17 MAJOR ACCIDENTS AND NATURAL DISASTERS

17.1 INTRODUCTION

This section of the Environmental Impact Assessment Report (EIAR) describes the likely significant effects on the environment arising from the vulnerability of the Project, as detailed in **Chapter 2: Project Description**, to risks of major accidents and/or natural disasters. It has been completed in accordance with the guidance set out by the Environmental Protection Agency (EPA) in 'Guidelines on Information to be contained in Environmental Impact Statements' (EPA, 2022) and the European Commission in relation to Environmental Impact Assessment of Projects (Directive 2011/92/EU, as amended by 2014/52/EU), namely 'Guidance on the preparation of the Environmental Impact Assessment Report'.

The assessment of the vulnerability of the Project 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 those projects that:

"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 2014 EIA Directive (The European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018) transpose the requirements of the 2014 EIA Directive into the Planning and Development Regulations 2001 (As Amended)), this chapter seeks to determine:

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

This chapter is supported by **Appendix 1.4: Glossary of Common Acronyms** in **Volume IV.**

Table 17.1: Glossary of Common Acronyms

Glossary of Common Acronyms	
BE	Bachelor of Engineering
CEMP	Construction Environmental Management Plan
DoEHLG	Department of Environment, Heritage and Local Government
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
GIS	Geographical Information Systems
GSI	Geological Survey of Ireland
HSE	Health Service Executive
IT Sligo	Institute of Technology, Sligo
km	Kilometre
km/h	Kilometres per hour
kV	Kilovolt
LPG	Liquified Petroleum Gas
m	Metre
MSc	Master of Science
MSc	Metre
NIFM	National Indicative Fluvial Mapping
OPW	Office of Public Works
PSRA	Peat Slide Risk Assessment
RSA	Road Safety Authority
TDR	Transport Delivery Route
TMP	Traffic Management Plan

17.1.1 Statement of Authority

This chapter has been prepared by Emma Yore with the assistance of Shirley Holton and it was reviewed by David Kiely of Jennings O'Donovan & Partners Limited.

David Kiely is a Managing Director of JOD who holds a BE in Civil Engineering from University College Dublin and MSc in Environmental Protection from IT Sligo. He is a Fellow of Engineers Ireland, a Chartered Member of the Institution of Civil Engineers (UK) and has over 40 years' experience. He has extensive experience in the preparation of EIARs and EISs for environmental projects including Wind Farms, Solar Farms, Wastewater Projects,

and various commercial developments. David has also been involved in the construction of over 60 wind farms since 1997.

Shirley Holton is an Environmental Scientist with over 3 years' experience in Environmental Consultancy. She graduated with a First-Class Honours Degree (BSc. Hons) in Environmental Science from the Institute of Technology, Sligo. She was also awarded the Governing Body award for a BSc in Environmental Protection. Shirley's key capabilities include project management; using software such as WindPRO 4.1 and ArcGIS Pro; and the preparation of planning applications, Environmental Impact Assessment Reports, Feasibility Studies, Construction & Environmental Management Plans and management plans relating to surface water, peat, spoil and waste.

Emma Yore is a Junior Environmental Scientist and holds a Bachelor (Hons.) Degree in Environmental Science from the Institute of Technology, Sligo. She has experience through various projects since joining JOD with a current focus on the environmental sector. Emma's key capabilities are in report writing of Appropriate Assessments and Environmental Impact Assessment Reports.

17.2 ASSESSMENT METHODOLOGY

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

- Census of Ireland;
- Regional Spatial and Economic Strategy (RSES) 2020-2032, published by the Southern Regional Assembly on 31 January 2020;
- Cork County Development Plan 2022 – 2028;
- Cork County Council Website, and
- Fáilte Ireland.

Major accidents or natural disasters are hazards which have the potential to affect the Project and consequently have potential impacts on the environment. These include accidents during construction, operation and decommissioning 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.

17.2.1 Legislative Context

17.2.1.1 Legislation

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

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

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

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

17.2.1.2 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
- IEMA (2020), Major Accidents and Disasters in EIA: A Primer
- Cork County Council (2021) Major Emergency Plan.

17.2.2 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 17.3.

17.2.3 Impact Assessment Methodology

17.2.3.1 Introduction

This assessment is focused on an understanding that the Project will be designed, built and operated in line with the methodologies and measures prescribed in this EIAR.

An assessment of potential accidents and disaster scenarios such as pollution incidents to ground and watercourses as well as assessment of flooding events and peat instability are also described in the relevant EIAR assessment chapters (Refer to **Chapters 8: Soils and Geology** and **Chapter 9: Hydrology and Hydrogeology** for further details).

17.2.3.2 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, operation and decommissioning of the Project. The approach to identifying and quantifying risks associated with the Project 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.

17.2.3.2.1 Risk Identification

Risks have been reviewed through the identification of reasonably foreseeable risks in consultation with relevant contributors to this EIAR (Please see **Chapter 1: Introduction, Scoping and Consultation** and **Appendix 1.1: Author Qualifications** for details of

[1] EPA (2014) Guidance on assessing and costing environmental liabilities. [Accessed online 12/11/2024] Available at https://www.epa.ie/publications/compliance--enforcement/licensees/reporting/financial-provisions/EPA_OEE-Guidance-and-Assessing-WEB.pdf

contributors). The identification of risks has focused on non-standard but plausible incidents that could occur at or as a result of the Project during construction, operation and decommissioning phases.

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

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

17.2.3.2.2 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 17.2** 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 17.2: 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.

Ranking	Likelihood	Description
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 Cork County Council Major Emergency Plan (2021)[2], if implemented as intended, would 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 17.3**.

The consequence of a risk to/from the Project 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 17.3: 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).
2	Limited	Life, Health, Welfare	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.

[2] Major Emergency Plan, Cork County Council (2021). Available online: https://www.corkcoco.ie/sites/default/files/2022-02/cork-county-council-major-emergency-plan-pdf.pdf [Accessed 12/11/2024]

Ranking	Likelihood	Impact	Description
		Environment	Simple contamination, localised effects of short duration
		Infrastructure	€0.5-3M
		Social	Normal community functioning with some inconvenience
3	Serious	Life, Health, Welfare	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	€10-25M
		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.

Ranking	Likelihood	Impact	Description
		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.

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 17.4**) indicates the critical nature of each risk. This risk matrix has therefore been applied to evaluate each of the risks associated with the Project. 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 17.4: 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					

17.3 PROJECT HAZARD ANALYSIS

Under certain specific circumstances Regional Level Major Emergencies may be declared and the Plan for Regional Level Co-ordination activated. This will provide for mutual aid, support and co-ordination facilities to be activated in a region, the boundaries of which are determined to suit the exigencies of the particular emergency. There are eight regions throughout the country of Ireland that have been created for Major Emergency purposes.

The HSE Emergency Management: Emergency Plans for the Major Emergency Management regions outline several hazard categories which may have the potential to lead to a major emergency. The hazard categories include Natural, Transportation, Technological and Civil. The hazard categories, types and subtypes, and their relevance to the Project, are listed below in **Table 17.5**.

As of November 2024, there is no HSE Emergency Plan publicly available for Area 4 (Cork, Kerry). **Table 17.5** below was modelled on available Emergency Plans namely Area 1 (Donegal, Sligo, Leitrim, Cavan, and Monaghan) and Area 2 (Galway, Mayo, and Roscommon).

Table 17.5: HSE Emergency Plan hazard types (HSE, 2024)

Category	Type	Subtype	Relevance to the Project
Natural Hazards			
Meteorological	Storm / Gale Both coastal and inland areas can be affected by high winds	Both coastal and inland areas can be affected by high winds	• Poor driving conditions • Loss of infrastructure • Flooding • Falling Trees • Damage to turbines • Public health risk - Endangerment of workers or tourists on nearby trails from falling debris
	Heavy Snow	Blizzards- 'Poor visibility	• Poor Driving conditions • Public Health Risk (hypothermia)
	Severe Cold / Frost extremes of Temperature	Icy Roads/Impassable Roads Hypothermia Freezing of Supply Network	• Poor Driving Conditions • Public Health Risk • Lack of Road Grit • Ice throw from turbine blades
	Thunder & Lightning Dense/ Persistent Fog Heat Wave /Drought	Road Traffic collisions Fires for Turbines/Onsite Substation and Control Building	• Loss of Infrastructure • Poor driving conditions • Public Health Risk • Water Shortage
	Forest / Wilderness fire - Air Pollution	Fire	Loss of infrastructure - There are forestry plantations surrounding the Site
Hydrological	Flooding	Coastal / Inland	• Potential for flooding via on-site rivers and drains • Impacts on access to project elements
	Heavy Rain		• May lead to flooding in Low Lying areas or areas with poor drainage • Potential bridge collapse
Geological	Landslide		• Peat Instability • Potential bridge collapse

Category	Type	Subtype	Relevance to the Project
Transportation Hazards			
Aviation	Aircraft Collision /Loss	Mid Air and Land	Not Applicable
Road	Multiple Road Traffic Collision		• Public Roads via which construction staff and materials access the site are impacted. • Risk to human life
	Hazmat		• Fuel Transport to/from site impacted • Risk to human health
	Bridge		Potential bridge collapse
Water	Inland Water ways	Pleasure Craft/Cruises Pollution from above	Not Applicable
	Coastal	Car Ferry/ passenger Ferries	Potential for Turbine components to fall overboard
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	• Risk to human life • Risk to public health • Loss of infrastructure
	Gas Emission		Not Applicable
	Fluid/ Fuel Emission		Refuelling on site
Explosions	Domestic	Natural Gas explosion	Not Applicable
	Bomb		Not Applicable
	LPG	LPG Tank Fire	Not Applicable
	Pipeline		Not Applicable
Fires	Substation/turbine		• Air Pollution • Risk to human life • Risk to public health
Building Collapse			Not Applicable
Hazardous substance		Accident at site	Not Applicable
		Transportation accident	Hazmat on roads
		Weapons	Not Applicable
	Biological	Leak/Weapons	Not Applicable
	Radiological	"Dirty Bomb"	Not Applicable
		Industrial Accident	Damage to Infrastructure Personal Injuries/ fatalities
		Health facilities	Not Applicable
Pollution/	Air/Water Pollution		Fire

Category	Type	Subtype	Relevance to the Project
Contamination			Sediment-laden Water Fuel/hydrocarbon spill/leak
Civil Hazards			
Major Crowd Safety	(Movement, crushing etc.)	Pop Concerts Sports Events Fireworks 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 Drought	Not Applicable
Water Supply		Shortage/ Contamination Freezing /Flooding	Contamination of drinking water supply Freezing /Flooding
Epidemics and pandemic		Communicable diseases	Not Applicable
Animal Disease		Foot & Mouth Avian Influenza	Not Applicable
Terrorism	Bombs	Car-bombs	Not Applicable
		Bombs in buildings	Not Applicable
		Fire-bombing	Not Applicable
	CBRNE		Not Applicable
	Disruption	Bomb scares	Not Applicable

The risks which are most relevant to this assessment are described in the sections that follow.

17.3.1 Meteorology and Climate Change

Meteorology

Ireland has a temperate, oceanic climate, resulting in mild winters and cool summers. The dominant influence on Ireland's climate is the Atlantic Ocean. Consequently, Ireland does not suffer from the extremes of temperature experienced by many other countries at similar latitude. The hills and mountains, many of which are near the coasts, provide shelter from strong winds and from the direct oceanic influence.

The Met Éireann weather station at Cork Airport is the nearest weather and climate monitoring station to the Project that has meteorological data recorded for the 32-year period from 1991 to 2023. The monitoring station is located approximately 66 km east of the Site. Meteorological data recorded at Cork Airport over the 32-year period from 1991 -

2023 is shown in **Chapter 15: Air and Climate**. The mean annual air temperature between 1994 and 2023 was 10.1°C. Mean monthly temperatures ranged from 5.8°C in January to 15.2°C in July. Mean annual rainfall over this period was 1254.8 mm, with a maximum monthly mean rainfall of 148.9 mm in October and a minimum monthly mean rainfall of 80.0 mm in April.

The works programme for the construction stage of the Project will take account of weather forecasts and work will be suspended in the case of extreme weather events.

The following forecasting and weather warning systems are available and will be used on a daily basis at the site to direct proposed construction activities:

- General Forecasts: Available on a national, regional and county level from the Met Eireann website (www.met.ie/forecasts). These provide general information on weather patterns including rainfall, wind speed and direction but do not provide any quantitative rainfall estimates.
- Weather Warning or Advisories: Met Éireann's main suite of warnings are issued by the duty forecaster between 10:00 and midday and are updated as necessary as new information becomes available. In general, warnings will not be issued more than 60-hours ahead of the expected adverse weather but advisories on potential hazards are issued up to a week in advance. The three warning categories are:
  - Yellow: Not unusual weather. Localised danger.
  - Orange: Infrequent. Dangerous/disruptive.
  - Red: Rare. Extremely dangerous/destructive.
- MeteoAlarm: Alerts to the possible occurrence of severe weather for the next 2 days. Less useful than general forecasts as only available on a provincial scale.
- 3-hour Rainfall Maps: Forecast quantitative rainfall amounts for the next 3 hours but does not account for possible heavy localised events.
- Rainfall Radar Images: Images covering the entire country are freely available from the Met Éireann website[3]. The images are a composite of radar data from Shannon and Dublin airports and give a picture of current rainfall extent and intensity. Images show a quantitative measure of recent rainfall. A 3-hour record is given and is updated every 15 minutes. Radar images are not predictive.
- Consultancy Service: Met Éireann provide a 24-hour telephone consultancy service. The forecaster will provide interpretation of weather data and give the best available forecast for the area of interest.

[3] http://www.met.ie/latest/rainfall_radar.asp

The DoEHLG Guidelines 2006 and the draft revised guidelines 2019 state that there is a very remote possibility of injury to people from flying fragments of ice or from a damaged blade. However, the blades are composite structures with no bolts or separate components and the danger is therefore minimised. The build-up of ice on turbines is unlikely to present problems. The wind turbines will be fitted with anti-vibration sensors, which will detect any imbalance caused by icing of the blades. The sensors will cause the turbine to wait until the blades have been de-iced prior to beginning operation. Road grit will be available in bulk all year round.

Turbine blades are manufactured of glass reinforced plastic which will prevent any likelihood of an increase in lightning strikes within the Site or the local area. Flame-retardant materials are used in the manufacture of critical components, especially those that are susceptible to high temperatures. Lightning protection conduits will be integral to the construction of the turbines. Lightning conduction cables, encased in protection conduits, will follow the electrical cable run, from the nacelle to the base of the turbine. The conduction cables will be earthed adjacent to the turbine base. The earthing system will be installed during the construction of the turbine foundations.

There is no forestry within the Site, however forestry exists directly adjacent to the Proposed Development. A suitable distance from trees and forestry was included in the design of the Proposed Development in terms of viable wind resource and therefore the risk of forest fire reaching wind farm infrastructure has been minimised.

Climate Change

Climate change means a significant change in the measures of climate, such as temperature, rainfall, or wind, lasting for an extended period – decades or longer. Earth's climate has changed naturally many times during the planet's existence. However, current human activities are significantly contributing to climate change through greenhouse gas emissions. The global average temperatures have now increased by more than 1°C since pre-industrial times.

Current projections indicate that continued emissions of greenhouse gases, including the burning of fossil fuel to produce electricity, will cause further warming and changes to our climate. Climate is predicted to have indirect and direct impacts on Ireland including:

- Rising sea-levels threatening habitable land and particularly coastal infrastructure;
- Extreme weather, including more intense storms and rainfall affecting our land, coastline and seas;

- Further pressure on our water resources and food production systems with associated impacts on fluvial and coastal ecosystems;
- Increased chance and scale of river and coastal flooding;
- Greater political and security instability;
- Displacement of population and climate refugees;
- Heightened risk of the arrival of new pests and diseases;
- Poorer water quality, and
- Changes in the distribution and time of lifecycle events of plant and animal species on land and in the oceans[4]

If the Proposed Development was not to proceed, greenhouse gas emissions, e.g., carbon dioxide, carbon monoxide and nitrogen oxides associated with construction and decommissioning works would not arise. However, the greenhouse gas savings that would arise from the operation of the Proposed Development would also be lost leading to a long-term, moderate, negative impact.

17.3.2 Flooding and Hydrological

As detailed in **Chapter 9: Hydrology and Hydrogeology,** (Gortloughra Wind Farm Site Specific Flood Risk Assessment), no recurring or historic flood incidents are recorded within the Site or along the Grid Connection Route and Turbine Delivery Route.

The closest recurring flood event to the Site is mapped as the "*Sruhaunphadeen Derrynagree*" recurring flood event which occurs in a rural area approximately 1.8 km north of the Site. This recurring flood event is located approximately 50 m below the lowest altitude of the Site and has been recorded through mapping produced by Coillte identifying a number of areas prone to flooding in Cork. An additional recurring flood event has also been mapped by Coillte at Derragh Bridge, south of Shanacrane East along the R585 Road, approximately 2.2 km south-east of the Site. The recurring flood event at Derragh Bridge is located at an altitude approximately 200 m lower than that of the southern Site boundary. Given the distance of these recurring flood events to the Site and their occurrence at much lower altitudes than the Site, potential impacts from these flood events on the Proposed Development are expected to be negligible. Furthermore, given the considerable distance from the Site to these recurring flood events, and the minimal surface water runoff increase that is expected to occur as a result of the Proposed Development, the Proposed

[4] https://www.gov.ie/pdf/?file=https://assets.gov.ie/293730/00ee6688-fc2a-4897-8077-de73280ec7fc.pdf#page=null [Accessed 04/07/2024]

Development is not anticipated to exacerbate the existing potential for flooding at these locations.

For the Dunmanway Grid Connection route option (Option A), one single flood event has been recorded at Ardcahan Bridge when the Bandon River flooded in February 1991, approximately 220 m southwest of the existing roadway which this Grid Connection Route option would traverse. Office of Public Works (OPW) photographic records also exist for a flood event on 19th February 2002, at Inchicuhan Crossroads along which Option A would traverse and also at Ardcahan Bridge. The cause of this flooding in February 2002 is noted to be the Caha River and not the Bandon River which caused the February 1991 flooding. Since two separate rivers were the cause of these two flood events, this is presumably the rationale as to why the Ardcahan Bridge flooding has not been mapped as a recurring flood event on the OPW Past Flood Event database although it is noted that it has been known to become flooded more than once.

Further north of Ardcahan Bridge, along the R587 road which Option A would traverse, a flood event occurred on 2nd February 2021. This event has been recorded on the OPW flood database as "*Flooding at Dunmanway/Enniskeane*" with the source of this flood event being attributed to a river. Although details of the river in question are not provided on the OPW database, it is notable that two rivers are located in close proximity to the R587 road at this location, namely the Caha River and a tributary of the Caha River with the EPA name of "*Ardachan*". It is possible that either or both of these rivers resulted in the flooding along this stretch of the R587 road in February 2021. Approximately 900 m further northwest of this single flood event, a recurring flood event of the Caha River is recorded as "*Caha River Neaskin*". This location is approximately 240 m west of Option A along the R587 road at the closest extent. Approximately 370 m further north along the R587 road, another single flood event is recorded as "*Flooding at Ardachan*" where a flood event occurred on 11th September 2015. A river was the source of this flood event and although the details of the river in question are not provided on the OPW database, two rivers exist in close proximity to this location. These are the Caha River and a tributary of the Caha River with the EPA name of "*Aultagh*". Similar to the flood event described above at Ardachan in February 2021, it is possible that either or both of these rivers resulted in the flooding along this stretch of the R587 road in September 2015.

South of Keelaraheen, approximately 500 m south of the L-8551-15 local road along which Option A would traverse, a recuring flood event has also been recorded along the Bandon River. This recuring flood event has also been recorded by Coillte and is located on land

approximately 10 m lower in altitude than the L-8551-15 local road along which this Grid Connection route option would traverse. The Bandon River has also flooded in east Dunmanway in October 1996 along the R586 near "*The Long Bridge*". This location is approximately 500 m west of the substation near Ballyhawlwick, Dunmanway, where Option A would terminate. The immediate area surrounding the substation at Dunmanway is not recorded as having been impacted by the 1996 flood event nor any other flood events.

For the Carrigdangan Grid Connection route option (Option B), no single or recurring past flood events have been recorded either on or in close proximity to the road network along which Option B would follow. The closest recorded flood events to Option B is the "*Sruhaunphadeen Derrynagree*" recurring flood event described above, which is also the closest recurring flood event to the mains Site. The "*Sruhaunphadeen Derrynagree"* recurring flood event is located approximately 890 m northwest of the L-8544 local road along which both Grid Connection options (A and B) would traverse, although it is located at an altitude of approximately 90 m lower than the L-8544 local road at the closet extent. Any potential impacts from the *Sruhaunphadeen Derrynagree"* recurring flood event on either of the Grid Connection route options (A or B) is expected to be negligible.

Approximately 1.7 km south of Grid Connection Route Option B, both a recurring and single flood event are recorded in the townland of Knockariblihane. The single flood event in this area last occurred at Inchigeelagh Junction, on the R585 regional road, on September 11th, 2015. The flood source is not identified on the OPW database for this flood event with only limited details being available for this flood event. The recurring flood event in this area occurs approximately 340 m northeast of a single flood event in this area which is described as the "*Caha Knockariblihane recurring*" flood event where the flood source is a "*River*", which is presumably the Caha River which flows past this location. The immediate area surrounding the Carrigdangan Substation is not recorded to have been impacted by any historical flood events.

Regardless of which Grid Connection route option is chosen (A or B), the Grid Connection route would consist of underground trenching along public roads which will be restored with like-for-like surfaces. Any trenching works which will be carried out will be temporary in nature with no additional hardstand being proposed. As a result, runoff characteristics will be effectively unchanged when compared to the existing surfaces along the chosen route. The chosen Grid Connection route will therefore not change flood risk potential upstream or downstream of the Grid Connection.

In terms of the Turbine Delivery Route (TDR), a review of past flood events along the road network from the Port of Cork to the Site has been carried out. A single flood event recorded as "*Inchigeelagh 15/01/11*" on the L-4608 local road occurred near the townland of Cappanclare in January 2011. The cause of this single flood event was reported to be overtopping of the River Lee, which is located to the north of this section of road. An additional single flood event recorded as "*Flooding at Inchigeelagh Junction on 11/09/2015*" occurred in September 2015, only limited information regarding this event is available on the OPW floodinfo website. The flood source for this event is not listed, it could have resulted from overtopping of the nearby Caha River, although this is not stated on the OPW database. Only short duration minor works consisting of checking of the road with for oversail and overrun widening areas, and/or vegetation clearing will be carried out in the vicinity of these locations. The use of the road network for the purpose of TDR is expected to have a negligible impact on potential flooding at these locations and on the vehicles/personnel that will temporarily be utilising the road network.

An additional single flood event recorded as "*Flooding at Crookstown June 28th 2012*" is also recorded on the OPW flood database. In this instance, the flood source is recorded as being the "*River Bridge / Brouen River*". No works will be carried out in the vicinity of this recorded flood event location, use of the road network for the purpose of TDR is expected to have a negligible impact on flooding at this location.

A blade laydown area, to the east of Cookstown, is the furthest east between the Site and the Port of Cork where any works will be required along the TDR. No single flood or recurring flood east of this location have been considered further since use of the wider road network for the purposes of the TDR is not expected to have any impacts on potential flooding or on the vehicles/personnel that would be temporarily utilising the public road network.

Rainfall runoff from the Site will be captured for attenuation in the Site's designed drainage system, which will include settlement ponds. The settlement ponds will be strategically located at turbine bases and/or hardstand areas which will facilitate the treatment of runoff water through the settling out of sediments before eventual discharge to the existing drainage environment. The proposed drainage system will result in increased attenuation of rainwater during heavy rainfall events prior to ultimately being discharged to the surrounding environment for natural recharge. Natural recharge will occur via seepage to groundwater, diverted to topographically low points such as drains via the undulating topography or absorbed by the natural vegetation. The Proposed Development will

therefore not exacerbate the identified pre-existing single or recurring flood event due to an absence of direct pathways between the Site and the identified flood event locations.

The Geological Survey of Ireland (GSI) groundwater flooding probability maps were also reviewed[5]. There are no low, medium or high probability instances of groundwater flooding predicted to occur at the Site or along the proposed Grid Connection Route. The closest area to the Site which is mapped for potential groundwater flooding impacts is located approximately 52 km to the northeast of the Site near Cecilstown, County Cork. Ordnance Survey Ireland's (OSI's) National Townland and Historical 6 and 25 inch maps were also consulted for potential evidence of historical references to flooding at the Site. These historical maps do not provide any references to lands within or adjacent to the Site boundary being prone to flooding.

The National Indicative Fluvial Mapping (NIFM) have also been consulted with reference to fluvial (rivers and streams) flooding for both current day and future case scenarios. The medium and low probability present day scenarios relate to an annual exceedance probability (AEP) of 1% and 0.1% respectively. The medium and low probability present day scenarios reflect the odds of a theoretical extreme flood event occurring in a given year being 1:100 and 1:1000 respectively. There are no 1% or 0.1% AEP fluvial flood events predicted within the Site boundary for the present-day scenario. A possible 0.1% and 1% AEP fluvial flood event is mapped downstream of the Site adjacent to Shanacrane East River for the medium and low probability present day scenario.

There are two culvert watercourse crossings, and one bridge crossing required for the Project. All proposed works (except for watercourse crossings or where existing tracks are being upgraded) are located at least 50 m from a watercourse.

As the associated drainage - some of which is permeant for the lifetime of the Project, will be attenuated for greenfield run-off, the Project will not increase the risk of flooding elsewhere in the catchment. Based on this information, the Project complies with the appropriate policy guidelines for the area and is at no risk of flooding. A Surface Water Management Plan has been prepared as part of **Appendix 2.1: Construction Environmental Management Plan**.

[5] Geological Survey of Ireland: https://www.floodinfo.ie/map/floodmaps/

The Project will use the latest best practice guidance to ensure that flood risk within or downstream of the Site is not increased as a function of the Project, i.e., a neutral impact at a minimum.

The risk of the Project contributing to downstream flooding is also negligible, as the long-term plan for the Site is to retain and slow down drainage water prior to release. Robust drainage measures on the site will include swales, silt traps, check dams, settlement ponds and buffered outfalls. Please refer to the **Surface Water Management Plan (Appendix 2.1 Construction Environmental Management Plan)** for further details.

17.3.3 Landslides and Peat Stability

A comprehensive Peat Stability Risk Assessment (PSRA) (**Appendix 8.1**) has been undertaken for the Site and used to inform the design process including the siting of all proposed main infrastructure locations and drainage control measures. A desk-stop study was undertaken for the Turbine Delivery Route and proposed Grid Connection Route Options. The Peat Stability Risk Assessment was informed by the Scottish Government's 2017 guidance document, Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments and informed by reference to Irish peat slides arising in the country. Intrusive ground investigation works were carried out as part of the Peat Stability Assessment which included peat depth probing, shear strength testing, ground auguring/coring and trial pitting. The extensive suite of ground investigations and the robust PSRA completed has provided that the risk of such an event occurring during the construction, operation or decommissioning at the Project is minimised.

It was determined, after robust testing, that peat depth across the site is generally very shallow to shallow (average peat depth of 0.34 m) with the exception of isolated pockets of moderately deep peat (3.8 m) delineated by shallow subsoils and/or bedrock at or near the surface. No infrastructure is proposed in the areas of moderately deep peat. There was no deep or very deep peat observed at the Site. Six out of ten locations assessed contain a maximum thickness of peat greater than 0.5 m. The qualitative slope stability assessment suggests that the risk of slope failure at these six locations is considered to be low while the risk of slope failure at the remaining locations is considered to be negligible.

Please see **Chapter 8: Soils and Geology** and **Appendix 8.1** for more details.

17.3.4 Traffic

The highest risk in terms of traffic is road traffic accidents in the form of collisions. Mapped statistics for accident data in the area were not available from the RSA website at time of writing. Risks are mitigated for in the Traffic Management Plan (**Appendix 14.2**). Any potential collision will be localised and temporary in nature and will not have a significant impact on the environment or road infrastructure.

The Project will utilise the existing road network during the construction phase. Construction related traffic will originate from the delivery of materials to site, removal of surplus excavated material from site and transport of employees to, from and throughout the Site. The localised traffic disruptions will be mitigated through the use of industry standard traffic management measures. Please see **Chapter 14: Traffic and Transport** for details.

A Traffic Management Plan (TMP) (**Appendix 14.2**) is provided specifying details relating to traffic management. Prior to the commencement of the construction phase of the Project, a detailed TMP will be prepared by the Contractor for agreement with the relevant local authorities and An Garda Síochána. The TMP includes recommendations for the following:

- Traffic Management Co-ordinator;
- Delivery Programme;
- Provision of information to locals;
- A Pre and Post Construction Condition Survey;
- Liaison with the relevant local authority;
- Implementation of temporary alterations to the road network at critical locations;
- Identification of delivery routes;
- Delivery times of large turbine components;
- Travel plan for construction workers;
- Additional measures, and
- Re-instatement works.

Please see **Chapter 14: Traffic and Transportation** and TMP (**Appendix 14.2**) for further details.

17.3.5 Industrial Accident

The Project is not connected to or in the vicinity of any site regulated under the Control of Major Accident Hazards Involving Dangerous Substances Regulations (SEVESO sites). Gas explosions, petrochemical fires and fires from fuel emissions, leakages and spillages could occur causing personal injury, structural damage and forest fires. Therefore, no

significant effects associated with major industrial accidents involving dangerous substances are anticipated.

17.3.6 Loss of Critical Infrastructure

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

The Project is anticipated to connect to either Option A: Dunmanway 110 kV substation or Option B: Carrigdangan 110 kV substation.

17.3.7 Contamination

The Project has the potential to cause contamination and pollution of groundwater and surface water from potential release of hydrocarbons, earthworks and excavations on Site. A Construction Environment Management Plan (CEMP) (**Appendix 2.1**) has been prepared in conjunction with the EIAR and the NIS which accompanies the planning application for the Project.

Section 3 of the CEMP sets out details of the environmental controls to be implemented on site. The CEMP provides details on site drainage measures, peat stability monitoring measures, waste management and pollution prevention measures for refuelling and managing hazardous materials and cement-based products. The CEMP also sets out the Emergency Response Procedure (**Management Plan 1**) to be adopted in the event of an emergency including contamination, health and safety and environmental protection.

The CEMP provides details on all mitigation and monitoring measures to be actioned prior to construction, during the construction, operation and decommissioning phase. The CEMP will be subject to ongoing review through regular environmental auditing and site inspections during the construction phase. This will confirm the efficacy and implementation

of all mitigation measures and commitments identified in the application documentation. Please see **Chapter 2: Project Description** and **Appendix 2.1 Construction Environmental Management Plan** for further details.

17.3.8 Health and Safety

During construction of the Project, 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' and Safety, Health and Welfare (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) (**Appendix 2.1**) 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.

17.3.9 Turbine Safety

Turbines pose no threat to the health and safety of the general public. The Department of the Environment, Heritage and Local Government (DoEHLG)'s 'Wind Energy Development Guidelines for Planning Authorities 2006' state that there are no specific safety considerations in relation to the operation of wind turbines. Fencing or other restrictions are not necessary for safety considerations. People or animals can safely walk up to the base of the turbines. The Department of Housing, Planning and Local Government's "Draft Revised Wind Energy Guidelines, December 2019" state

'*health and safety issues are generally covered by separate legislation and not by planning legislation however developers of wind energy developments should be aware of the requirements*.'

Section 17.3.1 references ice throw from turbines, lightning conduction and forest fires.

17.3.10 Fire/Explosion

There is a potential risk of fire/explosion at the Project from malfunctioning equipment in the wind turbine tower and nacelle as well as at the Onsite Substation and Control Building.

A Construction Environment Management Plan (CEMP) (**Appendix 2.1**) has been prepared in conjunction with the EIAR and the NIS which accompanies the planning application for the Project. The CEMP also sets out the Emergency Response Procedure (**Management**

Plan 1) to be adopted in the event of an emergency including health and safety, environmental protection and fire.

Please see **Chapter 2: Project Description** and **Appendix 2.1 Construction Environmental Management Plan** for further details. Forest fires are included in Section 17.3.1.

17.4 RISK ASSESSMENT

This section outlines the possible risks associated with the Project for the construction, operational and decommissioning phases.

These risks have been assessed in accordance with the relevant classification as outlined in **Table 17.2** and **Table 17.3**.

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.

17.4.1 Likely Significant Effects

17.4.1.1 Do-Nothing Scenario

If the Project was not to proceed it would not be able to supply the electricity generated to the national grid. The opportunity to generate renewable energy and electrical supply to the national grid would be lost. Existing land-use practices and recreational amenities would continue at the Site. Climate change would continue unabated without the development of renewable energy infrastructure in sufficient quantities to facilitate the move to net zero as enshrined in Irish, EU and international law.

17.4.1.2 Assessment of Effects During Construction

A risk register has been developed which contains all potentially relevant risks identified during the construction phase of the Project. Six risks specific to the construction of the Project have been identified and are presented in **Table 17.6**.

Table 17.6: Risk Register - Construction Phase

Risk ID	Potential Risk	Possible Cause
Potential vulnerability to disaster risks		
A	**Severe Weather** Storm / Gale Both coastal and inland areas can be affected by high winds; Heavy Snow; Severe Cold / Frost extremes of Temperature; Thunder & Lightning Dense/ Persistent	Extreme weather - periods of heavy rainfall, taking into account climate change and strong winds

Risk ID	Potential Risk	Possible Cause
	Fog Heat Wave /Drought; Forest / Wilderness fire - Air Pollution Risk to construction activity on site, poor visibility, road traffic collisions, fire.	
B	**Flooding** Impacts on access to project elements; potential bridge collapse. High levels of surface water on site.	Extreme weather - periods of heavy rainfall, taking into account climate change and strong winds Poor drainage.
C	**Peat Stability** Movement of peat within the site during construction	Mismanagement of excavation and excavated material on site Severe weather conditions - storm, flooding, bridge collapse
Potential to cause accidents and / or disasters		
D	**Traffic Incident** Collisions onsite and offsite with vehicles involved in construction of the Project Bridge collapse	Driver negligence or failure of vehicular operations on site roads. Bridge collapse. 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 Project cable trench resulting in entrainment of sediment from the excavations during construction; and Erosion of sediment from emplaced site drainage channels.

Risk ID	Potential Risk	Possible Cause
F	Industrial Accident- Fire, gas explosion	Equipment or infrastructure failure; Electrical problems; and Employee negligence.

17.4.1.3 Assessment of Effect During Operation

Six risks specific to the operation of the Project have been identified and are presented in **Table 17.7**.

Table 17.7: Risk Register – Operational Phase

Risk ID	Potential Risk	Possible Cause
Potential vulnerability to disaster risks		
G	**Contamination** Discharge or spillage of fuel, chemical solvents, sewage or wastewater into watercourse or percolated to groundwater	A vehicular incident on the public road involving fuel, wastewater or sewage transportation in the operational phase.
Potential to cause accidents and / or disasters		
H	**Industrial Accident – Fire / 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 the Project.	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

17.4.1.4 Assessment of Effect During Decommissioning

Six risks specific to the decommissioning of the Project have been identified and are presented in **Table 17.8**.

Table 17.8: Risk Register – Decommissioning Phase

Risk ID	Potential Risk	Possible Cause
Potential vulnerability to disaster risks		
M	**Severe Weather** Risk to decommissioning activity on site	Extreme weather- periods of heavy rainfall, taking into account climate change and strong winds.
N	**Flooding of site** High levels of surface water on site	Extreme weather- periods of heavy rainfall, taking into account climate change and strong winds.
Potential to cause accidents and / or disasters		
O	**Traffic Incident** Collisions onsite and offsite with vehicles involved in construction of the Project	Driver negligence or failure of vehicular operations on site roads. Traffic Management not implemented.
P	**Contamination** Discharge or spillage of fuel, chemical solvents into watercourse or percolated to groundwater	Fuel spillage during delivery to site. Failure of fuel storage tank or tanks in plant and machinery and vehicles. Drainage and seepage water resulting from infrastructure excavation. Erosion of sediment from emplaced site drainage channels.
Q	**Industrial Accident - Fire/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 17.2** and **Table 17.3**) and the resulting risk analysis is given in **Table 17.9**.

The risk register is based upon possible risks associated with the Project. As outlined in **Section 17.3**, 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.

17.4.1.5 Assessment of Effect – Summary

Table 17.9: Risk Assessment

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
Construction Phase								
A	Severe Weather	Extreme weather-periods of heavy rainfall, taking into account climate change and strong winds	Illness or loss of life; Sedimentation of nearby watercourse Damage to, or depletion of aquatic habitats and species;	3	The risk of severe weather is unlikely when considering the assessment in **Chapter 15: Air and Climate** and weather conditions recorded over the last 32 years within the area.	1	The risk of severe weather conditions during the construction phase will result in a minor consequence in that a 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	Illness or loss of life; Sedimentation of nearby watercourse;	2	The risk of flooding is considered very unlikely when taking into account the	1	The risk of flooding during the construction 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)
		climate change and strong winds	Damage to, or depletion of aquatic habitats and species;		baseline assessment in **Chapter 9: Hydrology and Hydrogeology** and due to no recurring or historic flood incidents being recorded within the Wind Farm site or along the Grid Connection route.		that a 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.	
C	Peat Stability	Mismanagement of excavations and excavated material on site Extreme weather conditions	Movement of peat within the Project; Sedimentation of nearby watercourse; and Damage to, or depletion of aquatic habitats and species;	2	The Project has been designed to minimise the potential for peat instability and failure. Refer to **Appendix 8.1**: **Peat Stability Risk Assessment Report**	2	The risk of peat instability during the construction phase will result in a limited consequence in that there would be a limited affects with 'localised effects of short duration'. Contamination of environment (e.g.,	4

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
							watercourses) and damage to aquatic life, localised effects of short duration.	
D	Traffic Incident	Driver negligence or failure of vehicular operations on Site Access Tracks. Traffic Management not implemented or not adhered Bridge collapse	Injury or loss of life.	3	A limited number of vehicles will be permitted on the Site as part of the construction phase. As such, it can be determined that there is some 'opportunity, reason or means' for a vehicle collision to occur on Site, 'at some time.' An unlikely risk is therefore predicted.	1	A minor consequence is predicted. Having regard to on-site speed limits and vehicular movements, a small number of people would be affected' should a vehicular collision occur, with no fatalities and small number of minor injuries with first aid treatment.'	3
E	Contamination	Fuel spillage during delivery to Site.	Damage to, or depletion of aquatic habitats and species	2	As outlined in **Chapter 2: Project Description** and the **Appendix 2.1 Construction**	2	The risk of a fuel spillage or impact on surround drainage during the construction phase 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)
		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 Project resulting in entrainment of sediment from the excavations during construction; and	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		**Environmental Management Plan**, fuel will be stored on-site but in a bunded area to ensure containment and prevent spillages of fuel. The fuel tank will not be filled to overflowing. 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:**		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. Contamination of environment (e.g., watercourses and aquatic life), localised effects of short duration.	

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
		Erosion of sediment from emplaced site drainage channels			**Hydrology and Hydrogeology.**			
F	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 2 Project Description** and **Appendix 2.1: Construction Environmental Management Plan**, fuel will not be stored on-site post construction, therefore fuel is not considered to be a significant fire risk. There are no Gas Networks within the vicinity of the Project. Therefore, there is low risk of explosion.	2	Should a fire/explosion occur at the site, it will be of 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.,	4

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
					In accordance with Chapter 19 of the Safety, Health and Welfare at Work Act 2005 (the 2005 Act), the Project will be subject to a fire safety risk assessment which would assist in the confirmation of any major risks of fire on site e.g., wind turbines, substation, vandalism.		watercourses), and damage to aquatic life localised effects of short duration.	
Operational Phase								
G	Contamination	A vehicular incident, refuelling incident, wastewater or sewage transportation in the operational phase.	Damage to, or depletion of aquatic habitats and species. Release of suspended solids to surface	2	As outlined in **Chapter 2: Project Description** and **Appendix 2.1 Construction Environmental Management Plan**, fuel will be stored on-site but in a bunded	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	4

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
			watercourses could result in an increase in the suspended sediment load. Increased turbidity which in turn could affect the water quality and fish stocks of downstream water bodies.		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: Hydrology and Hydrogeology**.		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.	
H	Industrial Accident -	Equipment or infrastructure failure;	Illness or loss of life;	2	As outlined in **Chapter 2: Project Description**, fuel will	2	Should a fire/explosion occur at the site, it will be of limited consequence	4

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
	Fire/Gas explosion	Fuel spillage/storage; Electrical problems; and Employee negligence.	Damage to, or depletion of habitats and species; and Impacts on ambient air quality.		not be stored on-site post construction therefore fuel is not considered to be a significant fire risk. Gas will not be used onsite; therefore, it is not considered a fire/explosion risk. In accordance with Chapter 19 of the Safety, Health and Welfare at Work Act 2005 (the 2005 Act), the Project will be subject to a fire safety risk assessment which would assist in the identification of any major risks of fire on		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.	

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
					site e.g. wind turbines, substation, vandalism			
I	Collapse/ damage to structures	Landslide/ Earthquake; Extreme weather conditions such as flooding and storms; Vehicular collisions due to driver negligence; and Mismanagement of excavated material on Site.	Injury or loss of life. Movement of peat within the site; Sedimentation of nearby watercourse; and Damage to, or depletion of aquatic habitats and species.	2	According to the Irish National Seismic Network, 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	1	The risk of infrastructure collapse or damage to structures during the construction phase will result in a minor consequence in that a 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.	2

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
					site, it is not predicted that any collision of vehicles and any infrastructure would result in significant damage/collapse. The Project has been designed to take into account any issues on peat or spoil stability.			
J	Traffic Incident	Driver negligence or failure of vehicular operations on Site Access Roads. Traffic Management not implemented. Bridge collapse.	Injury or loss of life. Localised damage to aquatic 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	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)
					occur on Site, 'at some time.'			
K	Loss of Critical Infrastructure	Equipment or infrastructure failure; Electrical problems; Employee negligence; Landslide/ Earthquake; and Extreme weather conditions such as flooding and storms. Fire	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 Project will be connected to either Option A: Dunmanway 110 kV substation or Option B: Carrigdangan 110 kV substation and any shortages or failures will not impact other connections to the same substation	2	Should a power failure occur at either Dunmanway or Carrigdangan 110 kV substations (depending on final option chosen), it will result in a limited number of people affected- localised effects of short duration.	2

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
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; and Damage to, or depletion of aquatic habitats and species.	2	The risk of severe weather is unlikely when considering the assessment in **Chapter 15: Air and Climat**e and weather conditions recorded over the last 32 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	Illness or loss of life;	1	The risk of flooding is considered very unlikely when taking into account the	1	The risk of flooding during the decommissioning phase will result in a minor	1

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
		climate change and strong winds	Sedimentation of nearby watercourse; and Damage to, or depletion of aquatic habitats and species.		baseline assessment in **Chapter 9: Hydrology and Hydrogeology** and due to no recurring or historic flood incidents recorded within the Site or along the Grid Connection route.		consequence in that 'small number of people would be affected should a severe weather event occur, with no fatalities and a small number of minor injuries with first aid treatment. No contamination of environment (e.g., watercourses), localised effects.	
N	Traffic Incident	Driver negligence or failure of vehicular operations on Site Access Roads. Traffic Management not implemented.	Injury or loss of life.	3	A limited number of vehicles will be permitted on the Site as part of the decommissioning phase. As such, it can be determined that there is some 'opportunity,	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	3

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
					reason or means for a vehicle collision to occur on site, 'at some time.' An unlikely risk is therefore predicted.		injuries with first aid treatment.	
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	2	As outlined in **Chapter 2: Project Description** and **Appendix 2.1 Construction Environmental Management Plan**, 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	2	The risk of a fuel spillage or impact on surrounding drainage during the decommissioning phase will result in a limited consequence in that there would be a limited number of people affected with localised effects of short duration through the use of bunded containment areas during operation. Simple contamination of environment (e.g., watercourses), localised effects of short duration.	4

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
			stocks of downstream water bodies.		features means that adequate room is maintained for the proposed drainage measures as detailed in **Chapter 9: Hydrology and Hydrogeology**.			
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 depletion of habitats and species Contamination	2	As outlined in **Chapter 2: Project Description** and **Appendix 2.1 Construction Environmental Management Plan**, 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	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 decommissioning that would result in any such incident. There will be normal community	4

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
					Safety, Health and Welfare at Work Act 2005 (the 2005 Act), the Project will be subject to a fire safety risk assessment which would assist in the identification of any major risks of fire on site.		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; 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 Project will be connected to either	2	Should a power failure occur at either Dunmanway 110 kV substation or Carrigdangan 110 kV substation (depending on final option chosen) it will result in a limited number of people affected- localised effects of short duration.	2

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
					Dunmanway 110 kV substation or Carrigdangan 110 kV substation and any shortages or failures will not impact other connections to the same substation			

The risk assessment for each of the potential risks identified are consolidated in **Table 17.10** which provides their 'risk score.' A corresponding risk matrix is provided in **Table 17.11**, which is colour coded to provide an indication of the critical nature of each risk. As outlined in **Table 17.4**, the red zone represents 'high risk' scenarios', the amber zone represents 'medium risk scenarios and the green zone represents 'low risk scenarios.

Table 17.10: Risk Scores

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

Table 17.11: Risk Matrix

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

Table 17.11, presents the potential risks identified during the construction, operation and decommissioning of the Project 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 Project is identified below:

Peat Stability During Construction

The likelihood of peat instability during the construction of the Project is considered very unlikely as the soil stability risk assessment classified the site as low risk. The risk of peat instability has been minimised through the careful design of the Project and will be further limited through the implementation of the best practice construction control measures outlined in **Appendix 8.1**.

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

Contamination During Construction, Operation and Decommissioning

There is a potential risk of contamination from site activities during the construction, operational and decommissioning phases from potential release of hydrocarbons. The risk of contamination was given a risk score of 4. However, as outlined in **Chapter 2: Project Description**, **Appendix 2.1: CEMP** and **Chapter 9: Hydrology and Hydrogeology**, 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 as adherence to the CEMP mitigation measures will be required 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 Project. However, as outlined in Section 17.2.1, the scope of this assessment has been based on the understanding that the Project 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 Project will be subject to a fire safety risk assessment which will assist in the identification of any major risks of fire on site e.g., wind turbines, substation, vandalism.

Therefore, the risk of fire/explosion occurring at the Project 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.

17.4.2 Mitigation Measures

As outlined in Section 17.4.1, the scenarios with the highest risk score in terms of the occurrence of major accident and/or disaster were identified as 'Contamination' caused by the Project and risk of 'Industrial Accident- Fire/Gas Explosion' during the construction, operation and decommissioning phases.

The Project has been designed in accordance with the best practice measures described in detail in this EIAR and, as such, mitigation against the risk of major accidents and/or disasters is embedded through the design.

As discussed, the application for the Project is accompanied by a CEMP (**Appendix 2.1**) which sets out details of the environmental controls to be implemented on site. The CEMP sets out the Emergency Response Procedure to be adopted in the event of an emergency including contamination, health and safety and environmental protection. The CEMP provides details on all mitigation and monitoring measures to be actioned prior to construction, during the construction, operation and decommissioning phase. The CEMP will be subject to ongoing review through regular environmental auditing and site inspections. This will confirm the efficacy and implementation of all mitigation measures and commitments identified in the application documentation.

The CEMP includes an Emergency Response Plan (**Management Plan 1**). It provides details of procedures to be adopted in the event of an emergency relating to health & safety or environmental protection. The Emergency Response Plan includes details on the response required and the responsibilities of all personnel in the event of an emergency. Please see **Appendix 2.1** for details.

17.4.3 Residual Effects

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

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

17.4.4 Assessment of Cumulative Effects

17.4.4.1 Cumulative Impact Assessment

A search in relation to developments that may have the potential to result in a cumulative impact with the Project on the environment was carried out as part of the EIAR (Please see **Appendix 2.4**). The Project has been considered, cumulatively with these developments. The closest developments to the Site that are not yet constructed are a wind farm (Cork County Council Planning Ref. No. 19112) located 4.1 km south of the Site; a wind farm (Cork County Council Planning Ref. No. 20350) located 5.2 km northwest of the Site and a wind farm extension located 6.6 km east of the Site (Cork County Council Planning Ref. No. 215372). Due to the separation distance of the projects, the Project being located at a higher elevation than the other developments, lack of connectivity of forestry parcels and the implementation of proposed mitigation measures, there is no potential for significant cumulative increase in the vulnerability of the Project to risks such as peat stability, flooding, contamination, fire or traffic or loss of critical infrastructure.