CONTENTS

TABLES

19 MAJOR ACCIDENTS AND DISASTERS

19.1 Introduction

This Chapter has been prepared by Nicholas O'Dwyer Ltd. and presents a risk assessment of major accidents and disasters relevant to the Oatfield proposed development, as required in the EIA Directive, and described in the EPA's EIAR 2022 Guidelines.

The EIA Directive requires the assessment of risk of major accidents and disasters to be included within the scope of EIA. The aim is to determine any potential major accidents and/or natural disasters that the Proposed Development could (i) be vulnerable to, and (ii) cause, and to determine appropriate measures required to reduce the risk by reducing the probability of an event occurring and/or reducing the effect of the consequence.

In this chapter, a range of accident and disaster scenarios were identified that could result in environmental damage or deterioration. The range of scenarios covers:

- Risks associated with extreme/natural events; and
- Risks of major accidents and offsite disasters.

Thus, this chapter considers potential environmental risk under abnormal or emergency conditions. Potential and likely environmental effects associated with normal conditions at any phase of the Proposed Development are assessed in the preceding chapters of Part II of this EIAR.

19.2 Statement of Authority

This chapter has been prepared by Krista Farrugia, a Principal EIA Consultant in Nicholas O'Dwyer Ltd., with 20 years of experience in the field of EIA. As a consultant, Krista has coordinated EIAs, including Risk Assessment and Major Accident and Disasters chapters. Krista has also conducted risk assessment for projects outside of EIA, as requested by the Competent Authority in Malta. Krista was also responsible for review of risk assessments in her role as Environment Protection Officer for three years with the Malta Environment and Planning Authority (MEPA). Krista holds a Master of Science in Integrated Environmental Management from the University of Bath, a Post Graduate Diploma in Wildlife Biology and Conservation from Edinburgh Napier University, and a Bachelor of Science (Hons) in Chemistry and Biology from the University of Malta. She is a Practitioner with the Institute of Environmental Management with extensive experience in EIA.

19.3 Methodology

A desk-based study has been undertaken in order to establish the baseline environment on which the risk assessment is being carried out, as this will influence both the likelihood and the impact of a major accident and/or disaster. Generally, environmental risk occurs when there is a means, or pathway by which a hazard (source) results in a negative impact to the surrounding environment, *i.e.,* receptor/s. Risk assessment includes identification, classification, and evaluation of the risks.

The following reference materials were used to inform and guide the assessment:

- EU (2017) Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report;
- EPA (2022) Guidelines on the information to be contained in Environmental Impact Assessment Reports;
- EPA (2014) Guidance on Assessing and Costing Environmental Liabilities;
- DoEHLG (2010) Guidance Document 1: A Guide to Risk Assessment in Major Emergency Management;
- Dept of Defence (2017) A National Risk Assessment for Ireland 2017;
- IEMA, ARUP (2020) Major Accidents and Disasters in EIA: A Primer; and
- ISO31010 Risk Assessment Techniques.

The following approach was adopted as part of the risk assessment:

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

19.3.1 Risk Identification

Risks were identified through review of EIAR environmental factor chapters (Part 2 of the EIAR, including **Chapter 6** to **Chapter 18**) and consultation with experts, as required. As set out in the EU guidance document, risks are identified both in respect of (i) the potential vulnerability of the Project to major accidents and disasters; and (ii) the potential for the Project to cause accidents and/or disasters.

19.3.2 Risk Classification

19.3.2.1 Risk Assessment Criteria

The risk criteria applied in this assessment are based on a consequence/likelihood matrix consistent with *ISO31010: Risk Management: Risk Assessment Techniques*, a supporting standard for the international risk standard ISO31000. Reference was made to the DoEHLG and the EPA (2014) guidance documents; the following risk criteria were adapted for the purposes of this assessment. **Table 19.1** lists the criteria used for assessing environmental consequences. **Table 19.2** presents the criteria to determine the likelihood of an event occurring. The approach adopted has assumed a 'risk likelihood' where one or more aspects of the likelihood description are met, i.e., any risk to the Proposed Development less than extremely unlikely to occur has been excluded from the assessment.

19.3.2.2 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. Further to this, the Clare County Council Major Emergency Plan, 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 19.1**.

Table 19.1: Criteria for Assessing Scale of Environmental Consequences

Rating	Classification	Effects description
1	Insignificant	No contamination; localised, short-term effects to land, biodiversity, ecosystem services, water resources, human health
2	Minor	Limited contamination, short duration, localised effects to land, biodiversity, ecosystem services, water resources, human health
3	Moderate	Moderate, medium-term impacts with widespread effects to land, biodiversity, ecosystem services, water resources, human health
4	Major	Medium- to long-term, serious environmental effects with some impairment to ecosystem function and human health, widespread impacts
5	Catastrophic	Permanent, severe impacts to land, biodiversity, ecosystem services, water resources, human health

19.3.2.3 Classification of Likelihood

Having identified 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 19.2** defines the likelihood ratings that have been applied.

Table 19.2: Criteria for Assessing Likelihood of Event Occurring

Rating	Classification	Effects description
1	Extremely unlikely	Consequence may only occur in exceptional circumstances
2	Unlikely	Consequence could occur at some time
3	Occasionally	Consequence may occur at some time
4	Likely	Consequence will probably occur in most circumstances
5	Almost certain	Consequence is expected to occur in most circumstances

19.3.3 Risk Evaluation

The risk matrix categorises risks based on their severity (consequence) and likelihood, and was developed with reference to the guidelines, listed above, in particular, the EPA (2014) and the DoEHLG (2010) guidance documents. **Table 19.3** presents the matrix that was applied in carrying out the risk assessment.

Table 19.3: Risk Matrix

	Environmental Consequence				
Likelihood	**1: Insignificant**	**2: Minor**	**3: Moderate**	**4: Major**	**5: Catastrophic**
1: Extremely Unlikely	Very Low	Very Low	Low	Low	Low
2: Unlikely	Very Low	Low	Low	Moderate	Moderate
3: Occasional	Low	Low	Moderate	Moderate	High
4: Likely	Low	Moderate	Moderate	High	Very High
5:Almost Certain	Low	Moderate	High	Very High	Very High

19.4 Existing Environment

The Proposed Development is in an upland setting dominated by commercial coniferous plantation forestry, blanket bog, wet heath and rough/wet grassland. There is also agricultural land bounded by hedgerows, and conifer plantations. An area of broadleaf forestry is located at the North-West of the site.

The predominant habitat on site is conifer forestry. Agricultural land is present throughout the site. Marginal grazing land is predominant in large areas to the North-east of the site. There are sections of shrubby, broadleaf woodland to the North-west of the site. The site is hydrologically connected to the Blackwater River (Clare), approximately 6km downstream.

The settlement pattern in the vicinity of the Proposed Development (approximately 2km of each turbine position) is characterised by dwellings and farm buildings located mainly along the public roads, with some dwellings located down private lanes.

The works for installation of the independent power producer (IPP) and grid connection route (GCR) underground cabling are within the public road corridor of local roads, and a crossing of the R471 road.

The temporary works required for transporting turbine components to the Proposed Development via Foynes port will be within and adjacent to the public road corridors of national primary roads and motorways (N69, M7), regional roads (R494, R463, R471) and local roads requiring temporary removal of street furniture, temporary surfaces through roundabouts and in road verges, and clearance and trimming back of vegetation, where required. The temporary works will be minimised, wherever possible.

19.5 Natural Disasters

Given its geographical location, Ireland is relatively less vulnerable to natural disasters such as earthquakes or tsunamis. However, in recent years there has been an increase in the number of extreme weather events, particularly those leading to flooding and flash flood incidents.

19.5.1 Seismic Events

Ireland lies at the north-west margin of Europe, adjacent to the continental shelf and is characterised by very low levels of seismic activity. This lack of seismic activity in Ireland has been demonstrated by the low number of historical observations, regional seismic assessments and modern instrumental readings.

Historically, only 26 credible seismic events were felt in Ireland in the interval 1500 to 1970 (EPA 2014)[1]. Of these 26, 13 were earthquakes with magnitudes of around 5.0 on the Richter Scale, occurred in western Britain, and were widely felt across Britain and Ireland. The largest earthquake of these 13 was of magnitude 5.4 (Richter Scale). No earthquake in Ireland has produced a surface rupture, and typically fault rupture lengths for the largest British earthquakes have a length of 1–2km, with a slip of 10cm.

The Irish National Seismic Network (INSN) records and reports on earthquakes and other seismic events (e.g., quarry blasts) in Ireland. There are no records for any events in County Clare.

19.5.2 Extreme weather events

The Atlantic storm track has a significant influence on the Irish climate.

In recent years, more frequent and intense storms have hit Ireland. Variability in the frequency of storms in the past (particular increase in storms recorded for 1910s-1920s and 1980s-1990s) were attributed to the North Atlantic Oscillation (NAO), an atmospheric circulation pattern. When the pressure difference is high, the westerly airflow over the Atlantic strengthens causing a series of storms over northern Europe. The NAO continues to influence of storm variability in Ireland.

Storms are a main cause of structural failures in wind turbines. High winds, lightning, ice and snow can all have negative consequences on wind turbines as assessed in **Table 19.4**.

19.5.3 Flooding

As identified in the Flood Risk Assessment and in EIAR **Volume II Chapter 10 Hydrology and Hydrogeology**, the nearest past flood events recorded are located approximately 5km west of the Proposed Development site, as follows:

- The Owenogarney (060) River (approximately 5km west); and
- The Broadford (010) River (approximately 2km north).

The Proposed Development site is not located within a probable flood zone, nor has it experienced any historical flooding.

19.5.4 Ground stability

Chapter 10 and **Appendix 10.1** specifically assesses peat stability and the potential for landslides at the site. **Chapter 10** reports that most landslides occur after an intense period of rainfall. As described in **Appendix 10.1**, there are no recorded landslide events in close proximity to the Site (GSI, Accessed October 2023). As described in **Chapter**

[1] Environmental Protection Agency (2014) 2014-W-UGEE-1, Summary Report 2: Baseline Characterization of Seismicity

10, the closest mapped landslide event recorded was approximately 12km to the northeast of the Proposed Development site and occurred as a result of peat movement. During site surveys there was no evidence of stability issues or mass movement on the Site. Peat probing was carried out and revealed that peat depth is largely shallow throughout the site although pockets of greater peat depth were identified. A peat stability risk assessment was carried out for each of the turbine locations. Risks were ranked between very low and low. See **Appendix 10.1** for further detail.

It is noted that along the Turbine Delivery Route (TDR), a mapped landslide event occurred approximately 2.5km to the north at Killaloe and occurred in 1948, as a result of a riverbank slide.

19.5.5 Wildfire

The risk of wildfires in Ireland is highest in March and April. The year 2022 was a record year where over 3,400 hectares of land were damaged by a total of 69 large wildfires. This was the highest number of large individual wildfires recorded in two decades, setting a new record over the previous year, which was also relatively high, where 50 individual fires were recorded[2]. Dead grasses and shrubs such as heather and gorse present particular risk as well as weather conditions and fire behaviour. As described in **Chapter 7**, the Proposed Development and surroundings includes vegetation and habitat types that could support and spread wildfires.

19.6 Potential Sources of Major Accidents & Offsite Hazards

As required by Annex IV (5) of the EU EIA Directive 2011/92/EU, as amended, the potential for the Proposed Development to cause risks to human health, cultural heritage or the environment due to its vulnerability to external accidents or disasters is addressed in this section.

19.6.1 Risk of major incidents involving dangerous or hazardous substances

The wind farm element in the Proposed Development is not located close to a Major Accidents Hazard (COMAH) site as designated under the Seveso-III-Directive (2012/18/EU). Upper Tier and Lower Tier sites (depending on the amounts of dangerous substances stored on site) listed by the Health and Safety Authority under the Seveso Directive within 20km of the Proposed Development to the site include:

- Analog Devices International located approximately 14.3km south of the Site’
- Avara Shannon Pharmaceutical Services, approximately 14.0km west of the Site
- Enva Ireland Ltd (hazardous waste facility), approximately 12.3km west of the Site
- Grassland Agro, approximately 11.3km south of the Site
- Roche Ireland, approximately 17.5km west of the Site
- Shannon Airport, approximately 16.1km west of the site.

[2] Mccarthaigh, S. 2023. More than 3,400 hectares damaged as record number of wildfires in Ireland last year. www.breakingnews.ie.

Other sites, permitted through Industrial Emissions Licences or Integrated Pollution Control Licensing are also located within 15km, with the closest being Enva Longpavement landfill site, located 8.1km south of the site.

19.6.2 Risk of a pollution incident from hydrocarbons, chemicals and wastes

In the event of a major accident or natural disaster, the potential sources of pollution as a result of the Proposed Development during the construction and operational phases include bulk storage of hydrocarbons, chemicals and waste. Storage and use of chemicals onsite is limited. These will be stored securely and in appropriately bunded areas to ensure containment and prevent spillages. No fuels, chemicals or solvents will be stored outside such confines.

During the refuelling operations for plant and other equipment there is the potential for spillage of these fuels. As described in **Chapter 5**, a temporary construction compound will be constructed that will include a bunded refuelling area (including oil interceptor).

In extreme pluvial events, wastes such as temporary stockpiled material could be carried off site in large quantities which can result in siltation of water bodies. **Chapter 9** describes mitigation measures to contain the stockpiles under normal conditions but also considers additional requirements to be implemented during storm events.

19.6.3 Risk of structural or technical failures of turbines

Most structural failures are caused by storms, however, mechanical faults such as assembly and misalignment and foundation faults also contribute.

Potential 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 (electrical).

Primary mitigation has been implemented at design stage including design of turbine foundations (which are site specific) as well as through adequate siting of wind turbines to provide sufficient set back distances from occupied dwellings and other infrastructure.

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 units to provide backup power in the event of a loss of mains power supply that could impact the control system.

19.7 Risk Assessment

A range of scenarios were identified which have the potential to lead to disaster or emergencies as presented in **Table 19.4**. A risk assessment was carried out using the classification and evaluation criteria described in **Table 19.1** to **Table 19.3**. This risk assessment established the consequence and likelihood of each disaster/emergency scenario in the absence of secondary mitgation, and then used this information to determine the resultant risk level (see **Table 19.4**).

Disaster/emergency scenarios where the resultant risk level is determined to be *moderate* or higher were then subject to further risk assessment (see **Table 19.5**). This involved the identification of further mitigation measures to be implemented during the detailed design and subsequent operation of the Proposed Development, with the aim of reducing the resultant risk level to a low rating.

Table 19.4: Rating of Major Accidents and Disasters

Event	Disaster / Worst-case Scenarios	Primary/Embedded Mitigation Measures	Environmental Consequence	Likelihood	Resultant Risk Level
Seismic events	Damage to turbine foundations and/or ancillary facilities including crane pads, the electrical substation, the meteorological mast, and loop-in towers. During an earthquake, wind turbine foundations experience dynamic loads that vary in magnitude and direction, These loads induce vibrations and forces that could compromise the structural integrity of the foundation and the entire wind turbine, which could cause collapse[3].	Ensuring stability through designing according to site geology.	**Catastrophic** Potentially permanent and severe impact on environmental receptors.	**Extremely unlikely** Earthquakes are rare in Ireland and when recorded, their intensity has been relatively low and has not resulted in creation of fissures in the ground.	**Low**
Extreme weather such as high winds, storms, lightning, ice and snow	Turbines can be overloaded and damaged if wind speed is too high. Storms can cause structural damage to turbines, which may include damage to the tower, the nacelle, the blades, electrical damage to the generator, the transformer and the control system. Wind turbines can be susceptible to lightning strike which can damage blades or cause a fire. If ice forms on the blades of the turbine, pieces can be thrown off at high speeds, which presents a safety hazard. Ice can also reduce efficiency (aerodynamic performance) of the blades and cause an imbalance in the rotor.	All three turbine types under consideration (see **Chapter 5**, **Table 5.3**) use pitch control or feathering (where the blades are able to rotate around their axis to change orientation allowing them to reduce their surface area). Installation of lightning rods and surge protectors. The Vestas V150 includes a Lightning Detection System. Coating blades with water-repellent and impact-resistant materials.	**Moderate** Primary mitigation measures will address the main threats and reduce severity of damage, although residually, some damage could still be sustained; if maintenance personnel cannot get to the site as needed, moderate impacts could occur.	**Occasionally** As described, extreme weather events, particularly storms do occur in Ireland.	**Moderate**

[3] Keskin, H. 2023. Wind and Earthquake Effects on Wind Turbine Foundation Design. www.medium.com

Event	Disaster / Worst-case Scenarios	Primary/Embedded Mitigation Measures	Environmental Consequence	Likelihood	Resultant Risk Level
	Snow on roads can block access to maintenance vehicles. It can also interfere with sensors and instrumentation as well as alter wind profile and turbulence on the ground.	Ice Detection systems detect ice build-up on rotors, limiting the risk of ice throw. De-icing systems (whether passive or active, e.g.the Vestas De-Icing system uses air heaters to circulate hot air within the turbine blades during standstill. Wind turbines are fitted with sophisticated remote monitoring and control systems to manage rotational speed. Turbines can shut down in storm conditions through adjustment of blade pitch (see above). Set back distances from the electrical substation, as required by EirGrid, were adhered to at the design stage.			
Flooding	Damage to turbine towers / foundations, substation, and other ancillary facilities including loop-in towers. Blocking of access to maintenance vehicles	Seals on turbine towers are designed and built to ensure no water ingress to the tower. There are seals in the foundations to ensure no ingress of water. Design and construction of foundations ensuring	**Moderate** Design measures will limit damage though any ingress of water that could result in a moderate impact	**Unlikely** As described in **Chapter 9,** the Proposed Development is not located in an area that is prone to flooding.	**Low**

Event	Disaster / Worst-case Scenarios	Primary/Embedded Mitigation Measures	Environmental Consequence	Likelihood	Resultant Risk Level
		resilience if exposed to water. All relevant materials will be waterproof.			
Peat landslide / mass movement event	Landslides during excavation works. Landslide causing damage to turbines/ substations, loop in towers and/or toppling.	Siting of turbines, substation, grid connection and other ancillary facilities to avoid peat and areas with steep to severe slopes.	**Major** Potentially serious impacts on environmental receptors.	**Unlikely** Low risk was identified in **Chapter 10.**	**Moderate**
Wildfire	Fire damage to turbines or ancillary facilities e.g., substation	Setback of turbines, met mast and substation from flammable vegetation to maintain fire break.	**Major** Potentially serious impacts if embedded mitigation fails.	**Unlikely** Given the habitat on and around the site, the event could occur at some time, depending on practices in the area.	**Moderate**
Incident at Seveso site	Explosion / fire occurring at facility containing flammable / hazardous substances Seveso site for which fire services may need to access the Seveso site.	N/A	**Insignificant** There are no Seveso sites close to the Proposed Development. In the unlikely event of an explosion at the nearest site, the distance is considered too great to result in an impact on the Proposed Development	**Extremely unlikely** Such an event would be an exceptionally rare occurrence given the preventative procedures in place at a Seveso site.	**Low**
Pollution accidents - fuel / oil spillage or leakage; waste contaminated run-off	Fuel / oil spillages or leakages being conveyed to surface water bodies, ground/land and groundwater causing contamination. Large amounts of excavated and stockpiled material can end up in surface	Minimal volumes of chemicals/fuel stored on site. These are stored in secure, appropriately bunded areas.	**Minor** Even though this assessment considers large scale events in abnormal situations, the small amounts of material	**Unlikely** The primary mitigation measures should prevent extensive contamination.	**Low**

Event	Disaster / Worst-case Scenarios	Primary/Embedded Mitigation Measures	Environmental Consequence	Likelihood	Resultant Risk Level
	water run-off from the Proposed Development.	Exposed soils/peat will be covered with plastic sheeting during all heavy rainfall / storm events and during periods where works have temporarily ceased before completion, weekends, overnight, etc. No direct flow paths will be permitted between stockpiles and watercourses. Collector drains and/or soil berms will be established to direct/divert surface water runoff from development areas, including temporary stockpiles, and direct same into established treatment trains including stilling ponds, buffered discharge points or other surface water runoff control infrastructure as appropriate. Silt fences will be established along the perimeter of source areas e.g., stockpiles, within the drainage network, and in existing natural drains and degraded peat areas	to be stored on site means that the impact will be localised		

Event	Disaster / Worst-case Scenarios	Primary/Embedded Mitigation Measures	Environmental Consequence	Likelihood	Resultant Risk Level
		which are likely to receive surface water runoff.			
Structural & technical failures	Mechanical faults such as those resulting from errors in assembly, as well as misalignment and foundation faults, can result in collapse of the turbine (due to foundation or tower failure), wind turbine rotational failure in extreme wind conditions (due to control system or rotor break failure), and fire (electrical). Severance of wind turbine blades, where a piece of blade can break off and present a potential hazard depending on where it lands. Generator, substation transformer and loop-in tower failures can result in fire, which would generally require replacement of the whole turbine.	Site specific design of turbine foundations. Peat stability tests were conducted and it was ensured that the turbines were not placed in areas where there will be peat instability. Siting of wind turbines to provide sufficient set back distances from occupied dwellings and other infrastructure. Careful siting and design with minimum setback distances to nearby occupied dwellings of 720 m applied. Furthermore, the proposed wind farm will be remotely monitored, and potential accidents will be quickly identified and reported. Wind turbines are fitted with sophisticated remote monitoring and control systems to manage rotational speed. Turbines can shut down in storm conditions through adjustment of blade pitch (see above).	**Major** Potentially permanent and severe impact on environmental receptors.	**Unlikely** Extensive primary mitigation is in place to reduce the likelihood of any technical faults, however, emergency and unplanned events are still possible.	**Moderate**

Event	Disaster / Worst-case Scenarios	Primary/Embedded Mitigation Measures	Environmental Consequence	Likelihood	Resultant Risk Level
		Turbines are fitted with emergency power supply units to provide backup power in the event of a loss of mains power supply that could impact the control system. Wind turbines fitted with fire suppression systems. Regular maintenance according to manufacturer's instructions, systems inspections, and timely repair of identified deficiencies.			

The findings of the risk assessment presented in **Table 19.4** can be summarised as follows:

- A robust suite of primary mitigation measures has been incorporated into the design to reduce the risk level associated with each of the events assessed;
- Some of the worst case scenario events were considered to have a Low resultant risk level. Low risk events do not require further mitigation at this stage. Nonetheless, these risks will be continuously monitored through all stages of the project.
- Events whereby the resultant risk level is moderate or greater require further mitigation. This includes the following events:
    - Extreme weather events;
    - Ground stability;
    - Wildfire; and
    - Structural and/or technical faults.

Table 19.5 presents the residual risk assessment for these events, with consideration during detailed design stage and operation, there will be ongoing refinement of the risk management strategy and mitigation measures.

Table 19-5 Further Risk Assessment with Additional Mitigation Measures

Event	Disaster / Worst-case Scenarios	Mitigation Measures	Environmental Consequence	Likelihood	Resultant Risk Level
Extreme weather such as high winds, storms, lightning, ice and snow	Turbines can be overloaded and damaged if wind speed is too high. Storms can cause structural damage to turbines, which may include damage to the tower, the nacelle, the blades, electrical damage to the generator, the transformer and the control system. Wind turbines can be susceptible to lightning strike which can damage blades or cause a fire. If ice forms on the blades of the turbine, pieces can be thrown off at high speeds, which presents a safety hazard. Ice can also reduce efficiency (aerodynamic performance) of the blades and cause an imbalance in the rotor. Snow on roads can block access to maintenance vehicles. It can also interfere with sensors and instrumentation as well as alter wind profile and turbulence on the ground.	Communication of design data and risk assessments completed in support of this planning application to the future detailed designers. A detailed Hazard and Operability (HAZOP) study should be carried out at detailed design stage. The HAZOP should evaluate the mitigation measures in place and address the potential for refinement to reduce the risk associated with this event to a "low" resultant risk level. The CEMP includes an Emergency Response Plan. For the operational phase, an Emergency Response Protocol will also be developed for this event. The emergency response planning requirements should include the following requirements at a minimum: - Response hierarchy: a hierarchy of the roles and responsibilities of the relevant personnel	**Minor** The additional mitigation measures will assist in the management of the aftermath, reducing recovery time and extent of impact to minor consequences.	**Occasionally** As described, extreme weather events, particularly storms do occur in Ireland.	**Low**

Event	Disaster / Worst-case Scenarios	Mitigation Measures	Environmental Consequence	Likelihood	Resultant Risk Level
		under each category of emergency event. - Response assessment: the initial assessment of the emergency event and the required actions, which will be carried out once the alarm / alert has been raised. - Response procedures: the procedure for the implementation of emergency response actions, as determined by the initial response assessment. Protocol for site management in the case of an extreme snow event that is causing access issues. Training of personnel in the Emergency Response Protocol.			
Peat landslide / mass movement event	Landslides during excavation works Landslide causing damage to turbines and/or toppling.	An emergency response system will be developed for the construction phase of the project, particularly during the early excavation phase. This, at a minimum, will involve 24-hour advance meteorological forecasting (Met Éireann download) linked to a trigger-	**Moderate** Effective implementation of emergency response procedures will reduce the severity of the consequence.	**Unlikely** Low risk was identified in **Chapter 10.**	**Low**

Event	Disaster / Worst-case Scenarios	Mitigation Measures	Environmental Consequence	Likelihood	Resultant Risk Level
		response system. When a pre-determined rainfall trigger level is exceeded (e.g., one in a 100-year storm event or very heavy rainfall at >25mm/hr), planned responses will be undertaken. These responses will include; cessation of construction until the storm event including storm runoff has passed over. Following heavy rainfall events, and before construction works recommence, the Site will be inspected and corrective measures implemented to ensure safe working conditions, for example dewatering of standing water in open excavations, etc.			
Wildfire	Fire damage to turbines or ancillary facilities e.g., substation	Communication of design data and risk assessments completed in support of this planning application to the future detailed designers. This will enable them to ensure that all residual risks are comprehensively addressed by the detailed design solution. A detailed Hazard and Operability (HAZOP) study will be carried out at detailed design stage. The HAZOP will	**Moderate** Potentially permanent and severe impact on environmental receptors.	**Unlikely** Given the habitat on and around the site, the event could occur at some time, depending on practices in the area.	**Low**

Event	Disaster / Worst-case Scenarios	Mitigation Measures	Environmental Consequence	Likelihood	Resultant Risk Level
		evaluate the mitigation measures in place and address the potential for refinement to reduce the risk associated with this event to a “low” resultant risk level. An Emergency Response Protocol will be developed for this event. The emergency response planning requirements will include the following requirements at a minimum: - Response hierarchy: a hierarchy of the roles and responsibilities of the relevant personnel under each category of emergency event. - Response assessment: the initial assessment of the emergency event and the required actions, which will be carried out once the alarm / alert has been raised. - Response procedures: the procedure for the implementation of emergency response actions, as determined			

Event	Disaster / Worst-case Scenarios	Mitigation Measures	Environmental Consequence	Likelihood	Resultant Risk Level
		by the initial response assessment. Protocol for site management in the case of an extreme snow event that is causing access issues will be developed Training of personnel in the Emergency Response Protocol.			
Structural & technical failures	Mechanical faults such as those resulting from errors in assembly, as well as misalignment and foundation faults, can result in collapse of the turbine (due to foundation or tower failure), wind turbine rotational failure in extreme wind conditions (due to control system or rotor break failure), and fire (electrical). Flying blades, where a piece of blade can break off and fly through the air, also present a potential hazard. Generator failures can result in fire, which would generally require replacement of the whole turbine.	Communication of design data and risk assessments completed in support of this planning application to the future detailed designers. This will enable them to ensure that all residual risks are comprehensively addressed by the detailed design solution. A detailed Hazard and Operability (HAZOP) study will be carried out at detailed design stage. The HAZOP will evaluate the mitigation measures in place and address the potential for refinement to reduce the risk associated with this event to a "low" resultant risk level. An Emergency Response Protocol will be developed for this event. The emergency response planning	**Moderate** Primary and Secondary mitigation is expected to limit the severity of impacts..	**Unlikely** Extensive primary mitigation is in place to reduce the likelihood of any technical faults, however, emergency and unplanned events are still possible.	**Low**

Event	Disaster / Worst-case Scenarios	Mitigation Measures	Environmental Consequence	Likelihood	Resultant Risk Level
		requirements will include the following requirements at a minimum: - Response hierarchy: a hierarchy of the roles and responsibilities of the relevant personnel under each category of emergency event. - Response assessment: the initial assessment of the emergency event and the required actions, which will be carried out once the alarm / alert has been raised. - Response procedures: the procedure for the implementation of emergency response actions, as determined by the initial response assessment. Protocol for site management in the case of an extreme snow event that is causing access issues will be developed. Training of personnel in the Emergency Response Protocol.			

19.8 Summary of Findings

Table 19.4 and **Table 19.5** illustrate that the primary mitigation measures included in the design, together with additional mitigation, results in low risk levels.

In summary, half of the identified and assessed worst-case scenarios were deemed to have a Low resultant risk level given the primary mitigation measures included in the Proposed Development design. While "low" risk events do not require further mitigation at this stage, nonetheless, they will be further refined at detailed design stage to identify any opportunities for further risk reduction. For those events with a "moderate" resultant risk level, while all reasonably practicable measures have been incorporated at this stage of design, further refinements are required for implementation at detailed design stage and during the operation of the system to reduce the risk level to a rating of "low".

Orsted will regularly assess the risk of major accidents and/or disasters throughout the operational phase and will periodically review emergency response protocols.