functional Areas
5. **Major RTA / Hazmat** – M8 and M9 motorways, National Primary Routes, Iarnród Éireann; There are currently 2 no. SEVESO sites in Kilkenny County Council's functional area.
6. **Rail Accident** – Kilkenny County Council Functional Areas
7. **Industrial Fire / Explosion** – Kilkenny County Council Functional Areas
8. **Critical Infrastructure** – Kilkenny County Council Functional Areas
9. **Methane Explosion** – Kilkenny County Council Functional Areas
10. **Gas Explosion on main Cork to Dublin gas line** – Applicable to sections of the line that reach Co. Kilkenny.
11. **Bridge Collapse** – Kilkenny County Council Functional Areas
12. **Structural Collapse** – Kilkenny County Council Functional Areas

16.3.1 Risks to the Proposed Development (Laois and Kilkenny)

The risks, outlined in the Laois and Kilkenny Major Emergency Plans, which are most relevant to this assessment are described below:

Severe Weather

The climate change risk assessments included in the Laois LACAP and Kilkenny LACAP detail the major risks posed from climate change being river flooding, severe wind storms, extreme precipitation, heatwaves and drought. The changes in frequency in intensity of weather patterns as a result of climate change will continue to influence the wide range of functions caried out by Local Authorities. The identification of future risks is critical to enable the progression of adaptation and mitigation measures in the development and execution of plans and policies.

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 15.1 Traffic and Transport in Chapter 15 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)*'.

Flooding

The Proposed Development is not located within an urban area; therefore, the urban flooding scenario is not applicable.

Chapter 9 and the accompanying Appendix 9-1 Flood Risk Assessment (FRA), detail the flood risk of the Proposed Development site. Based on the information provided in the stated documents, the areas of the Proposed Development at risk of flooding were identified.

No recurring flood incidents within the Proposed Wind Farm site were identified from OPW's indicative river and coastal flood map. There are several recurring flood incidents surrounding the Proposed Wind Farm site, which are mapped along the River Nore to the north, east and south. The nearest recurring flood incident is mapped ~0.2km from the north of the site. This flooding is noted as recurring after heavy rainfall in the area.

Groundwater flooding is mapped by the GSI (GSI GWFlood Project)[2]. The groundwater flood modelling highlights areas ~12.5km southwest of the Proposed Wind Farm site which corresponds to mapped turloughs and springs. There are no areas within the site which are mapped within a groundwater flood zone.

There are no recurring flood zones mapped along the Proposed Grid Connection route. There is 1 no. recurring flood zone recorded ~ 800m south of the Proposed Grid Connection route, just north of Ballyragget Bridge, where the N77 National Road crosses the River Nore. This is noted as recurring after heavy rainfall in the area.

Surface water and groundwater flooding was investigated along the Proposed Grid Connection underground cabling route during walkover surveys. No evidence of groundwater or surface water flooding were observed during these surveys.

Therefore, the Proposed Development will have no impact on flood risk elsewhere in the locality and this is largely due to the avoidance of fluvial flood zones for all sensitive aspects of the Proposed Development infrastructure.

[2] https://www.gsi.ie/en-ie/programmes-and-projects/groundwater-and-geothermal-unit/activities/groundwater-flooding/gwflood-project-2016-2019/Pages/default.aspx

The overall risk of flooding posed at the Proposed Wind Farm is assessed to be very low, and the overall risk of flooding posed at the Proposed Grid Connection Route is assessed to be low. Please refer to the Chapter 9 Water of this EIAR for further details.

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 Section 15.2 in Chapter 15 of this EIAR: Material Assets. The scoping response from the Irish Aviation Authority (IAA) set out that in the event of planning consent being granted, the applicant should be conditioned to contact the IAA to (1) agree an aeronautical obstacle warning light scheme for the wind development, (2) provide as-constructed coordinates in WGS84 format together with ground and blade tip height elevations at each wind turbine location and (3) notify the IAA of intention to commence crane operations with at least 30 days prior notification of their erection. The coordinates and elevations for built turbines will be supplied to the IAA, as is standard practice for wind farm developments.

Following the guidance above, consultation with the IAA and the Department of Defence (DoD) has been carried out by MKO as part of the assessment of the Proposed Development and are summarised in Section 15.2.4.2.3 of Chapter 15 of this EIAR.

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 the Proposed Development site. These impacts are addressed in detail in the Chapter 9 of this EIAR: Water and are not related to either the vulnerability of the Proposed Development to natural disasters or major accidents nor the potential for the Proposed Development to cause natural disasters or accidents.

There is potential for hazardous materials in the form of hydrocarbons to be transported to and used on the Proposed Development. Mitigation measures as best practise as detailed in Chapter 9 Water and the Construction and Environmental Management Plan (CEMP) (Appendix 4-2), respectively, will minimise the potential for leaks and will break the potential pathways between any source and receptor therefore resulting in no residual effects. The removal of hazardous materials will be done so by licenced operators for disposal at licensed waste facilities. There will be no potential for hazardous material release during the operational phase of the Proposed Development.

The release of wastewater in relation to the Proposed Development 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 above which will break the potential pathways between any source and receptor therefore resulting in no residual effects. Indirect impacts associated with major accidents and/or natural disasters on contamination are considered further in Section 16.4.1.

Hazmat

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 SEVESO site within County Laois and 3 no. SEVESO sites within County Kilkenny. The SEVESO sites within both counties have specific External Emergency Plans for each site which are reviewed and tested on a three-year cycle. The closest SEVESO site to the Proposed Development is the Grassland

Fertilisers Yard in Co. Kilkenny, located approximately 15.9km to the northwest of the Proposed Development at its closets point (the termination of the Proposed Grid Connection Route at the existing Ballyragget 110kV substation). Given the separation distance, it is considered that neither the Proposed Development nor the SEVESO site have the opportunity to negatively impact the other.

Rail Accident

The Dublin to Cork rail line runs approximately 15km to the northwest of the Proposed Development in a general northeast to southwest orientation. The Proposed Development does not physically interact with the railway infrastructure.

The Kilkenny train station is located 17.2km southeast of the Proposed Development. This station is a stop on the Dublin to Waterford rail line. The Proposed Development will not physically interact with the railway infrastructure.

Works relating to the construction of the Proposed Development, which will be confined to a minimum 20m set back from the railway line, will not interfere with the track, track drainage or embankment. Nonetheless, during the construction phase, the requirements for third parties as set out in 'CCE Department Technical Guidance Document CCE-TMS-310 Guidance on Third Party Works' and 'CCE Departmental and Multidisciplinary Standard I-DEP-0121 Third Party Works: Additional Details of Railway Safety Requirements' will be adhered to. Furthermore, contact will be made to IEDR 30 days prior to the works that will take place at a minimum of 20m northwest of CIE infrastructure.

Industrial Fire / Explosion

The likelihood of fire or explosion occurring at the Proposed Development is anticipated to be low. The likelihood of fire or explosion occurring will be further lowered by the implementation of good site management practices during the construction, operational and decommissioning phases.

Loss of Critical 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 the Proposed Development and transport of employees to, from and throughout the Proposed Development.

It is proposed that large wind turbine components will be delivered to the Proposed Wind Farm 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 15.1 Traffic and Transport in Chapter 15 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)*'.

In regard to telecoms and other signally infrastructure, the Proposed Development will have no impact as it will not physically interact with any of infrastructure of this nature.

Gas Explosion on Main Cork to Dublin Gas Line

The likelihood of a methane explosion occurring at the Proposed Development is anticipated to be low. The likelihood of a methane explosion occurring will be further lowered by the implementation of good site management practices during the construction, operational and decommissioning phases.

The Cork to Dublin Gas line runs from Cork to Waterford, Laois, Kildare and terminates in Dublin. Offshoots of the line from Cork northwards into Kilkenny City. The closest gas line is located approximately 245m west of the EIAR Site Boundary at its nearest point. As such, it is considered that neither the Proposed Development nor the gas line have the opportunity to negatively impact the other.

Major Road Traffic Accident

The Proposed Project will utilise the existing road network during the construction phase. Construction related traffic will comprise both turbine component and construction materials delivery and the subsequent return of empty vehicles, and daily construction staff movements to and from the Site.

It is proposed that large wind turbine components will be delivered to the Site, under Garda escort and mainly at night.

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 the Proposed Project. As detailed in Section 15.1 of this EIAR: Material Assets, the localised traffic disruptions due to other proposed works will be mitigated using 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)'.*

A strict speed limit will be imposed on the internal Wind Farm road network to reduce the likelihood of any collisions or traffic incidents. The internal Wind Farm road network and site access junctions have all been designed to reduce the likelihood of traffic incidents or collisions, with appropriate sightlines in place at all Site junctions.

A Traffic Management Plan (TMP) has been prepared in Appendix 15.2 of Chapter 15 of this EIAR.

Bridge / Structural Collapse

Bridge or structural collapse in the surrounding areas of the Proposed Development may occur due to earthquake, extreme weather events, and/or vehicular collision due to driver negligence.

Due to the transport of abnormal loads, i.e., turbine components, there is potential for bridge and/or road infrastructure collapse during turbine delivery. This impact may be exacerbated by extreme weather i.e., severe wind storms and heavy precipitation resulting from climate change. As outlined in Chapter 11 of this EIAR, due to Ireland's latitudinal position, the probability of extreme weather events posing a threat to the built environment are low. However, in the circumstance of such a weather event occurring at the site of the Proposed Development during the operational phase, the measures set out in the HSE South-East (Area 5) Major Emergency Plan will be followed.

Having regard to public speed limits within the Proposed Wind Farm site, it is not predicted that any collision of vehicles and any infrastructure would result in significant damage/collapse.

The Proposed Development will utilise the existing road network during the construction phase. Construction related traffic will originate from the delivery of materials to the Proposed Development and transport of employees to, from and throughout the Proposed Development. It is proposed that large wind turbine components will be delivered to the Proposed Wind Farm 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 and bridges, and structural collapse.

As detailed in Section 15.1 Traffic and Transport in Chapter 15 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).*

As detailed in Section 4.8.2 in Chapter 4 of this EIAR, the underground Proposed Grid Connection Route will not involve any bridge crossings, however, a watercourse crossing using Horizontal Directional Drilling (HDD) will be used to cross the River Nore west of Ballyragget 110kV substation. HDD is a method of drilling under obstacles such as water courses, bridges, railways etc. in order to install cable ducts under the obstacle. The HDD methodology is outlined in detail in Section 4.8.2.6.1 of Chapter 4.

The avoidance of bridges has been a key consideration of the Proposed Development design. The likelihood of bridge/structural collapse will be further lowered by the implementation of good site management practices during the construction, operational and decommissioning phases.

16.4 Risk Assessment

This section outlines the possible risks associated with the Proposed Development for the construction, operational 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 Likely Significant Effects

16.4.1.1 Do-Nothing Scenario

If the Proposed Development were not to proceed, the existing use of the Proposed Wind Farm for small-scale agricultural farming practices would continue, and public road corridor along the Proposed Grid Connection Route.

If the Proposed Development were not to proceed, the opportunity to capture a significant part of County Laois's and County Kilkenny's as well as 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 and to diversify the local economy would also be lost.

16.4.1.2 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 flooding in areas surrounding the Proposed Development 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 Proposed Grid Connection Route.	Construction activity along Proposed Grid Connection Route 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 Proposed Development roads (Proposed Wind Farm access roads and public road network in which Proposed Grid Connection Route is proposed). Traffic Management not implemented
F	**Contamination** Discharge or spillage of fuel, chemical solvents into watercourse or percolated to groundwater. Discharge due to horizontal directional drilling (HDD) frack out on Proposed Grid Connection Route 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; Stockpiled excavated material becoming unstable and providing a point source of exposed sediment;

		Excavation works during the construction of the Proposed Development which may result in entrainment of sediment from the excavations during construction; and, Frack Out associated with HDD along Proposed Grid Connection Route underground electrical cabling route which may result in sediment release to surface water.
G	**Fire / Gas Explosion**	Equipment or infrastructure failure; Electrical problems; and Employee negligence.
H	**Collapse / damage to structures**	Earthquake, land slide, extreme weather events; and Vehicular collisions due to driver negligence on public roads. Traffic Management not implemented

16.4.1.3 Identification of Effect During Operation

Six 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		
I	**Severe Weather** Risk to operational activity on site, blade or turbine damage	Extreme weather- periods of heavy rainfall, taking into account climate change and strong winds.
J	**Flooding** Risk of flooding in areas surrounding the Proposed Development impacting the construction phase and leading to environmental emissions	Extreme weather- periods of heavy rainfall, taking into account climate change and strong winds
K	**Contamination** Discharge or spillage of fuel, chemical solvents, sewage or wastewater into	A vehicular incident on the public road involving fuel, wastewater or sewage transportation in the operational phase.

	watercourse or percolated to groundwater	Spill or leak of oil during operational maintenance.
L	**Fire / Gas Explosion**	Equipment or infrastructure failure; Electrical problems; and Employee negligence.
Potential to cause accidents and / or disasters.		
M	**Collapse / damage to structures**	Earthquake, land slide, extreme weather events; and Vehicular collisions due to driver negligence on public roads.
N	**Traffic Incident** Collisions onsite and offsite with vehicles involved in operation of Proposed Development.	Driver negligence or failure of vehicular operations on Proposed Wind Farm roads. Traffic Management not implemented

16.4.1.4 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		
O	**Severe Weather** Risk to decommissioning activity on the Proposed Development leading to environmental emissions	Extreme weather- periods of heavy rainfall, taking into account climate change and strong winds.
P	**Flooding** Risk of flooding in areas surrounding the Proposed Development 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.		
Q	**Traffic Incident**	Driver negligence or failure of vehicular operations on Proposed Wind Farm roads.

	Collisions onsite and offsite with vehicles involved in construction of Proposed Development.	Traffic Management not implemented.
R	**Contamination** Discharge or spillage of fuel, chemical solvents into watercourse or percolated to groundwater	Accidental fuel spillage during delivery to the Proposed Development. 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 16.2.4.2.2, 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.

16.4.1.5 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 and severe weather conditions impacting the identified road network is very unlikely when considering the assessment in Chapter 11 Climate (weather conditions recorded over the last 30 years within the area) and Chapter 15.1 – 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 very unlikely when considering the assessment in Chapter 11 and weather conditions recorded over the last 30 years within the area. The works programme for the groundworks part of the	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,	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			construction phase of the Proposed Development which is laid out in detail in the Construction and Environmental Management Plan (CEMP), will take account of weather forecasts and predicted rainfall in particular and construction will be paused if required. All construction works will be paused during a Red Weather Warning as issued by Met Éireann and will not recommence until the weather warning has been lifted and it has been deemed safe to do so.		with 'no 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 Proposed Development 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.	2	As detailed in Appendix 9-1, a flood risk identification study was undertaken to identify existing potential flood risks associated with the Proposed Development. In relation to the Proposed Wind Farm, the closest mapped historic and recurring flood events are situated in the River Nore catchment. The nearest recurring flood incident is mapped ~0.2km	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'.	2

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
			Damage to, or depletion of aquatic habitats and species;		from the north of the site No Proposed Development infrastructure within the site is proposed in the River Nore surface water catchment, and the Proposed Development is also not mapped within any OPW/CFRAM flood zones.		Flooding has the potential to cause increased sediment mobilisation however flooding is not anticipated and should any flooding occur, it would be localised.	
D	**Utility emergencies**	Construction activity along road network during the Proposed Grid Connection Route installation impacting on local services and utilities Connecting the Proposed Development to the national grid at the 110kV Ballyragget Substation	Illness or loss of life; Disruption to services	2	Confirmatory surveys will be carried out by the Contractor to ensure that the Proposed Grid Connection Route is designed to take into consideration any services and utilities with the road network. As such the risk of a utility emergency occurring during the construction of the Proposed Grid Connection Route is considered very unlikely.	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

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
E	**Traffic Incident**	Driver negligence or failure of vehicular operations on the Proposed Development roads (Proposed Wind Farm access roads and public road network in which Proposed Grid Connection Route is proposed). Traffic Management not implemented	Injury or loss of life.	3	The Traffic and Transport section of Chapter 15: Material Assets of this EIAR details traffic movements which relate to the Construction Phase of the Proposed Development. The Traffic Management Plan included as Appendix 15-2 details proposals for traffic movements entering and leaving the Site, and within the internal access roads. The internal road network within the Proposed Wind Farm has been designed to allow for 2 vehicles to pass on the road, and/or in passing bays, which will reduce the likelihood of a traffic incident or collision occurring within the Proposed Wind Farm. There will also be a speed limit imposed on the internal Proposed Wind Farm road network, which will also reduce the likelihood of any traffic incident or collision. As such, it can be determined that there is some 'opportunity, reason	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)
					or means' for a vehicle collision to occur on site or public roads, 'at some time.' An unlikely risk is therefore predicted. Staff will be trained/toolbox talks highlighting construction entrances and proper access and egress procedures.			
F	**Contamination – Fuel storage and handling** **-General Construction**	Fuel spillage during delivery to the Proposed Development. Failure of fuel storage tank or tanks in plant and machinery and vehicles. Drainage and seepage water resulting from infrastructure excavation.	Release of suspended solids to groundwater. Contamination of local drinking water supplies and groundwater aquifers. Groundwater and surface water emissions from construction activities including	2	As outlined in Chapter 4, fuel will be stored onsite at the Proposed Wind Farm 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 Proposed Wind Farm. Setback distances from sensitive hydrological features means that adequate room is maintained for the proposed drainage mitigation measures as detailed in Chapter 9. Detailed mitigation measures and methodologies for the control of emissions from Proposed Grid Connection Route works as	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' on environmental receptors through the use of bunded containment areas during construction. The Proposed Grid Connection Route is located in the existing road network which is of	4

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
		Stockpiled excavated material providing a point source of exposed sediment. Works during the construction of the Proposed Development which may result in entrainment of sediment from the excavations or HDD.	trench excavations and HDD Accidental spillage during refuelling.		described in the EIAR. Standard and specific mitigation to prevent accidents and indirect effects of accidents are included in the Proposed Development design and will be implemented.		low value environmental receptor. Horizontal Directional Drilling (HDD) is planned for a limited number of locations and will be controlled to prevent significant environmental effects should frack out occur. 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	Illness or loss of life; Damage to, or depletion of habitats and species; and	2	As outlined in Chapter 4, fuel will be stored on-the Proposed Wind Farm but in a bunded area to ensure containment and prevent spillages of fuel. No fuels, chemicals or solvents will be	2	Should a fire/explosion occur at the Proposed Development, a limited consequence in that there would be 'a limited number of people affected' with 'localised	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.		stored outside of the confines of the site. In accordance with Chapter 19 of the Safety, Health and Welfare at Work Act 2005 (the 2005 Act), the Proposed 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.		effects of short duration' on people and environmental receptors due to the nature of the Proposed Development 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 Laois and Kilkenny County Council Major Emergency Plans will work to reduce the consequence (both on people and the environment) of potential fire/explosions at the Proposed Development.	

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
H	**Collapse/ damage to structures**	Earthquakes, extreme weather events; and Vehicular collisions due to driver negligence on public roads.	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 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. Due to the transport of abnormal loads, i.e., turbine components, there is potential for bridge and/or road infrastructure collapse during turbine delivery. This impact may be exacerbated by extreme weather i.e., severe wind storms and heavy precipitation resulting from climate change. The Proposed Development will utilise the existing road network during the construction phase. It is proposed that large wind	2	The risk of infrastructure collapse during the operational phase will result in a limited consequence in that 'a limited number of people affected' with 'localised effects of short duration' on people and environmental receptors due to the nature of the Proposed Development.	2

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
					turbine components will be delivered to the Proposed Wind Farm under Garda escort. Having regard to public speed limits within the surrounding area of the Proposed Development, it is not predicted that any collision of vehicles and any infrastructure would result in significant damage/collapse. The avoidance of bridges or structural collapse, and structural reinforcement of bridge infrastructure has been a key consideration of the Proposed Development design.			
Operational Phase								
I	**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 very unlikely when considering the assessment in Chapter 11 and weather conditions recorded over the last 30 years within the area.	1	The risk of severe weather conditions during the operational phase will result in a minor consequence in that 'small number of people would be affected' should a severe weather occur,	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					with 'no fatalities and a small number of minor injuries with first aid treatment'.	
J	**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	As detailed in Appendix 9-1, a flood risk identification study was undertaken to identify existing potential flood risks associated with the Proposed Development. In relation to the Proposed Wind Farm, the closest mapped historic and recurring flood events are situated in the River Nore catchment. The nearest recurring flood incident is mapped ~0.2km from the north of the Site. No Proposed Development infrastructure within the site is proposed in the River Nore surface water catchment, and the Proposed Development is also not mapped within any OPW/CFRAM flood zones.	1	The risk of flooding during the operational 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
K	**Contamination**	A vehicular incident on the public road or	Damage to, or depletion of aquatic	2	As outlined in Chapter 4, fuel will not be stored on-site post construction therefore contamination caused by fuel	1	The risk of a fuel spillage or impact on surround drainage during the operational stage will	2

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
		Proposed Wind Farm internal road network involving fuel, wastewater or sewage transportation in the operational phase.	habitats and species Contamination of local drinking water supplies and groundwater aquifers.		stored on site is not considered to be a significant contamination risk. However, due to the presence of maintenance and monitoring vehicles, fuel leakage from onsite vehicle during the operational phase may occur. As such the likelihood of fuel leakages occurring is very unlikely.		result in a minor consequence in that there would be 'a small 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 9 which concludes that there will be no significant environmental effects.	
L	**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 Proposed Development shall be subject to a fire safety risk assessment which would assist in the identification of any major	1	Should a fire/explosion occur at the Proposed Development, a minor consequence in that there would be 'a small number of people affected' with 'localised effects of short duration' on people and environmental receptors due to the nature of the Proposed Development and the lack of infrastructure or fuel	2

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.		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 Laois and Kilkenny County Council Major Emergency Plans will work to reduce the consequence (both on people and the environment) of potential fire/explosions at the Proposed Development site.	
M	**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 Ireland. These are known as	2	The risk of infrastructure collapse during the operational phase will result in a limited consequence in that 'a limited number of people	2

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.			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. Having regard to public speed limits within the Proposed Wind Farm, it is not predicted that any collision of vehicles and any infrastructure would result in significant damage/collapse. As outlined in Chapter 11 of this EIAR, due to Ireland's latitudinal position, the probability of extreme weather events posing a threat to the built environment are low. However, in the circumstance of such a weather event occurring at the site of the Proposed Development during the operational phase, the measures set out in the HSE South-East (Area 5) Major Emergency Plan will be followed.		affected' with 'localised effects of short duration' on people and environmental receptors due to the nature of the Proposed Development.	

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
					Having regard to public speed limits within the Proposed Wind Farm site, it is not predicted that any collision of vehicles and any infrastructure would result in significant damage/collapse.			
N	**Traffic Incident**	Driver negligence or failure of vehicular operations on the Proposed Wind Farm roads. Traffic Management not implemented	Injury or loss of life.	3	A very low number of vehicles will access the Proposed Wind Farm site as part of the operational phase. As such, it can be determined that there is some 'opportunity, reason or means' for a vehicle collision to occur on the Proposed Wind Farm 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
Decommissioning Phase								
O	**Severe Weather**	Extreme weather-periods of heavy rainfall, taking into	Illness or loss of life; Damage to, or depletion of	2	The risk of severe weather is very unlikely when considering the assessment in Chapter 11 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	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	aquatic habitats and species;		Decommissioning works will be paused should a Status Red weather warning alert be issued by Met Eireann as is standard practice		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	
P	**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	2	As detailed in Appendix 9-1, a flood risk identification study was undertaken to identify existing potential flood risks associated with the Proposed Development. In relation to the Proposed Wind Farm, the closest mapped historic and recurring flood events are situated in the River Nore catchment. The nearest recurring flood incident is mapped ~0.2km from the north of the Site. No Proposed	1	The risk of flooding 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'.	2

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
			habitats and species;		Development infrastructure within the site is proposed in the River Nore surface water catchment, and the Proposed Development is also not mapped within any OPW/CFRAM flood zones.		Flooding has the potential to cause increased sediment mobilisation however flooding is not anticipated and should any flooding occur, it would be localised.	
Q	**Traffic Incident**	Driver negligence or failure of vehicular operations on the Proposed Wind Farm roads. Traffic Management not implemented	Injury or loss of life.	3	A limited number of vehicles will be permitted on the Proposed Development 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 the Proposed Development 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
R	**Contamination**	Fuel spillage during delivery to the Proposed Development.	Damage to, or depletion of aquatic habitats and species	2	As outlined in Chapter 4, fuel will be stored on-the Proposed Development but in a bunded area to ensure containment and prevent spillages of fuel. No fuels, chemicals or solvents will be	2	The risk of a fuel spillage or impact on surrounding drainage during decommissioning will result in a limited consequence where 'a limited number of people	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		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 9		affected' with 'localised effects of short duration' through the use of bunded containment areas during decommissioning. The potential residual environmental effects are described in detail in Chapter 9 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
H	Collapse/ damage to structures	1	2	2
Operational Phase				
I	Severe Weather	2	1	2
J	Flooding	2	1	2
K	Contamination	2	1	2
L	Fire / Gas Explosion	2	1	2
M	Collapse/ damage to structures	1	2	2
N	Traffic Incident	3	1	3
Decommissioning Phase				
O	Severe Weather	2	1	2
P	Flooding	2	1	2
Q	Traffic Incident	3	1	3
R	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, N, Q				
	2. Very Unlikely	B, C, D, I, J, K, L, O, P,	F, G, R			
	1. Extremely Unlikely	A,	H, M,			

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.

16.4.1.6 Contamination During Construction, Operation and Decommissioning

There is a potential risk of contamination from Proposed Development site activities during the construction, operational 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 8, Section 8.4 cand Chapter 9, Section 9.4, 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.

16.4.1.7 Fire/Explosion During Construction, Operation and Decommissioning

There is a potential risk of fire/explosion at the Proposed Development. 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 Proposed Development, and mitigation of the same during operation.

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, operation and decommissioning was identified as 'Contamination' of the site and risk of 'Fire/Explosion' occurring at the Proposed Development.

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 at the Proposed Development 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 8 Land, Soils and Geology, and Chapter 9 Water. The mitigation measures outlined in Chapter 9 to protect environmental receptors as well as the procedures and measures described in the Construction 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 4-2 of this EIAR. Upon a grant of planning permission for the Proposed Development, the CEMP will be updated to reflect the conditions stipulated in the consent 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 4-2 for the CEMP that sets out the minimum standards to be employed by the contractor.

All mitigation measures proposed as part of this project are also listed in Chapter 18: Schedule of Mitigation.

16.4.2.2 Mitigation – Fire/Explosion During Construction, Operation and Decommissioning

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 the Proposed Development, and mitigation of the same during operation.

As outlined in Section 4.3.4.1 of the EIAR, a detailed 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 4-2 for the CEMP that sets out the minimum standards to be employed by the contractor.

All mitigation measures proposed as part of this project are also listed in Chapter 18: Schedule of Mitigation.

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

Please refer to Chapter 18 Schedule of Mitigation and Monitoring Measures which details all proposed mitigation and monitoring measures for the construction, operation and decommissioning of the Proposed Development.

16.4.4.1 Monitoring During Construction

As outlined in Section 4.3.4.1 of the EIAR, a detailed 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 4-2 for the 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 the Proposed Development 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 4-4) the final 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. The Decommissioning Plan includes mitigation and monitoring measures that will be in place during the decommissioning phase. These can also be found in a Chapter 18 Schedule of Mitigation and Monitoring Measures which sets out all proposed Mitigation and Monitoring Measures for all three phases of the Proposed Development.

16.4.5 Impacts of Cumulative and In Combination Impacts

A search in relation to plans and projects that may have the potential to result in a cumulative impact with the Proposed Development on the environment was carried out as part of the EIAR. The Proposed Development has been considered, in combination with existing, permitted and Proposed Developments and plans (wind energy or otherwise), as set out in Section 2.9 in Chapter 2 of this EIAR, along with Appendix 2-3 of this 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, Section 2.9 and Appendix 2-3,

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 Development 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. Therefore, the cumulative residual effect of the Proposed Development to cause or be impacted by major accidents and natural disasters is not significant.