



Chapter 16: Major Accidents and Disasters

Coolglass Windfarm EIAR Vol 2

Coolglass Wind Farm Limited

Prepared by:

SLR Environmental Consulting (Ireland) Ltd

City Gate, Mahon 1000, Cork, T12 W7CV

SLR Project No.: 501.V00727.00006

27 June 2023

Revision: 3.0

Copyright © 2023 Coolglass Wind Farm Limited

All pre-existing rights reserved.

This document is supplied on and subject to the terms and conditions of the Contractual Agreement relating to this work, under which this document has been supplied.

Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
0.1 (Internal)	19 February 2023	COS / GOR / CL	AOB	
1.0 (Issue)	3 March 2023			CL
1.1 (revision)	14 April 2023	CL / GOR		
2.0 (Issue)	6 June 2023	GOR		CL
2.1 (internal)	22 June 2023	CL/OR		
3.0 (Issue)	27 June 2023			CL



Table of Contents

Acronyms and Abbreviations.....	iv
16.0 Major Accidents and Disasters.....	6
16.1 Introduction.....	6
16.1.1 Statement of Authority.....	6
16.2 Assessment Methodology.....	7
16.2.1 Legislative Context.....	7
16.2.2 Guidance Documents and Resources.....	8
16.2.3 Categorisation of the Baseline Environment.....	8
16.3 Assessment Methodology.....	9
16.3.1 Introduction.....	9
16.3.2 Site-Specific Risk Assessment Methodology.....	9
16.3.3 Risk Identification.....	9
16.3.4 Risk Classification.....	10
16.4 Vulnerability of the Project to Major Accidents and Natural Disasters.....	15
16.4.1 Flooding (Meteorological and Hydrological).....	16
16.4.2 Fire.....	16
16.4.3 Major Accidents Involving Dangerous Substances.....	17
16.4.4 Catastrophic Events.....	17
16.4.5 Landslides.....	18
16.4.6 Health and Safety.....	19
16.4.7 Turbine Safety.....	19
16.4.8 Electromagnetic Interference.....	19
16.4.9 Risk Assessment.....	20
16.4.10 Likely Significant Effects.....	20
16.4.11 Assessment of Effects During Construction.....	20
16.4.12 Assessment of Effect During Operation.....	21
16.4.13 Assessment of Effect During Decommissioning.....	22
16.4.14 Assessment of Effect – Summary.....	24
16.5 Mitigation Measures.....	29
16.6 Residual Effects.....	30
16.7 Cumulative Effects.....	30
16.8 Conclusion.....	33



Tables in Text

Table 16-1 Classification of Likelihood (Source: DoEHLG, 2010).....	10
Table 16-2 Classification of Impact (Source: DoEHLG, 2010).....	10
Table 16-3 Matrix for determining significance of effect. (Source DoEHLG 2010).....	12
Table 16-4 HSE Emergency Plan hazard types (HSE, 2022).....	13
Table 16-5 Risk Register - Construction Phase.....	21
Table 16-6 Risk Register – Operational Phase.....	22
Table 16-7 Risk Scores.....	22
Table 16-8 Consolidated Risk Score.....	28
Table 16-9 Risk Score Matrix.....	28
Table 16-10 Cumulative Assessment.....	31



Acronyms and Abbreviations

ABP	An Bord Pleanála
AWEA	American Wind Energy Association
BAI	Broadcasting Authority Ireland
CAP23	Climate Action Plan 2023
CCC	Carlow County Council
CDP	County Development Plan
CEMP	Construction Environmental Management Plan
CSO	Central Statistics Office
DOEHLG	Department of the Environment Heritage and Local Government
EDs	Electoral Divisions
EHSRs	Essential Health and Safety Requirements
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
ELF	Extremely Low Frequency
EMF	Electromagnetic Field
EMP	Emergency Response Plan
EPS	Emergency Power Supply
ESB	Electricity Supply Board
EU	European Union
EWC	European Works Council
EWEA	European Wind Energy Association
FWD	Falling Weight Deflectometer survey
GSI	Geological Survey Ireland
GVA	Additional Gross Value
HSA	Health and Safety Authority
HSE	Health Service Executive
HV	High Voltage
IARC	International Agency for Research on Cancer
ICNIRP	International Commission on Non-Ionising Radiation Protection
IFI	Inland Fisheries Ireland
IR	Infra-Red
IW	Irish Water
IWEA	Irish Wind Energy Association
LCC	Laois County Council
LCDP	Laois County Development Plan
LVIA	Landscape and Visual Impact Assessment
NESC	National Economic and Social Council



PCE	Pre Connection Enquiry
PCS	Pavement Condition Survey
PPE	Personal Protective Equipment
RESS	Renewable Energy Support Scheme
SAC	Special Area of Conservation
SEAI	Sustainable Energy Authority of Ireland
SEI	Sustainable Energy Ireland
SLR	SLR Consulting Limited
SWMP	Surface Water Management Plan
TBC	To be Confirmed
TDR	Turbine Delivery Route
WEI	Wind Energy Ireland
WFD	Water Framework Directive
WHO	World Health Organisation



16.0 Major Accidents and Disasters

16.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) describes the likely significant effects on the environment arising from the vulnerability of the proposed project (the "Proposed Development") as detailed in Chapter 3 to risks of major accidents and/or natural disasters.

It has been completed in accordance with the guidance set out by the Environmental Protection Agency (EPA) in 'Guidelines on Information to be contained in Environmental Impact Statements' (EPA, 2017) 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 is carried out in compliance with the EIA Directive as amended 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 all 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, including flooding, fire, dangerous substances, catastrophic events and landslides;
- 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 chapter of the EIAR was prepared Gerald O'Reilly, BSc PG Dip, and Crystal Leiker, BA Soc Sc, M.Plan, of SLR Consulting.

- Gerald is a qualified Town Planner (MIPI) with 14 years' experience. He holds a Bachelor of Science degree in Spatial Planning from Technical University Dublin and a Postgraduate Diploma in Public Management from the University of Ireland. Gerald has several years in experience authoring EIA and ES chapters in the jurisdictions of Ireland and Northern Ireland.
- Crystal is a qualified (MIPI) Town Planner with 8 years' experience. She holds a Bachelor of Social Science and a Masters Planning and Sustainable Development, both from University College Cork. Crystal has 8 years of experience in the preparation of EIA chapters for Irish projects in renewables, infrastructure and tourism projects.



16.2 Assessment Methodology

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

- European Directive (2012/18/EU) – the “Seveso – III Directive”¹
- HSE Emergency Management services
- S.I. No. 209 of 2015 Control of Major Accident Hazards involving Dangerous Substances “COMAH”²
- ArcGIS Seveso site location map viewer³
- the National Planning Framework 2040;
- the Regional Spatial and Economic Strategy for the Eastern and Midland Region;
- Laois County Development Plan 2021 – 2027;
- Laois County Council Website
- Central Statistics Office (CSO);

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

16.2.1 Legislative Context

An assessment of the following key elements was undertaken in accordance with the EIA Directive as amended:

- 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 the environment

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

“(8) A description of the expected significant adverse effects of the project on the environment deriving from the vulnerability of the project to risks of major accidents and/or disasters which are relevant to the project concerned. Relevant information available and obtained through risk assessments pursuant to Union legislation such as Directive 2012/18/EU of the European Parliament and of the Council or Council Directive 2009/71/Euratom or relevant assessments carried out pursuant to national legislation may be used for this

¹ European Commission Seveso III https://environment.ec.europa.eu/topics/industrial-emissions-and-safety/industrial-accidents_en date accessed 20/6/2023

² European Union(Control of major accident hazards Involving dangerous substances)(Revocation) Regulations2015. https://www.hsa.ie/eng/Your_Industry/Chemicals/Legislation_Enforcement/COMAH/SI_208_of_2015.pdf date accessed 20/6/2023

³ Seveso (upper and lower tier) map viewer: <https://www.arcgis.com/home/item.html?id=a01b5a0a6ff24f10adff30beaa3b6fd0>. Date Accessed 20/6/2023



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 Guidance Documents and Resources

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
- 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
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (Environmental Protection Agency, August 2022);
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Housing, Planning and Local Government, August 2018).
- Notified Seveso Establishments on the HSA website⁴
- Seveso Site Locations, an ArcGIS library of mapped Seveso locations in the Republic of Ireland⁵

16.2.3 Categorisation of the Baseline Environment

A desk-study based on the above sources 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.

A site visit was undertaken to inform this chapter in November of 2021. A follow-up site visit was undertaken in May 2022, November 2022 and February 2023. Changes to the area have been noted and included where relevant. The Study Area for the site visit comprised a 2km radius from the Site to identify sensitive receptors (hospitals, community facilities, schools) and other receptors such as telecommunications masts, amenities, recreation trails, tourism areas and to identify socio-economic considerations in the area such as visible agriculture, minerals, manufacturing and service industry. Additionally, the settlements of Timahoe, Swan and Wolfhill were investigated to ascertain what sensitive and other receptors were present within each.

With regard to the control of major accident hazards involving dangerous substances, on examination of upper and lower tier Seveso Establishments in the surrounding region of the Proposed Development, no Seveso Establishments were identified in immediate proximity to the site (less than 5km). The nearest Seveso Establishment to the Site is ENVA, located in Portlaoise,

⁴ https://www.hsa.ie/eng/your_industry/chemicals/legislation_enforcement/comah/list_of_establishments/ Date Accessed 13/5/2023

⁵ <https://www.arcgis.com/home/item.html?id=a01b5a0a6ff24f10adff30beaa3b6fd0> Date Accessed 13/5/2023



13 km northwest of the nearest turbine (T2). ENVA is classified as an Upper Tier Seveso Site. The next nearest Seveso Establishment is Grassland Fertilisers in Kilkenny which is located 29km from the nearest turbine (T11).

16.3 Assessment Methodology

16.3.1 Introduction

This assessment is focused on an understanding that the Proposed Development will be designed, built and operated in line with the methodologies and measures prescribed in this EIAR. Therefore, the overall vulnerability of the Proposed Development to risks of major accidents and natural disasters is considered low.

Current EIA practice already includes an assessment of some potential accidents and disaster scenarios such as pollution incidents to ground and watercourses as well as assessment of flooding events (see Chapter 9 Water) and peat instability (see Chapter 8 Land Soils Geology). These are described in detail in the relevant EIAR assessment chapters. In relation to Human Health, please refer to Chapters 5 Population, Human Health and Material Assets for further detail.

16.3.2 Site-Specific Risk Assessment Methodology

A site-specific risk assessment identifies and quantifies risks focusing on unplanned, but possible and plausible events occurring during the construction and operation of the Proposed Development. The approach to identifying and quantifying risks associated with the Proposed Development by means of a site-specific risk assessment is derived from the EPA 'Guidance on Assessing and Costing Environmental Liabilities' document⁶. The following steps were taken as part of the site-specific risk assessment:

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

16.3.3 Risk Identification

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

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

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

⁶ 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



16.3.4 Risk Classification

16.3.4.1 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
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.

16.3.4.2 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. 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	No contamination, localised effects
		Infrastructure	<€0.5M
		Social	Minor localised disruption to community services or infrastructure (<6 hours).



Ranking	Likelihood	Impact	Description
2	Limited	Life, Health, Welfare	<ul style="list-style-type: none"> 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.
		Environment	Simple contamination, localised effects of short duration
		Infrastructure	€0.5-3M
		Social	Normal community functioning with some inconvenience.
3	Serious	Life, Health, Welfare	<ul style="list-style-type: none"> 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.
		Environment	Simple contamination, widespread effects or extended duration
		Infrastructure	€3-10M
		Social	Community only partially functioning, some services available.
4	Very Serious	Life, Health, Welfare	5 to 50 fatalities, up to 100 serious injuries, up to 2000 evacuated
		Environment	Heavy contamination, localised effects or extended duration
		Infrastructure	Community functioning poorly, minimal services available
		Social	Community functioning poorly, minimal services available
5	Catastrophic	Life, Health, Welfare	Large numbers of people impacted with significant numbers of fatalities (>50), injuries in the hundreds, more than 2000 evacuated.
		Environment	Very heavy contamination, widespread effects of extended duration.
		Infrastructure	>€25M
		Social	Serious damage to infrastructure causing significant disruption to, or loss of, key services for prolonged period. Community unable to function without significant support.

16.3.4.3 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 Matrix for determining significance of effect. (Source DoEHLG 2010)

		Consequence				
		1 Minor	2 Limited	3 Serious	4 Very Serious	5 Catastrophic
Likelihood	5 Very Likely	Low	Moderate	High	High	High
	4 Likely	Low	Moderate	Moderate	High	High
	3 Unlikely	Low	Low	Moderate	Moderate	High
	2 Very Unlikely	Low	Low	Low	Moderate	Moderate
	1 Extremely Unlikely	Low	Low	Low	Low	Low
	Normal Emergency			Major Emergency		

The HSE Emergency Management: Emergency Plans outline several hazard categories which may have the potential to lead to a major emergency. While the area within County Laois is not identified as an in the Emergency Plan on the HSE website, this assessment takes into consideration the general hazard categories utilised in Emergency Plans. The hazard categories include Natural, Transportation, Technological and Civil. The hazard categories, types and subtypes, and their relevance to the Development, are listed below in **Table 16-4**.



Table 16-4 HSE Emergency Plan hazard types (HSE, 2022)

Category	Type	Subtype	Relevance to the Proposed Development
Natural Hazards			
Meteorological	Storm / Gale	Both coastal and inland areas can be affected by high winds	Poor driving conditions, loss of infrastructure, flooding, falling trees, poor driving conditions
	Heavy Snow	Blizzards – poor visibility	Poor driving conditions
		Icy roads / impassable roads	Poor driving conditions
		Hypothermia	Public health risk
		Freezing of supply network	Lack of road grit
	Severe Cold and Frost or extremes of temperature	Icy roads / impassable roads	Poor driving conditions
		Hypothermia	Public health risk
		Freezing of supply network	Lack of road grit
	Thunder and lightning	Road traffic collisions	Loss of infrastructure Poor driving conditions
	Dense and persistent fog		
Heat wave / drought	Heat	Public health risk Water shortage	
Hydrological	Flooding / heavy rain	Coastal / inland	Potential for flooding via on-site rivers May lead to flooding in low lying areas or areas with poor drainage
Geological	Landslide	Landslide	Not Applicable
	Forest / wilderness fire	Fire	The majority of the Proposed Development site is commercial forestry
	Air pollution		
Transportation hazards			
Aviation	Aircraft collision / loss	Mid air and land	Not applicable
Roads	Multiple road traffic collisions	Roads	Public roads via which construction staff and materials access the site.
	Hazmat		Fuel transport to / from site
	Bridges		Not Applicable
Water	Inland waterways	Pleasure craft / cruises	Not applicable
	Coastal	Car ferry / passenger ferries	Not applicable



Category	Type	Subtype	Relevance to the Proposed Development
Technological Hazards			
Industrial accidents	Explosions		Damage to infrastructure, personal injuries / fatalities
	Petrochemical fires		Personal injuries. Severe burns, fatalities, air pollution
	Industrial fires	LPG Tank Fire	Not Applicable
	Gas emission		Not Applicable
	Fluid / fuel emission		Refuelling on site
Explosions	Domestic		Not Applicable
	Bomb		Not Applicable
	LPG	LPG Tank Fire	Not Applicable
	Pipeline		Not Applicable
Fires			Air Pollution
Building Collapse			Not Applicable
Hazardous Substances	Biological	Accident at site	Not Applicable
		Transportation accident	Hazmat on roads
	Radiological	Weapons	Not Applicable
		Leak / weapons	Not Applicable
		"dirty bomb"	Not Applicable
		Industrial Accident	Damage to infrastructure Personal injuries / fatalities
	Health Facilities	Not Applicable	
Pollution / Contamination	Air / Water Pollution		Fire
			Sediment lade water run off
			Fuel / hydrocarbon spill / leak
Civil Hazards			
Major Crowd Safety	Movement, Crushing	Pop concerts, sports, events, firework displays, air shows	Not Applicable
Loss of Critical Infrastructure	Energy and Power Supply	Electricity	Connection to National grid
		Natural gas	Not Applicable
		Fuel Oil	Not Applicable
		Communications	Telecom operators, mobile phone networks
Food Situation Crisis		Food contamination or drought	Not Applicable
Water Supply		Shortage / contamination, freezing or flooding	Not Applicable
Epidemics and pandemic		Communicable diseases	Not Applicable



Category	Type	Subtype	Relevance to the Proposed Development
Animal Disease		Foot & Mouth, Avian Influenza	Not Applicable
Terrorism	Bombs	Car bombs	Not Applicable
		Bombs in buildings	Not Applicable
		Fire bombing	Not Applicable
	CBRNE disruption		Not Applicable
		Bomb scares	Not Applicable

16.4 Vulnerability of the Project to Major Accidents and Natural Disasters

EU Directive 2014/52/EU which amends Directive 2011/92/EU states the following in relation to vulnerability of a project to natural disaster:

“In order to ensure a high level of protection of the environment, precautionary actions need to be taken for certain projects which, because of their vulnerability to major accidents, and/or natural disasters (such as flooding, sea level rise, or earthquakes) are likely to have significant adverse effects on the environment. For such projects, it is important to consider their vulnerability (exposure and resilience) to major accidents and/or disasters, the risk of those accidents and/or disasters occurring and the implications for the likelihood of significant adverse effects on the environment.”

The following section considers the Proposed Development vulnerability to major accidents and natural disasters, potential adverse impacts on human health and the environment, the magnitude of potential impacts, the likelihood of potential impacts and considers the preparedness of the Proposed Development in case of accident, disaster or emergency.

Should a major accident or natural disaster occur, the potential sources of pollution onsite during the construction and operational phases of the Proposed Development are limited. The primary sources with the potential to cause significant environmental pollution and associated negative effects on human health and the environment include the bulk storage of hydrocarbons, chemicals and wastes. In the case of the Proposed Development, the storage of chemicals of this kind are very limited.

There is limited potential for significant natural disasters to occur at Proposed Development as Ireland does not suffer from extreme temperatures like that of many countries at a similar latitude due to the dominant influence of the Gulf Stream. This provides Ireland with a mild temperate climate. Potential natural disasters that may occur are therefore limited to:

- Flooding;
- Fire;
- Major incidents involving dangerous substances;
- Catastrophic events; and
- Landslides.



16.4.1 Flooding (Meteorological and Hydrological)

In the event of extreme weather conditions there is potential for the Proposed Development to impact on human health in the surrounding environment due to increased surface water runoff as a result of additional impermeable surfaces. This has potential to add to flood risk which may impact on human safety (including traffic), water quality, biodiversity, soil stability, material assets and archaeological or architectural heritage. It is unlikely that potential increase in flood risk will impact on noise and vibration, air and climate, landscape and visual and telecommunication and aviation. If unmitigated, the magnitude of these consequences has potential to be significant resulting in potential injury or fatality, property damage, infrastructure damage and damage to ecosystems.

Due to inclusion of mitigation by design, the increased surface water runoff produced by the Proposed Development is considered negligible and therefore in the event of extreme weather conditions, it is unlikely that the Proposed Development will result in increased flood risk and as such will not result in negative effects on human safety (including traffic), water quality, biodiversity, soil stability, material assets and archaeological or architectural heritage.

The risk of flooding is addressed in Chapter 9: Hydrology and Water Quality, which concludes that the Proposed Development has a minimal impact on flooding risk in the surrounding area and therefore the increased risk of flooding as a result of the Proposed Development is negligible. In the event of extreme weather conditions, the proposed surface water drainage will manage storm water avoiding significant impact on the Proposed Development's infrastructure.

During the construction phase of the Proposed Development, emergency protocol will be in place in the unlikely occurrence of a flooding event.

An emergency response plan is set out in Section 6.1 of the Construction Environmental Management Plan (CEMP) included in Technical Appendix 3.2 found in Volume III of this EIAR. As set out in Chapter 8, earthworks are will not be scheduled during forecast severe weather conditions in order to avoid potential effect on water quality and aquatic biodiversity due to soil erosion. Proposed mitigation measures for flood risk are set out in Chapter 9: Hydrology and Water Quality.

16.4.2 Fire

In respect of fire, in May 2017 a major gorse/ground vegetation fire incident took place in proximity to the 169MW Galway Wind Park. This incident highlights fire as a potential impact for the Proposed Development, in particular, given that the majority of the site is adjacent to forestry. It should be noted that a significant number of wind farms are built within forestry in Ireland. In order to avoid impact from potential forest fires, a security management plan will be put in place to control the potential spread of forest fires. This will be achieved through the implementation of fire breaks within the lands and the training of staff in firefighting. Fire plans will be reviewed and updated where necessary and firefighting is checked annually. Furthermore, the proposed infrastructure including turbines, substations, battery storage and met masts will be appropriately set back from the surrounding treelines.

In the event that electrical equipment catches fire at the Proposed Development, and is confined to the Proposed Development, there is potential for impact on air quality due to additional CO₂ being released from the burning of material. This is likely to have an imperceptible impact on air quality, human health and biodiversity and will be offset by the carbon dioxide savings associated with the Proposed Development which will displace between 47,964 - 52,325 tonnes of CO₂ per annum.



In the event that electrical equipment catches fire at the Proposed Development and spreads to the surrounding forested areas there is potential for impact on human health and safety, air quality, water quality, biodiversity, soils, material assets, archaeological or architectural heritage and landscape and visual receptors. The magnitude of these consequences has potential to be significant, resulting in potential injury or fatality, property damage, infrastructure damage, loss of forested lands and damage to ecosystems- the Proposed Development is not predicted to give rise to any effects on noise, vibration, telecommunication or aviation.

In line with IWEA Health and Safety Guidelines for the Onshore Wind Industry (2011), Emergency Response Plans will include emergency response procedures for initial actions in the event of a fire. Records will be kept for testing of fire alarms and drills and maintenance/inspection of fixed and portable firefighting equipment. Information will be provided to employees on fire safety and fire prevention, including risks of and control measures to prevent fire outbreak, evacuation procedures and those responsible for their implementation, and the use of firefighting equipment, in line with HSA guidance.

During the construction phase of the Proposed Development, an emergency response plan will be in place as set out in Section 6.1 of the CEMP.

16.4.3 Major Accidents Involving Dangerous Substances

Major industrial accidents involving dangerous substances pose a significant risk to human health and to the environment both on and off the site of the accident. The Health and Safety Authority (HSA) of Ireland list all upper and lower tier SEVESO establishments throughout Ireland. The Proposed Development site is not close to any site regulated under the Control of Major Accident Hazards Involving Dangerous Substances Regulations i.e. SEVESO site, that would fall within the consultation radius distance, of 500m, from a SEVESO site as per Development Plan policy.

16.4.4 Catastrophic Events

According to the Health and Safety Authority (HSA, operation at wind farms are still considered a workplace (albeit not permanently occupied). All persons who have control to any extent over the Proposed Development have duties to ensure, so far as reasonably practicable, that the wind-farm does not pose a risk to those working there or to anyone not employed there but who may be affected by activities on the wind-farm.

Each wind-turbine, incorporating the tower, blades, gearbox and ancillary equipment in the tower and nacelle are considered to be machines under the European Machinery Directive [2006/42/EC]. The duties on designers and manufacturers of machinery are set out in the Machinery Directive, which has been transposed into national law by the 2008 European Communities (Machinery) Regulations [S.I.No.407/2008]. All wind turbines should be CE marked, which is in effect, a mark of assurance that the wind-turbine complies with the essential health and safety requirements (EHSRs) of EU supply law. In all cases, the manufacturer or the manufacturer's authorised representative must compile information in a technical file confirming how the machine complies with these requirements. The maintenance of turbines and ancillaries must only be carried out by competent, trained and qualified personnel. The system of work for operation and maintenance must be planned, organised, maintained and revised to ensure safety of personnel.

Potential catastrophic events associated with operational wind turbines include:

- Wind turbine toppling (due to foundation or tower failure);



- Wind turbine rotational failure in extreme wind conditions (due to control system or rotor break failure); and Fire.

The primary mitigation against a catastrophic event that may endanger the health and safety of the public implemented at design stage through adequate siting of wind turbines which provide sufficient set back distances from occupied buildings and other infrastructure to avoid the risk of impact in the event of wind turbine collapse.

The maximum proposed tip height for wind turbines at the development site is 180m. No wind turbine is located within 722m of a residential dwelling or 400m of the nearest commercial building. No turbines have been located within 2 x tip height of the proposed on-site substations in accordance with EirGrid general functional specifications. A minimum setback distance of 3.5 x rotor diameter has been imposed between wind turbines and existing HV overhead lines in accordance with EirGrid general functional specifications.

Turbines have been sited with consideration for existing ground conditions to minimise the risk of turbine foundation failure, toppling and landslide. Intrusive site investigations have been carried out to confirm ground conditions at turbine locations as well as slope stability analysis for turbines located on sloped ground. Other design mitigation measures that have been employed for the siting of wind turbines include the following:

- Areas mapped by GSI as having a high susceptibility to landslides have been avoided;
- Turbine locations have been assessed by site investigation and visually by geotechnical engineers prior to confirmation of final siting;
- If turbines are located on sloped ground, particular care has been taken in design of road and hard standing alignments, cutting and filling and drainage;
- Peat probing has been carried out at turbine locations. Locating turbines in peat has been avoided where possible. See Chapter 8: Land, Soil and Geology for more information on ground conditions.

Wind turbines are fitted with sophisticated remote monitoring and control systems to manage rotational speed. Turbines also have the capability to shut down in storm conditions through adjustment of blade pitch. Turbines are also fitted with emergency power supply (EPS) units to provide backup power in the event of a loss of mains power supply that could impact the control system.

Wind turbines shall be fitted with fire suppression systems and will have emergency escape procedures in place for operational staff in the event of fire in a wind turbine. An emergency response plan is contained in the CEMP included in Technical Appendix 3.2 found in Volume III of this EIAR.

16.4.5 Landslides

Landslides pose a risk to a range of environmental receptors including human safety (including traffic), hydrology and water quality, biodiversity, land, soil, geology and hydrogeology, material assets and archaeological and cultural heritage. These impacts can have a significant to profound impact on environmental sensitivities, depending on the scale of the landslide and the receiving environment.

Chapter 8: Land, Soils and Geology considers the susceptibility of the Proposed Development to landslides. The GSI Landslide Susceptibility database indicates that the Proposed Development and proposed infrastructure locations are generally located within areas of 'Low' susceptibility with 2 no. turbines located in areas considered 'Moderately High' susceptibility and 1 no. turbine locate on lands considered 'Low to Moderately Low' susceptibility.



As detailed in *Chapter 8: Land, Soils and Geology*, a slope stability assessment was carried out at the Proposed Development site to investigate potential slope failure. Safety ratios for potential slope failures indicates that the slopes are considered stable in the long-term drainage conditions. No Peat/Peaty was identified on site. As <0.5m of peat has been recorded, a peat stability assessment is not considered to be relevant for the Proposed Development. Therefore, it is concluded that the potential risk of landslide at the Proposed Development is negligible.

Mitigation by design has been incorporated into the Proposed Development to avoid potential effects from landslides. Mitigation measures for potential landslide/slope failure is set out in *Chapter 8: Land, Soils and Geology*. Mitigation measures relating to flood risk which could have a bearing on potential landslides are detailed in *Chapter 9: Hydrology and Water Quality*.

During the construction phase of the Proposed Development, an emergency response plan will be in place as set out in Section 6.1 of the CEMP in the unlikely event of a landslide/slope failure.

16.4.6 Health and Safety

During construction of the Proposed Development, all staff will be made aware of and adhere to the Health & Safety Authority's 'Guidelines on the Procurement, Design and Management Requirements of the Safety, Health and Welfare at Work (Construction) Regulations 2013'. This will encompass the use of all necessary Personal Protective Equipment and adherence to the site Health and Safety Plan. An Emergency Response Plan (ERP) will be implemented and adhered to on site. The ERP provides details of procedures to be adopted in the event of an emergency in terms of site health and safety and environmental protection. Please see Chapter 3 Description of Development and Appendix 3.2 CEMP for details.

16.4.7 Turbine Safety

Wind turbines do not pose any threats to the health and safety of the general public. According to the 'Wind Energy Development Guidelines for Planning Authorities 2006' issued by the Department of the Environment, Heritage and Local Government (DoEHLG), there are no specific safety concerns related to the operation of wind turbines. Therefore, there is no need for fencing or other restrictions for safety purposes, and individuals and animals can safely approach the base of the turbines.

Although the DoEHLG Guidelines acknowledge a very remote possibility of injury to individuals from flying ice fragments or damaged blades, most turbine blades are composite structures without bolts or separate components, reducing the risk. The accumulation of ice on the turbines is unlikely to cause problems as the wind turbines will be equipped with anti-vibration sensors. These sensors will detect any imbalance resulting from ice formation on the blades and delay the turbine's operation until the blades have been de-iced.

The turbine blades will be constructed using glass reinforced plastic, which effectively prevents an increase in lightning strikes within the Proposed Development site and the surrounding area. Lightning protection conduits will be an integral part of the turbine construction. Lightning conduction cables, enclosed in protective conduits, will follow the path of the electrical cables from the nacelle to the base of the turbine. These conduction cables will be properly grounded near the turbine base, and the earthing system will be installed during the construction of the turbine foundations.

16.4.8 Electromagnetic Interference

The installation of underground electric cables of the proposed capacity is a common practice across the country and adhering to the required specifications does not raise any specific health concerns. The extremely low frequency (ELF) electric and magnetic fields (EMF) associated with



the operation of these cables fully comply with the international guidelines for ELF-EMF established by the International Commission on Non-Ionizing Radiation Protection (ICNIRP), an official advisory body to the World Health Organisation. Additionally, the EMF exposure of the proposed cables meets the EU guidelines for human exposure to EMF. As a result, there will be no negative impact on properties (residential or otherwise), construction personnel, operational and maintenance staff, or recreational users of the site, as the ICNIRP guidelines will not be exceeded at any distances, including directly above the cables.

For further practical information on EMF, the ESB document 'EMF & You' (ESB, 2017) provides additional details. The potential impacts of electromagnetic interference on telecommunications and aviation are elaborated in Chapter 5 of the Environmental Impact Assessment Report (EIAR) under the section titled "Population, Human Health, and Material Assets."

16.4.9 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 **Table 16-2**.

As outlined in Section 16.3.4.3, 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.

16.4.10 Likely Significant Effects

16.4.10.1 Do-Nothing Scenario

In the event that the Proposed Development does not proceed, the existing land use will continue for agricultural and forestry purposes for the foreseeable future.

In the absence of renewable energy development, it is possible that there will be a continuance of excessive greenhouse gas emissions and consumption of fossil fuels.

The opportunity to harness the wind energy capacity of County Laois would be lost, further constraining the State from achieving its renewable energy targets of 70% by 2030. The net displacement of CO₂ over the operational lifetime (35 years) of the Proposed Development ranges between 1,678,740 to 1,831,375 (Vestas). If the Proposed Development is not constructed, the displacement of CO₂ per annum will not be achieved.

It is also envisaged that if the Proposed Development does not proceed, there will be no employment opportunities relating to the construction, operation and decommissioning of the Proposed Development, resulting in a net loss of economic activity in County Laois. No rates or development contributions will be made payable to Laois County Council by the developer and no Community Benefit Fund Scheme will be put in place in the locality.

16.4.11 Assessment of Effects During Construction

A risk register has been developed which contains all potentially relevant risks identified during the construction phase of the Proposed Development. Six risks (a – f) specific to the construction of the Proposed Development have been identified and are presented in **Table 16-5**.



16.4.11.1 Risk Assessment

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

Table 16-5 Risk Register - Construction Phase

Risk ID	Potential Risk	Potential Cause
Potential Vulnerability to disaster risk		
A	Severe Weather Risk to construction activity on site	Extreme weather- periods of heavy rainfall, taking into account climate change and strong winds
B	Flooding	Extreme weather- periods of heavy rainfall, taking into account climate change and strong winds
C	Peat Stability Movement of peat within the site during construction	Mismanagement of excavated material on site Severe weather conditions- storm, flooding.
Potential to cause accidents and / or disaster		
D	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 Plan not implemented
E	Contamination Discharge or spillage of fuel, chemical solvents into watercourse or percolated to groundwater	Fuel spillage during delivery to site. Failure of fuel storage tank or tanks in plant and machinery and vehicles. Drainage and seepage water resulting from infrastructure excavation; Stockpiled excavated material providing a point source of exposed sediment; Construction of the Proposed Development cable trench resulting in entrainment of sediment from the excavations during construction; and, Erosion of sediment from emplaced site drainage channels.
F	Industrial Accident Fire, gas explosion	Equipment or infrastructure failure; Electrical problems; and Employee negligence.

16.4.12 Assessment of Effect During Operation

Six risks specific to the operation of the proposed development have been identified and are presented in **Table 16-6**.



Table 16-6 Risk Register – Operational Phase

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

16.4.13 Assessment of Effect During Decommissioning

Four risks specific to the decommissioning of the proposed development have been identified and are presented in **Table 16-7**.

Table 16-7 Risk Scores

Risk ID	Potential Risk	Potential Cause
Potential Vulnerability to disaster risk		
M	Severe Weather Risk to decommissioning activity on site	Extreme weather- periods of heavy rainfall, taking into account climate change and strong winds
N	Flooding of site High levels of surface water on site	Extreme weather- periods of heavy rainfall, taking into account climate change and strong winds
Potential to cause accidents and / or disasters.		
O	Traffic Incident Collisions onsite and offsite with vehicles involved in construction of Proposed	Driver negligence or failure of vehicular operations on site roads. Traffic Management not implemented



Risk ID	Potential Risk	Potential Cause
	Development	
P	Contamination Discharge or spillage of fuel, chemical solvents into watercourse or percolated to groundwater	Fuel spillage during delivery to site. Failure of fuel storage tank or tanks in plant and machinery and vehicles. Drainage and seepage water resulting from infrastructure excavation; Erosion of sediment from emplaced site drainage channels.
Q	Industrial Accident - Fire/Gas explosion	Petrochemical Fires causing personal injury, structural damage and forest fires.
R	Loss of Critical Infrastructure	Electrical fault at substation bay

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 Section 16.4.14..

The risk register is based upon possible risks associated the Proposed Development. As outlined in Section 16.3.4.3, 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.



16.4.14 Assessment of Effect – Summary

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
Construction Phase								
A	Severe Weather	Extreme weather periods of heavy rainfall, taking into account climate change and strong winds	<ul style="list-style-type: none"> Illness or loss of life; Sedimentation of nearby watercourse Damage to, or depletion of aquatic habitats and species; 	3	The risk of severe weather is unlikely when considering the assessment in Chapter 6 and weather conditions recorded over the last 30 years within the area.	1	The risk of severe weather conditions during the construction phase will result in a minor consequence in that 'small number of people would be affected' should a severe weather occur, with 'no fatalities and a small number of minor injuries with first aid treatment'. No contamination, localised effects.	3
B	Flooding	Extreme weather- periods of heavy rainfall, taking into account climate change and strong winds	<ul style="list-style-type: none"> Illness or loss of life; Sedimentation of nearby watercourse Damage to, or depletion of aquatic habitats and species; 	2	The risk of flooding is considered very unlikely when taking into assessment in Chapter 9 of the EIAR and due to no recurring or historic flood incidents being recorded within the Wind Farm site or along the Grid Connection route. account the baseline	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' No contamination of environment (e.g. watercourses), localised effects.	2
C	Peat Stability	Mismanagement of excavated material on site Extreme weather conditions	Movement of soils within the site; Sedimentation of nearby watercourse; Damage to, or depletion of aquatic habitats and species;	2	The Proposed Development has been designed to minimise the potential for soil movement. There is no peat on the site	2	The risk of soil instability during the construction phase will result in a limited consequence in that there would be a limited number of people affected with localised effects of short duration. Simple contamination of environment (e.g. watercourses), localised effects of short duration.	2
D	Traffic Incident	<ul style="list-style-type: none"> Driver negligence or failure of vehicular operations on site roads. Traffic Management not implemented or not adhered 	Injury or loss of life.	3	<ul style="list-style-type: none"> 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
E	Contamination	Fuel spillage during delivery to site. Failure of fuel storage tank or tanks in plant and machinery and vehicles. Drainage and seepage water resulting from infrastructure excavation; Stockpiled excavated material providing a point source of exposed sediment; Construction of the Proposed Development resulting in entrainment of sediment from the excavations during construction; and, Erosion of sediment from emplaced site drainage channels	Damage to, or depletion of aquatic habitats and species. Release of suspended Solids to surface watercourses and could result in an increase in the suspended sediment load, resulting in increased turbidity which in turn could affect the water quality and fish stocks of downstream water bodies	2	As outlined in Chapter 3 and the CEMP Appendix 3.2, fuel will be stored on-site but in a bunded area to ensure containment and prevent spillages of fuel. No fuels, chemicals or solvents will be stored outside of the confines of the site Setback distances from sensitive hydrological features means that adequate room is maintained for the proposed drainage mitigation measures as detailed in Chapter 9 Water.	2	The risk of a fuel spillage or impact on surround drainage during the construction will result in a limited consequence in that there would be 'a limited number of people affected' with 'localised effects of short duration' through the use of bunded containment areas and proposed drainage mitigation measures during construction. Simple contamination of environment (e.g. watercourses), localised effects of short duration.	4



Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
F	Industrial Accident - Fire/Gas Explosion Fuel spillage/storage Electrical problems; and Employee negligence	Equipment or infrastructure failure; Damage to, or depletion of habitats and species; and Impacts on ambient air quality.	Illness or loss of life;	2	As outlined in Chapter 3 and the CEMP Appendix 3.2, fuel will not be stored on-site post construction therefore fuel is not considered to be a significant fire risk. In accordance with Chapter 19 of the Safety, Health and Welfare at Work Act 2005 (the 2005 Act), the development shall be subject to a fire safety risk assessment which would assist in the identification of any major risks of fire on site.	2	Should a fire/explosion occur at the site, a limited consequence in that there would be 'a limited number of people affected' with 'localised effects of short duration' due to the nature of the project and the lack of infrastructure or fuel storage during operation that would result in any such incident. There will be 'normal community functioning' in the area with 'some inconvenience'. Simple contamination of environment (e.g. watercourses), localised effects of short duration.	4
Operational Phase								
G	Contamination	A vehicular incident, refuelling incident, wastewater or sewage transportation in the operational phase.	Damage to, or depletion of aquatic habitats and species. Release of suspended solids to surface watercourses and could result in an increase in the suspended sediment load, resulting in increased turbidity which in turn could affect the water quality and fish stocks of downstream water bodies.	2	As outlined in Chapter 3 and the CEMP Appendix 3.2, fuel will be stored on-site but in a bunded area to ensure containment and prevent spillages of fuel. No fuels, chemicals or solvents will be stored outside of the confines of the site Setback distances from sensitive hydrological features means that adequate room is maintained for the proposed drainage measures as detailed in Chapter 8	2	The risk of a fuel spillage or impact on surrounding drainage during the operational stage will result in a limited consequence in that there would be 'a limited number of people affected' with 'localised effects of short duration' through the use of bunded containment areas during operation. Simple contamination of environment (e.g. watercourses), localised effects of short duration..	4
H	Industrial Accident - 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 3 and the CEMP Appendix 3.2, fuel will not be stored on-site post construction therefore fuel is not considered to be a significant fire risk. In accordance with Chapter 19 of the Safety, Health and Welfare at Work Act 2005 (the 2005 Act), the development shall be subject to a fire safety risk assessment which would assist in the identification of any major risks of fire onsite.	2	Should a fire/explosion occur at the site, a limited consequence in that there would be 'a limited number of people affected' with 'localised effects of short duration' due to the nature of the project and the lack of infrastructure or fuel storage during operation that would result in any such incident. There will be 'normal community functioning' in the area with 'some inconvenience' Simple contamination of environment (e.g. watercourses), localised effects of short duration.	4
I	Collapse/ damage to structures	Landslide/ Earthquake; and Extreme weather conditions such as flooding and storms. Vehicular collisions due to driver negligence Mismanagement of excavated material on site	Injury or loss of life. Sedimentation of nearby watercourse; Damage to, or depletion of aquatic habitats and species;	2	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. 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.	1	The risk of infrastructure collapse or damage to structures 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' No contamination of environment (e.g. watercourses), localised effects.	1
J	Traffic Incident	Driver negligence or failure of vehicular operations on site roads. Traffic Management not Implemented	Injury or loss of life.	3	A limited number of vehicles will be permitted on the site as part of the operation phase As such, it can be determined that there is some 'opportunity, reason or means' for a vehicle	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	3



Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
					collision to occur on site, 'at some time.' An unlikely risk is therefore predicted.		'no fatalities and small number of minor injuries with first aid treatment.'	
K	Loss of Critical Infrastructure	Equipment or infrastructure failure; Electrical problems; and Employee negligence Landslide/ Earthquake; and Extreme weather conditions such as flooding and storms.	Injury or loss of life	1	Eirgrid operate the grid from National Control Centres matching electricity production to customer demand, switching from synchronous to non-synchronous where required to ensure no power outages. The Proposed Development will be connected to a single bay at the 110kV substation and any shortages or failures will not impact other connections to the same substation	2	Should a power failure occur at the 110kV substation, it will result in a limited number of people affected- localised effects of short duration	2
Decommissioning Phase								
L	Severe Weather	Extreme weather- periods of heavy rainfall, taking into account climate change and strong winds	Illness or loss of life; Sedimentation of nearby watercourse Damage to, or depletion of aquatic habitats and species;	2	The risk of severe weather is unlikely when considering the assessment in Chapter 6 and weather conditions recorded over the last 30 years within the area.	1	The risk of severe weather conditions during the decommissioning phase will result in a minor consequence in that 'small number of people would be affected' should a severe weather occur, with 'no fatalities and a small number of minor injuries with first aid treatment'. No contamination of environment (e.g. watercourses), localised effects.	2
M	Flooding	Extreme weather- periods of heavy rainfall, taking into account climate change and strong winds	Illness or loss of life; Sedimentation of nearby watercourse Damage to, or depletion of aquatic habitats and species;	2	The risk of 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 decommissioning phase will result in a minor consequence in that 'small number of people would be affected' should a severe weather occur, with 'no fatalities and a small number of minor injuries with first aid treatment'. No contamination of environment (e.g. watercourses), localised effects.	2
N	Traffic Incident	Driver negligence or failure of vehicular operations on site roads. Traffic Management not implemented	Injury or loss of life.	3	A limited number of vehicles will be permitted on the site as part of the operation phase As such, it can be determined that there is some 'opportunity, reason or means' for a vehicle collision to occur on site, 'at some time.' An unlikely risk is therefore predicted.	1	A minor consequence is predicted. Having regard to on-site speed limits and vehicular movements, a 'small number of people would be affected' should a vehicular collision occur, with 'no fatalities and small number of minor injuries with first aid treatment.'	3
O	Contamination	Fuel spillage during delivery to site. Failure of fuel storage tank or tanks in plant and machinery and vehicles. Drainage and seepage water resulting from infrastructure removal; Erosion of sediment from site drainage channels.	Damage to, or depletion of aquatic habitats and species Release of suspended solids to surface watercourses and could result in an increase in the suspended sediment load, resulting in increased turbidity which in turn could affect the water quality and fish stocks of downstream water bodies	2	As outlined in Chapter 3, fuel will be stored on-site but in a bunded area to ensure containment and prevent spillages of fuel. No fuels, chemicals or solvents will be stored outside of the confines of the site Setback distances from sensitive hydrological features means that adequate room is maintained for the proposed drainage measures as detailed in Chapter 9	2	The risk of a fuel spillage or impact on surrounding drainage during the operational stage will result in a limited consequence in that there would be 'a limited number of people affected' with 'localised effects of short duration' through the use of bunded containment areas during operation. Simple contamination of environment (e.g. watercourses), localised effects of short duration.	4
P	Industrial Accident-Fire/gas explosion	Equipment or infrastructure failure; Fuel spillage/storage Electrical problems; and Employee negligence	Injury or loss of life Structural damage Forest fires Air Pollution Damage to, or	2	As outlined in Chapter 3, 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	2	Should a fire/explosion occur at the site, a limited consequence in that there would be 'a limited number of people affected' with 'localised effects of short duration' due to the nature of the project and the lack of infrastructure or fuel storage during operation that would result in any such incident. There will	4



Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
			depletion of habitats and species Contamination		development shall be subject to a fire safety risk assessment which would assist in the identification of any major risks of fire on site.		be 'normal community functioning' in the area with 'some inconvenience'. Simple contamination of environment (e.g. watercourses), localised effects of short duration.	
Q	Loss of Critical Infrastructure	Equipment or infrastructure failure; Electrical problems; and Employee negligence Landslide/ Earthquake; and Extreme weather conditions such as flooding and storms.	Injury or loss of life	1	Eirgrid operate the grid from National Control Centres matching electricity production to customer demand, switching from synchronous to non-synchronous where required to ensure no power outages. The Proposed Development will be connected to a single bay at the 110kV substation and any shortages or failures will not impact other connections to the same substation	2	Should a power failure occur at the 110kV substation, it will result in a limited number of people affected- localised effects of short duration	2



Table 16-8 Consolidated Risk Score

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

The risk assessment for each of the potential risks identified are consolidated in **Table 16-7** 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 16.3.4.3, the red zone represents 'high risk' scenarios', the amber zone represents 'medium risk scenarios and the green zone represents 'low risk' scenarios.

Table 16-9 Risk Score Matrix

		Consequence				
		1 Minor	2 Limited	3 Serious	4 Very Serious	5 Catastrophic
Likelihood	5 Very Likely	5	4	3	2	1
	4 Likely	4	3	2	1	0
	3	3	2	1	0	-1



		Consequence				
	Unlikely					
	2 Very Unlikely	A,C,I,L,J,M	B,E,F,G,H,O,P			
	1 Extremely Unlikely		K,Q			
		Normal Emergency		Major Emergency		

Table 16-9, presents the potential risks identified during the construction, operation and decommissioning of the Proposed Development all or which can be classified as ‘low risk scenarios.’

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

Contamination During Construction, Operation and Decommissioning

There is a potential risk of contamination from site activities during the construction, operation and decommissioning phases from potential release of hydrocarbons. The risk of contamination was given a risk score of 4. However, as outlined in Chapter 9 Section 9.9.3, measures are proposed and will be put in place to reduce the risk of accidental spillage and contamination of pollution risk to groundwater, surface water and associated ecosystems, and to terrestrial ecology.

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

Industrial Accident-Fire/Gas Explosion During Construction, Operation and Decommissioning

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.

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. 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.

16.5 Mitigation Measures

As stated in Section 16.4.10, the highest-risk scenario regarding the occurrence of major accidents or disasters in the construction, operation, and decommissioning phases of the Proposed Development is identified as ‘Contamination’ of the site and the risk of an ‘Industrial Accident - Fire/Gas Explosion’.



The design and construction of the Proposed Development adhere to the best practices outlined in this Environmental Impact Assessment Report (EIAR), incorporating mitigation measures to address the risk of major accidents or disasters.

The application for the Proposed Development includes a comprehensive Construction Environmental Management Plan (CEMP), which outlines the environmental controls to be implemented on-site. The CEMP specifies the Emergency Response Procedure to be followed in case of emergencies, encompassing contamination, health and safety, and environmental protection. It provides detailed information on all mitigation and monitoring measures to be implemented throughout the various phases of construction, operation, and decommissioning. The CEMP will undergo regular reviews through environmental audits and site inspections to ensure the effectiveness and implementation of all mitigation measures and commitments outlined in the application.

Within the CEMP, an Emergency Response Plan (ERP) is included, which outlines the procedures to be followed in the event of emergencies related to health and safety or environmental protection. The site ERP delineates the required response actions and the responsibilities of all personnel during emergency situations. For further information, please refer to Chapter 3 and Appendix 3-2 of the EIAR.

16.6 Residual Effects

The likelihood of a significant accident or disaster occurring during the construction of the Proposed Development is deemed to be minimal, as determined by the "Guide to Risk Assessment in Major Emergency Management" (Department of Environment, Heritage and Local Government, 2010).

It is anticipated that the implementation and strict adherence to the mitigation and monitoring measures outlined in the Construction Environmental Management Plan (CEMP) will effectively eliminate any significant residual impacts related to the construction, operation, and decommissioning of the Proposed Development.

16.7 Cumulative Effects

For the assessment of cumulative effects, any other permitted or proposed and unbuilt projects in proximity to the site (wind energy or other) have been considered where they have the potential to generate an in-combination or cumulative impact with the Proposed Development.

A monthly desktop based planning search spanning 10 years within a radius of 20km was undertaken. Sources consulted included the EIA portal, An Bord Pleanála, Laois County Council and Carlow County Council planning lists. The list was refined by eliminating all single homes from 2km outside the red line boundary of the Proposed Development and focused on planning applications of over 50 houses and planning applications which contained an EIAR or an NIS. This formed our cumulative long list of developments.

Further refinement was undertaken to ascertain developments within this list. These refinements included:

- All wind farms within 20m

A number of potential cumulative developments within 20km of the Proposed Development and the cumulative assessment have been identified and are set out in **Table 16-10**. The methodology for how these projects were identified is set out in section 3.12 of Chapter 3.



Table 16-10 Cumulative Assessment

Reg Ref	Applicant	Development Summary	Distance
20247 (Laois) Granted 19/11/2020	Michael Johnson	Restoration of a quarry- 15,000 tonnes per year	4km
Potential Effects:	Potential of intensification of road usage between the restoration of the quarry and the construction phase of the project which may impact on Traffic, Air Quality and Noise..		
Cumulative Assessment	<p>It is likely that should the construction phase of the Proposed Development coincide with the operational (restoration) phase of the Michael Johnson quarry that potential cumulative nuisance impacts will arise due to increased traffic, noise and dust in the vicinity of the development. However it is noted that the quarry entrance is on the N80 rather than the R426. In terms of impact on traffic / transport, the predicted cumulative effect is low and of short term duration (less than 3 years).No mitigation is required.</p> <p>In terms of Air Quality/Dust, it is considered that the proximity of the quarry to the Proposed Development is 4km distance. However it is noted that the quarry entrance is on the N80 rather than the R426. While there is no blasting in the quarry, the number of trucks entering the roadway in the vicinity of the Proposed Development is low. The cumulative effect is slight and of a short term duration (less than 3 years). No mitigation is required.</p> <p>In terms of Noise, the quarry is located 4km from the proposed development and does not have blasting on the site. However it is noted that the quarry entrance is on the N80 rather than the R426. Noise nuisance may arise in combination if the Proposed Development construction coincides with the operational phase of the quarry due to the combined number of vehicles on the road. The cumulative effect is slight and of a short term duration (less than 3 years). No mitigation is required.</p>		
Reg Ref	Applicant	Development Summary	Distance
Laois (20281) / Carlow (20282) Date Granted: 15.02.2022	Bilboa Wind Farm	4.6 ('km') of underground cables within Carlow County Council ('CCC') boundary and 2.0km within Laois County Council ('LCC') boundary and associated works, new substation, upgrading of existing forestry track; construction of two new onsite access track, amendments to a crane hardstanding area; road strengthening and widening along an updated turbine delivery route,	17 km
Potential Effects:	Potential of intensification of road usage between the construction phases of both projects which may impact on Traffic.		
Cumulative Effects (if any)	It is likely that should the construction phase of the Proposed Development coincide with construction phase of Bilboa Wind Farm that potential cumulative nuisance impacts will arise due to increased traffic, noise and dust to the south of the Proposed Development. However, it is noted that the cable corridor for Bilboa is located south of the southern cluster in close proximity to Carlow. As the TDR does not come through this area and given the nature of rolling construction works along the proposed cable route, the predicted cumulative effect is low and of short term duration (less than 3 years).No mitigation is required.		
Reg Ref	Applicant	Development Summary	Distance
PL11.232626 (ABP) / 13268 (Laois) Granted 14/6/2014	Cullenagh Wind Farm	develop 18 no. wind turbines each with a hub height of up to 85m and a rotor diameter of up to 93m with an overall tip height of up to 131.5m (including associated transformers and hardstands at each turbine) and all ancillary infrastructure	3.5 km
Potential Effects:	Potential of intensification of road usage between the restoration of the quarry and the construction phase of the project which may impact on Traffic, and Air Quality and Noise..		



Reg Ref	Applicant	Development Summary	Distance
Cumulative Effects (if any)	<p>Cullenagh Wind Farm was permitted in 2014. However, the associated grid connection has is under assessment and is expected to be submitted for development consent in the coming months. It is therefore likely that the construction phases of the Proposed Development with the construction of Cullenagh wind farm will coincide near the same time.</p> <p>As the TDR does not come through this area and given the nature of rolling construction works along the proposed cable route, the predicted cumulative effect is low and of short term duration (less than 3 years). No mitigation is required.</p> <p>Noise nuisance may arise in combination if the Proposed Development construction coincides with the construction phase of Cullenagh Wind Farm due to the combined number of vehicles on the road. The cumulative effect is slight and of a short term duration (less than 3 years). No mitigation is required.</p> <p>Dust nuisance may arise in combination if the Proposed Development construction coincides with the construction phase of Cullenagh Wind Farm due to the combined number of vehicles on the road. The cumulative effect is slight and of a short term duration (less than 3 years). No mitigation is required.</p>		
Reg Ref	Applicant	Development Summary	Distance
ABP-309293-21 / 19530 (Laois) 3rd Party appealed on 06/10/2022	Bord Na Móna Powergen Ltd.	Develop a Renewable Gas Facility, associated peat deposition area and external and internal road upgrades at Cúil Na Móna Bog within the townland of Clonboyne and Clonkeen, Portlaoise, Co. Laois. 1. Renewable Gas Facility (6.85 Ha) 2. Peat deposition and surrounding area (9.13Ha) 3. External road upgrades including proposed new roundabout, upgrade of R445 and local access road to existing site entrance - 660m in length (0.91Ha) 4. Internal upgrade of site access road - 443m in length (0.45Ha).	14 km
Potential Effects:	Potential of intensification of road usage between the construction phases of both projects which may impact on Traffic. This may also be considered as a Seveso site ⁷ when commissioned.		
Cumulative Effects (if any)	If the construction phase of the Proposed Development coincides with the construction phase of the consented facility, it is considered that the haulage route of the consented facility will coincide with a portion of the TDR along the M8 Motorway. However, as the Proposed Development TDR deliveries will largely take place during the overnight hours, it is considered that the cumulative effect will be slight and short term in nature.		
Reg Ref	Applicant	Development Summary	Distance
21700 (Laois)(Under Appeal currently APB-314760-22)	Lagan Materials Limited (Spink Quarry)	the continued use and operation of the existing quarry including deepening of the quarry. comprising an extraction area of c. 14.5 ha within an overall application area of c. 19.6 ha. new site infrastructure, including portacabin site office / canteen, toilets, concrete batching plant and truck washdown facility, hydrocarbon interceptors, mobile crushing and screening plant, upgrading of the water management system, provision of holding tank for wastewater, and other ancillaries.	3 km
Potential Effects:	Potential of intensification of road usage between the operation of the quarry and the construction phase of the project which may impact on Traffic and Air Quality.		
Cumulative Effects (if any)	If the construction stage of the Proposed Development coincides with the operational phase of the Spink quarry, there is a potential that both will utilise the same road network (R426) via the R430 which is where the Spink Quarry's site entrance is. According to the traffic numbers for the Spink Quarry in the submitted EIAR(2021), between 8-12 HGV trips		

⁷ Hazard Classification of Biogas and Risks of Large Scale Biogas Production -Section 2.3-2.4. https://www.build-a-biogas-plant.com/PDF/CET_007.pdf Date Accessed 15/6/2023



Reg Ref	Applicant	Development Summary	Distance
		are to be generated per hour, if permitted. It is considered in terms of traffic nuisance that the cumulative effect will be moderate and long term in duration. In terms of Air Quality (dust nuisance), it is considered in light of the above, the cumulative effect will be medium, slight and long term in duration.	
Reg Ref	Applicant	Development Summary	Distance
PL11.248518 (ABP) / 16/260 (Laois) Granted 03/09/2021	Pinewoods Wind Farm (3 applications)	11 wind turbines, electricity substation, switch room, equipment compound, site access tracks, 7 site entrances, meteorological mast, upgrade of road junction. Townlands: Knockardugar, Boleybawn, Garrintaggart, Ironmills, Co. Laois	
ABP-308448-20 Granted 22/11/2021		A 110kv 'loop in/loop-out' Air-Insulated Switchgear substation, electricity lines, on-site access tracks and all associated site development works. Townlands: Knockardugar, Ballinakill, County Laois	
PL10.248392 (ABP) /17/62 (Laois) Granted 03/09/2019		2 kilometres of site access tracks, underground electricity and communications cabling and site drainage works. Townlands: Lands at Crutt, County Kilkenny.	
Potential Effects:	Potential of intensification of road usage and construction activity (cable route, substation, construction works) between the construction phases of both projects.		
Cumulative Effects (if any)	It is likely that should the construction phase of the Proposed Development coincide with construction phase of Pinewoods Wind Farm that potential cumulative nuisance impacts will arise due to increased traffic, noise and dust to the south of the Proposed Development. It is noted that the EIAR for Pinewoods notes a total of 176 oversized loads with 3252 HGV loads over an 18 month construction period. The TDR does not travel through the area of the Proposed Development, instead diverting from the M8 to the M9 and N78. The HGV movements however do travel through the area of the proposed development to quarries in the vicinity of the proposed development (1 of 4 quarries). It is considered that the effect of the abnormal loads (turbines, substation, crane) is slight and of short term duration (less than 18 months) while the HGV traffic is of moderate and short term duration (less than 18 months). Grid Connection: given the nature of rolling construction works along the proposed cable route, the predicted cumulative effect is slight and of short term duration (less than 3 years). No mitigation is required.		

16.8 Conclusion

It is assessed that the project carries no significant risk of causing major accidents or disasters, nor is it vulnerable to potential disasters or accidents, including both natural and man-made incidents.

Considering the temporary nature of the construction phase, the scale of the proposed project, and the implementation of environmental protection measures from the outset, the risk of disasters (such as severe weather events) or accidents (such as fuel spills, traffic incidents, or peat slides) is deemed to be low.

In the event of severe weather conditions, such as flooding during construction, work will be halted. The susceptibility to landslides is low as there is no peat present on site. The project design incorporates Mitigation by Avoidance.

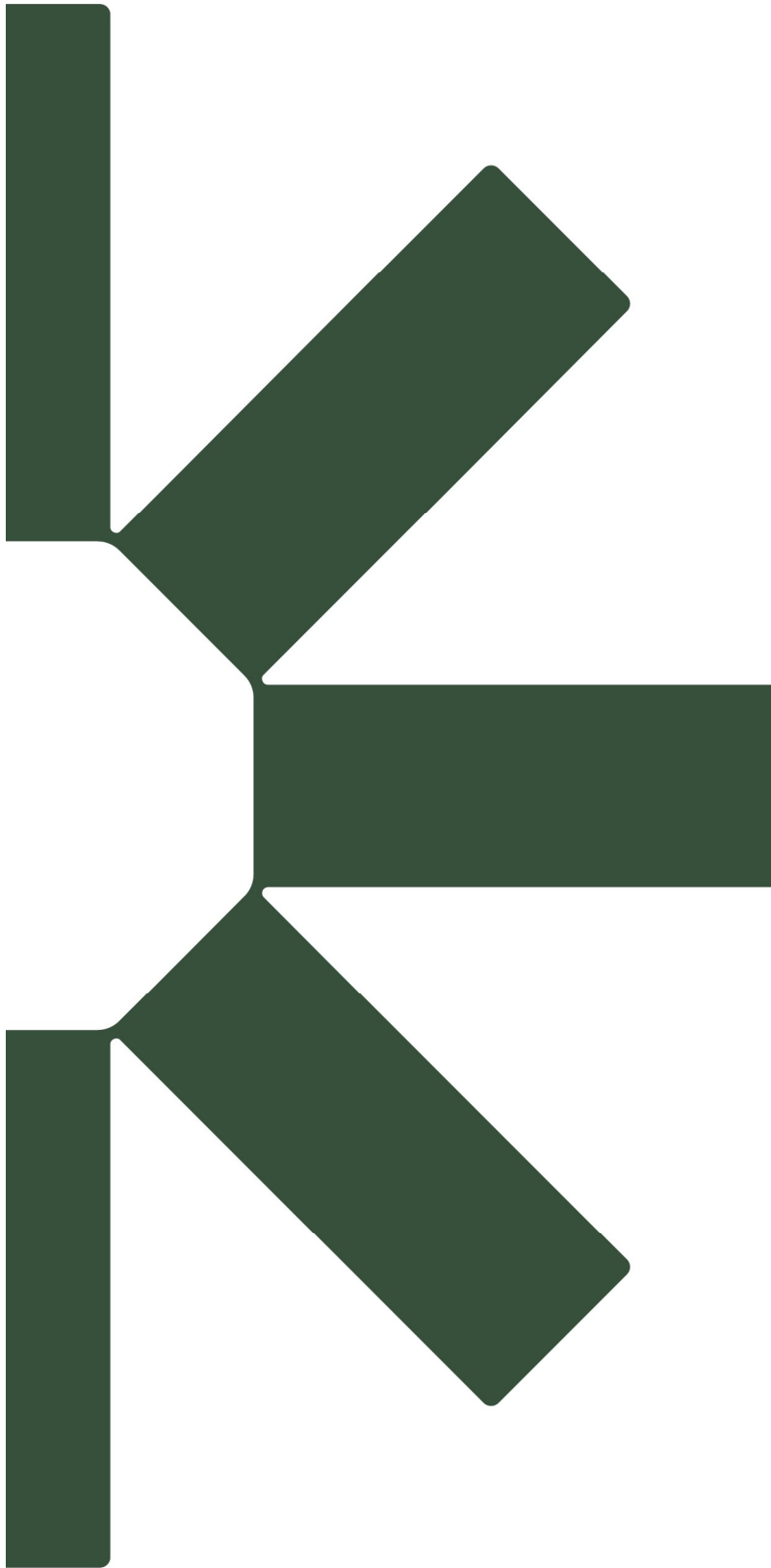
During the operational phase of the wind farm, particularly in the context of climate change, there is the potential for increased storm events and severe weather. Wind turbines are designed to withstand specific wind parameters and will automatically shut down during high wind speeds.

Therefore, the potential effects of climate change on the operational development may involve temporary shutdowns (curtailment) during severe wind conditions, but this does



not pose a likely risk of major accidents or disasters. As for the construction stage, the decommissioning poses similar risks in terms of major accidents and disasters. As the decommissioning stage will again be limited to a temporary period of time, it is considered that there is a low risk of major accidents or disaster.





Making Sustainability Happen