

Volume 5: Wider Scheme Aspects

Chapter 34
**Major Accidents and
Disasters**

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34. Risk of Major Accidents and/or Disasters

34.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) presents an assessment of the likely significant effects on the environment of the North Irish Sea Array (NISA) Offshore Wind Farm (hereafter referred to as the ‘proposed development’) due to its vulnerability to the risk of major accidents and/or disasters during the construction, operation, and decommissioning phases. The potential for the proposed development to cause major accidents and/or disasters, and the consequent likely significant effects on the environment, are also addressed.

This chapter sets out the methodology followed (Section 34.2), describes the baseline environment (Section 34.3) and summarises the main characteristics of the proposed development which are of relevance to risks of major accidents and/or disasters (Section 34.4), including any embedded mitigation. Potential impacts and relevant receptors are identified. An assessment of the likely significant effects due to the proposed development’s vulnerability to, and potential to cause, major accidents and/or disasters is undertaken (Section 34.5). Mitigation measures are proposed to mitigate and monitor these effects if required (Section 34.6) and any residual likely significant effects are then described (Section 34.7). Transboundary effects are considered (Section 34.8), and cumulative effects are summarised in Section 34.9 and detailed in full in Chapter 38 Cumulative and Inter-Related Effects. The chapter then provides a reference section (Section 34.10).

The EIAR also includes the following:

- Detail on the competent experts that have prepared this chapter is provided in Appendix 1.1 in Volume 8
- Detail on the extensive consultation which has been undertaken with a range of stakeholders during the development of the EIAR is set out in Appendix 1.2; and
- A glossary of terminology, abbreviations and acronyms is provided at the beginning of Volume 2 of the EIAR.

A detailed description of the proposed development including construction, operation and decommissioning is provided in Volume 2, Chapter 6: Description of the Proposed Development – Offshore (hereafter referred to as the ‘Offshore Description Chapter’), Volume 2, Chapter 7: Description of the Proposed Development – Onshore (hereafter referred to as the ‘Onshore Description Chapter’), Volume 2, Chapter 8: Construction Strategy – Offshore (hereafter referred to as the ‘Offshore Construction Chapter’), and the Construction methodology is described in Volume 2, Chapter 9: Construction Strategy – Onshore (hereafter referred to as the ‘Onshore Construction Chapter’).

In preparing this chapter of the EIAR, the Developer has complied with the requirements of the EIA Directive and legislation. It should be noted that both project partners, Statkraft and CIP, operate a zero-harm philosophy across all their projects, and have through their existing portfolios developed a series of dedicated standards, policies, procedures, and processes to ensure all foreseeable consequences and impacts of their actions are mitigated so far as reasonably practicable.

As such, the Developer commits to working collaboratively with all stakeholders to deliver the proposed development safely and responsibly.

34.2 Assessment Methodology

34.2.1 General

The overall EIA methodology is described in Volume 2, Chapter 2: EIA and Methodology for the preparation of an EIAR (hereafter referred to as the ‘EIA and Methodology Chapter’).

This chapter of the EIAR identifies how risks of major accidents and/or disasters relevant to the proposed development have been identified and how those risks have been managed.

This chapter considers:

- Major accidents and/or disasters to which the proposed development may be vulnerable.
- Major accidents and disasters potentially caused by the proposed development.
- Whether a major accident and/or disaster caused by the proposed development, or to which the proposed development may be vulnerable, could result in likely significant environmental effects, and if so, what these effects would be; and
- Existing and proposed mitigation measures to prevent or mitigate the likely significant adverse effects of such events on the environment.

The scope and methodology presented in the following sections is primarily based on the provisions of the EIA Directive (Directive 2011/92/EU as amended by Directive 2014/52/EU)¹, the Environmental Protection Agency (2022) *Guidelines on the information to be contained in Environmental Impact Assessment Reports*, European Commission (2017) *Guidance on the preparation of the EIA Report* and published risk assessment methodologies listed in Section 34.2.3 as well as professional judgement. Refer to Section 34.10 for full list of references.

A risk-analysis based methodology that covers the identification, likelihood, and consequence of major accidents and/or disasters has been used for this assessment (as detailed in Section 34.2.6.2).

34.2.2 Key Definitions

At the time of undertaking this assessment, there are no clear definitions for the terms ‘major accident’ or ‘disaster’ in the context of the EIA Directive. For the purpose of this assessment, key terms used in this chapter are set out below and are based on Institute for Environmental Management and Assessment (IEMA) *Major Accidents and Disasters in EIA – A Primer* (IEMA, 2020):

- Accident – something that happens by chance or without expectation.
- Disaster – a natural hazard (e.g. earthquake) or a man-made external hazard (e.g. act of terrorism) with the potential to cause an event or situation that meets the definition of a major accident.
- Major Accident – events that threaten immediate or delayed serious environmental effects to human health, welfare and / or the environment and require the use of resources beyond those of the client or its appointed representatives to manage. Whilst malicious intent is not accidental, the outcome (e.g. train derailment) may be the same and therefore many mitigation measures will apply to both deliberate and accidental events.
- Risk – the likelihood of an impact occurring, combined with the effect or consequence(s) of the impact on a receptor if it does occur.
- Risk event – an identified, unplanned event, which is considered relevant to the proposed development and has the potential to result in a major accident and / or disaster, subject to assessment of its potential to result in a significant adverse effect on an environmental receptor.
- Vulnerability – describes the potential for harm as a result of an event, for example due to sensitivity or value of receptors. In the context of the EIA Directive, the term refers to ‘exposure and resilience’ of the proposed development to the risk of a major accident and / or disaster. Vulnerability is influenced by sensitivity, adaptive capacity, and magnitude of impact; and

¹ Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment.

- Significant environmental effect (in relation to a major accident and / or disaster assessment) – includes the loss of life, permanent injury and temporary or permanent destruction of an environmental receptor which cannot be restored through minor clean-up and restoration.

In addition, a ‘significant environmental effect’ resulting from major accidents and / or disasters is identified if it meets the criteria for ‘Significant’, ‘Very Significant’ or ‘Profound’ under the EPA Guidelines (EPA 2022) (See Section 2.6 of Volume 2, Chapter 2: EIA Methodology). Conclusions of ‘Moderate’ effects or below are not considered significant, as outlined in the EPA Guidelines and in line with professional judgement.

The assessment of major accidents and disasters reported in this chapter considers the occurrence of extreme and highly unlikely incidences. As such, it considers accident scenarios that would not reasonably be covered by the specialist topic chapters.

34.2.3 Guidance and Legislation

The risk assessment methodology used in this assessment has been informed by the legislation, guidance, plans and reference material summarised below. Refer to specialist topic chapters for further details on specific legislation or guidance relating those topics.

34.2.3.1 EIA Directive

Article 3 of the EIA Directive requires that “the environmental impact assessment shall identify, describe, and assess in the appropriate manner, in light of each individual case, the direct and indirect significant effects” on the various environmental topics listed and that the effects shall “include the expected effects deriving from the vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project concerned”.

The information relevant to major accidents and/or disasters to be included in the EIAR is also set out in both Section 5(d) and Section 8 of Annex IV of the EIA Directive.

34.2.3.2 Safety, Health, and Welfare Legislation

The development of the risk assessment methodology has been informed by the following legislation:

- S.I. No. 138/2012 - Building Regulations (Part A Amendment) Regulations 2012.
- S.I. No. 291 of 2013 - Safety, Health, and Welfare at Work (Construction) Regulations 2013 (hereafter referred to as the Safety, Health, and Welfare (Construction) Regulations).
- S.I. No. 299/2007 - Safety, Health, and Welfare at Work (General Application) Regulations 2007 (hereafter referred to as the Safety, Health, and Welfare at Work (General Application) Regulations).
- Number 10 of 2005 - Safety, Health, and Welfare at Work Act 2005 (hereafter referred to as the Safety, Health, and Welfare at Work Act)

34.2.3.3 European Commission (2017) Environmental Impact Assessment of Projects- Guidance on the preparation of the Environmental Impact Assessment Report

The European Commission Guidance outlines the legislative requirements and key considerations in the preparation of EIARs with respect to major accident and disaster risks. As outlined in the European Commission’s guidance document, two key considerations emerge from the EIA Directive, namely:

- The proposed development’s potential to cause major accidents and/or disasters (in this case, the EIA Directive explicitly refers to considerations for human health, cultural heritage, and the environment); and
- The vulnerability of the proposed development to a potential major accident and/or disaster.

The Guidance lists the following issues which EIARs should address:

- What can go wrong with a project?

- What adverse consequences might occur to human health and to the environment?
- What is the range of magnitude of adverse consequences?
- How likely are these consequences?
- What is the project's state of preparedness in case of an accident/disaster?
- Is there a plan for an emergency situation?

34.2.3.4 *Environmental Protection Agency (2022) Guidelines on the information to be contained in Environmental Impact Assessment Reports*

The 2022 EPA guidelines state that the potential for a project to cause risks to human health, cultural heritage, or the environment due to its vulnerability to external accidents or disasters is to be considered where such risks are significant.

Section 3.3.6 of the 2022 EPA Guidelines under the heading of Climate notes that “the amended Directive also requires the vulnerability of a project to climate change to be addressed, particularly ‘the risk of major accidents and/or disasters which are relevant to the project concerned, including those caused by climate change, in accordance with scientific knowledge’”.

Section 3.7.3 of the 2022 EPA Guidelines advise:

“The extent to which the effects of major accidents and / or disasters are examined in the EIAR should be guided by an assessment of the likelihood of their occurrence (risk). This may be supported by general risk assessment methods or by systematic risk assessments required under other legislation e.g. a COMAH (Control of Major Accident Hazards involving Dangerous Substances) assessment.

“The potential for a project to cause risks to human health, cultural heritage, or the environment due to its vulnerability to external accidents or disasters is considered where such risks are significant, e.g. the potential effects of floods on sites with sensitive facilities. Where such risks are significant then the specific assessment of those risks in the form of a Seveso Assessment (where relevant) or Flood Risk Assessment may be required.”

34.2.3.5 *National Marine Planning Framework*

The National Marine Planning Framework (NMPF) contains 92 policy points intended to guide the development of the maritime space in Ireland. Of these, the policy points relevant to Major Accidents and Disasters are presented in Table 34.1. Refer also to Appendix 3.1 in Volume 8 for further details on how the proposed development complies with the NMPF.

Table 34.1 Summary of NMPF policy points relevant to major accidents and/or disasters

Summary of relevant NMPF policy	Where considered in the EIAR
Safety at Sea	
Safety at Sea Policy 3: All proposals for temporary or permanent fixed infrastructure in the maritime area must ensure navigational marking in accordance with appropriate international standards and ensure inclusion in relevant charts where applicable.	Safety at sea is discussed in Section 34.5 and mitigation measures in place to reduce the risk of major accidents and/or disasters in relation to safety at sea is discussed in Section 34.6 Further information on the navigational marking and embedded safety design in place for the proposed development is included in Volume 3, Chapter 17: Shipping and Navigation (hereafter referred to as the ‘Shipping and Navigation Chapter’).
Sports and Recreation	
Sports and Recreation Policy 5: Proposals should seek to enhance water safety through provision of appropriate International Organization for Standardization (ISO) and European Committee for Standardization (CEN) compliant safety signage.	The risks of major accidents and disasters on maritime users arising from the proposed development are addressed in Section 34.5.

Summary of relevant NMPF policy	Where considered in the EIAR
In general, the safety of persons should be a key consideration for planners and due consideration should be given to best practice guidance for marine and coastal recreation areas endorsed by the Visitor Safety in the Countryside Group.	Mitigation measures proposed to reduce the chance of major accidents and/or disasters as a result of the proposed development are presented in Section 34.6.

34.2.3.6 *Environmental Protection Agency (2014) Guidance on Assessing and Costing Environmental Liabilities*

This EPA (2014) guidance document describes the approach to identifying and costing the environmental liabilities associated with incidents which could occur on sites falling under the various EPA authorisation regimes. The document provides guidance on the identification and quantification of risks, focusing on unplanned, but possible and plausible events that may occur during the construction and operational phases of licensed facilities and/or activities. Specifically, in Section 3.3, guidance is provided on a range of risk assessment and evaluation techniques.

34.2.3.7 *Department of the Environment, Heritage and Local Government (2010) A Framework for Major Emergency Management Guidance Document 1-A Guide to Risk Assessment in Major Emergency Management*

The Department of the Environment, Heritage and Local Government (DoEHLG), as it then was, published a guidance note in January 2010 on best practice in the area of risk assessment for major emergency management (DoEHLG 2010).

The document provides guidance on the various stages of the risk assessment process and how it should be employed to inform mitigation and detailed planning during major emergency situations. Part 1 of the guidance defines criteria for classifying impact and likelihood scenarios in order to support the risk assessment process, as well as a process for recording the risk assessment.

34.2.3.8 *Institute for Environmental Management and Assessment (2020) Major Accidents and Disasters in EIA – A Primer*

The Major Accidents and Disasters in EIA - A Primer (the IEMA Primer), produced by IEMA and Arup, provides an assessment methodology for major accidents and disasters based on known current practice in the UK to date and provides definitions of key terminology. It offers a methodology for a proportionate assessment approach to determine a project's vulnerability.

While this guidance document was prepared for the UK, it is relevant in the Irish context as it is based on the EIA Directive 2014/52/EU requirements and is considered relevant to the current assessment.

34.2.3.9 *External Plans and Assessments*

The following external plans and assessments have also informed the assessment:

- Major Emergency Plan of Fingal County Council (FCC) (FCC, 2011).
- Major Emergency Plan 2022 (Dublin City Council, 2022).
- Information on Major Emergency Planning by Louth County Council from louthcoco.ie
- Strategic Emergency Management: National Structures and Frameworks (Department of Defence, 2017); and
- National Risk Assessment: Overview of Strategic Risks 2023 (Government of Ireland, 2023)

34.2.3.10 *Project Documents*

The Offshore Environmental Management Plan (Offshore EMP) (Appendix 6.1) and Onshore Construction Environmental Management Plan (Onshore CEMP) (Appendix 9.1) also informed the assessment.

34.2.4 Study Area

The proposed development boundary consists of all infrastructure located within the array area and offshore export cable corridor (hereafter referred to as the ‘offshore development area’) seaward of the high-water mark (HWM) and all onshore infrastructure located landward of the HWM (hereafter referred to as the ‘onshore development area’). Refer to the Offshore Description Chapter and the Onshore Description chapter for further information on the respective development areas. The study area for this assessment primarily focuses on the areas within and adjacent to the proposed development boundary. It is noted that the study area varies depending on the specialist EIAR assessment topic. This assessment has been cognisant of the study areas adopted for relevant EIAR specialist topics e.g. the study area in relation to risks of shipping collisions is addressed in the Shipping and Navigation chapter.

34.2.5 Data Collection and Collation

A desk-based study has been undertaken in order to establish the baseline environment for the risk assessment.

As outlined in the guidance, establishing the local, regional, and national context prior to completion of the risk assessment enables a better understanding of the vulnerability and resilience of the area to emergency situations. Section 34.3 provides an overview of the baseline environment that has been considered for this assessment.

34.2.6 Impact Assessment Methodology

34.2.6.1 Risk Assessment Methodology

This chapter of the EIAR differs from the other specialist chapters of the EIAR, which identify the potential for “likely significant effects” of the proposed development on the environment. This chapter deals with risk events that have a low likelihood of occurrence but have a potentially high consequence for the environment, human health, infrastructure and/or cultural heritage.

The IEMA Primer (2020) definition of ‘significant environmental effect’, presented in Section 34.2.2 above has been adopted for the purposes of this assessment.

The site-specific risk assessment identifies and quantifies risks focusing on unplanned, but possible and plausible events occurring during the construction, operation and decommissioning of the proposed development. The following steps were undertaken as part of the site-specific risk assessment:

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

34.2.6.2 Identification of Potential Risk Events

In accordance with the European Commission Guidance (2017), potential risk events are identified in respect of the proposed development, focused on:

Potential vulnerability to major accident and/or disasters; and

Potential to cause accidents and/or disasters.

The identification of potential risk events has focused on non-standard but plausible incidents, which could occur at the proposed development during construction, operation, and decommissioning, and which could cause a non-trivial impact on the environment. Similarly, if an off-site event could cause the proposed development to have a non-trivial impact on the environment, this was also classified as a plausible risk event. The list of potential risk events are presented in Tables 34.6 - 34.8 below.

34.2.6.3 Likelihood Classification

After initial identification of the potential risk events, the likelihood of occurrence of each risk event has been assessed. An analysis of safety procedures and proposed environmental controls was considered when estimating the likelihood of identified potential risk events occurring. Table 34.2 indicates the likelihood ratings that have been applied. The rating criteria adopted for the assessment as presented in Table 34.2 follows that used in the DoEHLG 2010 guide.

The approach adopted has assumed a ‘risk likelihood’ where one or more aspects of the likelihood description are met. Any risk event associated with the proposed development, with a likelihood of occurrence which is less than ‘extremely unlikely’, has been excluded from the assessment.

Note that in Table 3.2 of the Navigational Risk Assessment (NRA) (Volume 9, Appendix 17.1), the frequency of occurrence rankings ‘extremely unlikely’ ‘remote’ and ‘reasonably probable’ are considered equivalent to ‘very unlikely’ ‘unlikely’ and ‘likely’ in Table 34.2.

Table 34.2 Risk Classification Table – Likelihood (Source: DoEHLG)

Rating	Classification	Impact Description
1	Extremely unlikely	May occur only in exceptional circumstances; once every 500 or more years
2	Very unlikely	Is not expected to occur; and/or no recorded incidents or anecdotal evidence; and/or very few incidents in associated organisations, facilities, or communities; and/or little opportunity, reason or means to occur; may occur once every 100-500 years.
3	Unlikely	May occur at some time; and/or few, infrequent, random recorded incidents, or little anecdotal evidence; some incidents in associated or comparable organisation’s worldwide; some opportunity, reason or means to occur; may occur once per 10-100 years.
4	Likely	Likely to or may occur; regular recorded incidents and strong anecdotal evidence and will probably occur once per 1-10 years
5	Very likely	Very likely to occur; high level of recorded incidents and/or strong anecdotal evidence. Will probably occur more than once a year.

34.2.6.4 Classification of Consequence

The EPA Guidelines (EPA 2022) state that the risk assessment must be based on a ‘worst-case’ scenario. Therefore, the consequence rating assigned to each potential risk event has assumed that mitigation measures and/or safety procedures have failed to prevent an effect on the environment. The consequence rating of the effect, if the incident occurs, is indicated in Table 34.3. The classification of consequence, taken from the DoEHLG 2010 guide, is provided in Table 34.3.

Note that in Table 3.1 of the NRA (Volume 9, Appendix 17.1), the consequence rankings ‘minor’, ‘moderate’ and ‘serious’ are considered equivalent to the ranking’s ‘minor’, ‘limited’ and ‘serious’ in Table 34.3.

Table 34.3 Risk Classification Table – Consequence (Source: DoEHLG 2010)

Rating	Consequence	Impact	Description
1	Minor	Life, Health, Welfare Environment Infrastructure Social	<ul style="list-style-type: none"> Small number of people affected; no fatalities and small number of minor injuries with first aid treatment. No contamination, localised effects <0.5 million euro (in terms of costs of property/infrastructure damage as well as recovery costs or loss of economic production). Minor localised disruption to community services or infrastructure (<6 hours)
2	Limited	Life, Health, Welfare Environment Infrastructure Social	<ul style="list-style-type: none"> Single fatality: limited number of people affected; a few serious injuries with hospitalisation and medical treatment required. Localised displacement of a small number of people for 6-24 hours. Personal support satisfied through local arrangements. Simple contamination, localised effects of short duration 0.5 million to 3 million euro (in terms of costs of property/infrastructure damage as well as recovery costs or loss of economic production).

Rating	Consequence	Impact	Description
			<ul style="list-style-type: none"> Normal community functioning with some inconvenience
3	Serious	Life, Health, Welfare Environment Infrastructure Social	<ul style="list-style-type: none"> Significant number of people in affected area impacted with multiple fatalities (<5), multiple serious or extensive injuries (20), significant hospitalisation. Large number of people displaced for 6-24 hours or possibly beyond; up to 500 evacuated. External resources required for personal support. Simple contamination, widespread effects or extended duration 3 million to 10million euro (in terms of costs of property/infrastructure damage as well as recovery costs or loss of economic production). Community only partially functioning, some services available
4	Very Serious	Life, Health, Welfare Environment Infrastructure Social	<ul style="list-style-type: none"> 5 to 50 fatalities, up to 100 serious injuries, up to 2,000 evacuated Heavy contamination, localised effects, or extended duration 10 million to 25 million euro (in terms of costs of property/infrastructure damage as well as recovery costs or loss of economic production). Community functioning poorly, minimal services available
5	Catastrophic	Life, Health, Welfare Environment Infrastructure Social	<ul style="list-style-type: none"> Large numbers of people impacted with a significant number of fatalities (>50), injuries in the hundreds, more than 2000 evacuated. Very heavy contamination, widespread effects of extended duration. >25 million euro (in terms of costs of property/infrastructure damage as well as recovery costs or loss of economic production). Serious damage to infrastructure causing significant disruption to, or loss of, key services for prolonged period. Community unable to function without significant support

34.2.6.5 Risk Evaluation

In accordance with the DEHLG 2010 guidance, a risk matrix was used to determine the level of significance of each risk event. The risk matrix has three categories:

- High Risk – events that have an evaluation score of 15 to 25, as indicated by the red zones in Table 34.4.
- Medium Risk – events that have an evaluation score of 8 to 12, as indicated by the amber zone in Table 34.4; and
- Low Risk – events that have an evaluation score of 1 to 6, as indicated by the green zone in Table 34.4.

Major accident and/disaster risk events that fall in the amber or red zones ('Medium' or 'High' risk events) are considered to present a risk of significant effects, as defined in Section 34.2.2, and are brought forward for further consideration and assessment for mitigation.

Table 34.4 Risk Matrix (Source: DoEHLG)

Likelihood	5 – Very likely					
	4 – Likely					
	3 – Unlikely					
	2 – Very unlikely					
	1 – Extremely unlikely					
		1 – Minor	2 – Limited	3- Serious	4 – Very Serious	5 – Catastrophic
	Consequence of Impact					

34.3 Baseline Environment

34.3.1 Natural Disasters

According to the Irish National Seismic Network (INSN), earthquakes measuring ~2 on the Richter Scale are ‘normal’ in terms of seismicity in Ireland. These are known as microearthquakes. They are not commonly felt by people and are generally recorded only on local seismographs. With events of this magnitude, buildings in Ireland are extremely unlikely to be damaged or collapse due to seismic activity. Ireland has no active volcanoes and volcanic activity is not expected.

The geographic position of Ireland means that tsunamis, which might pose a risk to developments of such as the proposed development in other locations, are less likely to occur and less likely to be of significant magnitude.

34.3.2 Severe Weather Events and Climate Change Predictions

There has been a recent increase in the number of severe weather events in Ireland, including those leading to flash flooding, snow, both lower and higher temperatures than usual and strong winds. An historic timeline of severe weather events in Fingal, Dublin City, Meath, and Louth as noted in the Fingal County Council Climate Change Action Plan 2019-2024, the Dublin City Council Climate Change Action Plan 2019-2024, the Meath County Council Climate Action Plan 2024-2029 and the draft Louth County Council Climate Action Plan 2024-2029 are presented in Diagrams 34.1 and 34.2.

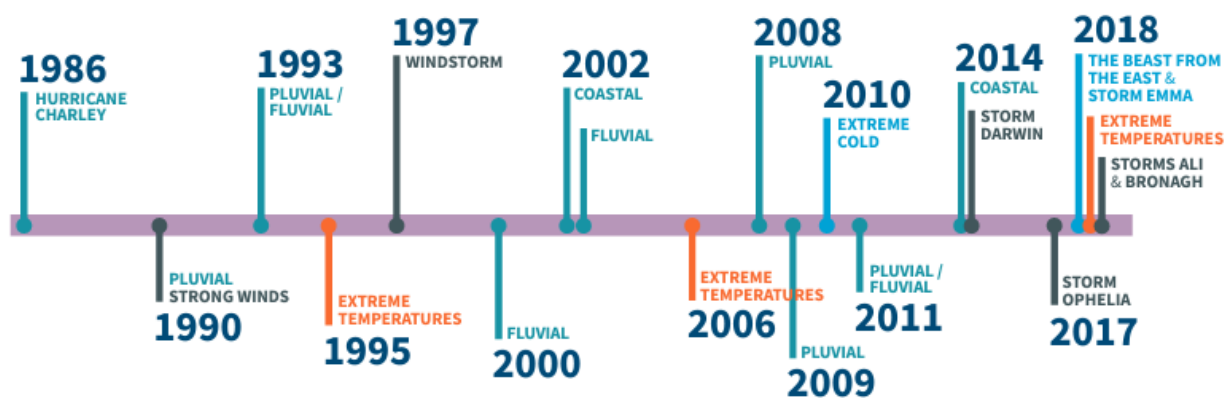


Diagram 34.1 Timeline of Major Climatic Events in Fingal and Dublin City (Source: Fingal County Council Climate Change Action Plan 2019-2024, and Dublin City Council Climate Action Plan 2019-2024)

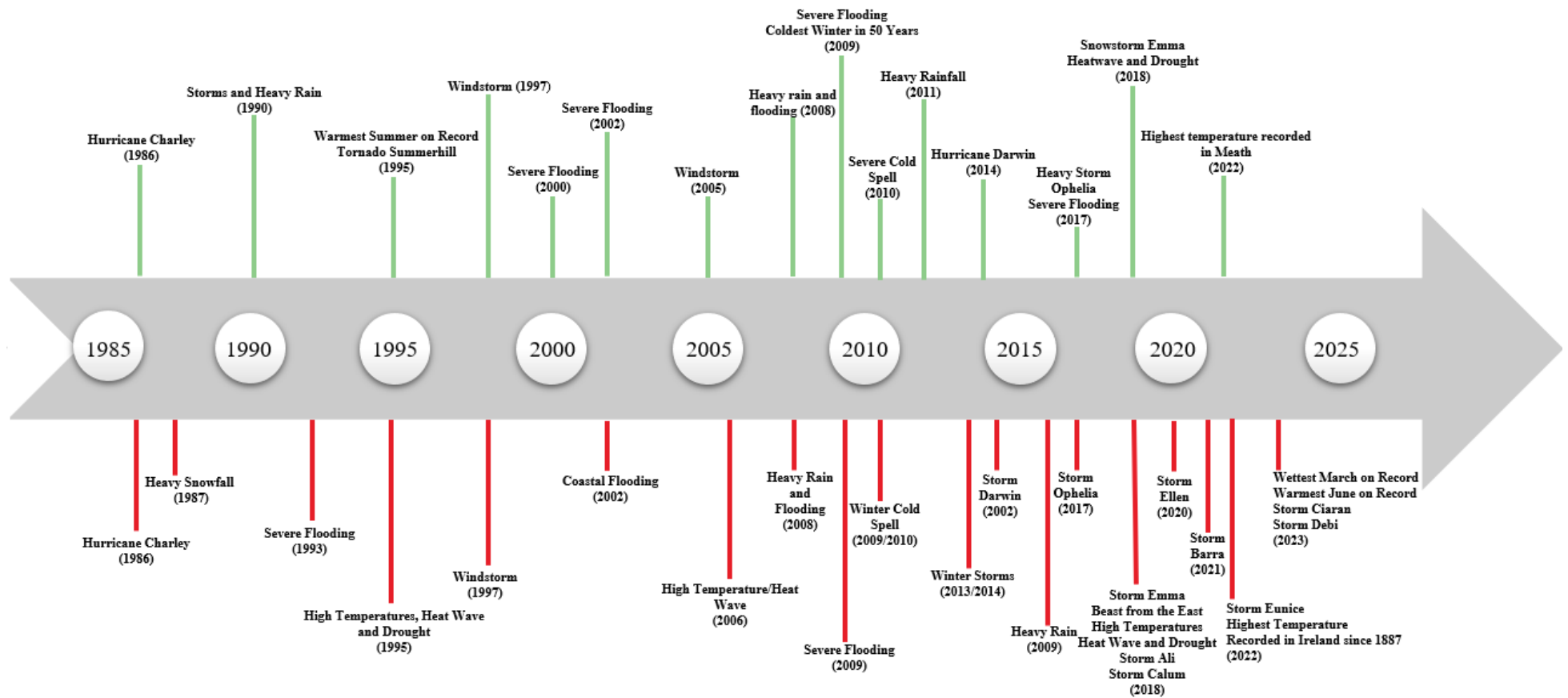


Diagram 34.2 Timeline of Major Climatic Events in Meath (outlined in Green) and Louth (outlined in Red) (Source: Meath County Council Climate Action Plan 2024-2029 and Draft Louth County Council Climate Action Plan 2024-2029)

EPA research (EPA 2020) shows an overall reduction in the number of less intense storms affecting Ireland and suggests an eastward extension of the more severe storms over Ireland and the UK from the middle of the century, as a result of climate change. However, the research notes that this should be taken with some caution as extreme storms are rare events. Refer also to Chapter 28 Climate in Volume 5.

34.3.3 Flooding

A flood risk assessment was undertaken for the proposed development. The flood risk assessment determined that the risk of flooding to the proposed development during operation can be managed to acceptable levels in accordance with relevant guidance. Mitigation measures were proposed to address the flood risk during the construction stage. Refer to the Flood Risk Assessment (FRA) which is presented in Volume 10, Appendix 22.1 of this EIAR.

34.3.4 Industrial Licensed Sites

The proposed development does not require an industrial emissions licence to operate.

There are three industrial sites within 500m of the onshore development area, which operate under Directive 2010/75/EU (the industrial emissions directive) licences from the EPA. These are:

- Padraig Thornton Waste Disposal Limited is located 350m from onshore cable route at the roundabout at the R132 and Harry Reynolds Road (Licence No: P1014-01).
- Bord na Móna Recycling Limited is located adjacent to the onshore cable route at Blakes Cross (Licence No: W0222-01).
- SK Biotek Ireland Limited (previously Swords Campus or Swords Laboratories) is located 500m from the onshore cable route at the Estuary Road and R132 roundabout in Swords (Licence No: P0014-04).

The sites are shown on Figure 7.4 in Volume 7A.

34.3.5 Seveso Sites

The Chemicals Act (Control of Major Accident Hazards involving Dangerous Substances) Regulations 2015 (S.I. No. 209 of 2015) (the “COMAH Regulations”), implement Directive (2012/18/EU) on the control of major accident hazards involving dangerous substances (Seveso III Directive). The Seveso III Directive and the COMAH Regulations impose obligations on operators of industrial establishments where dangerous substances, in quantities in excess of the thresholds specified in the Directive and Regulations, are stored. These establishments are referred to as ‘Seveso sites’ and are classified as upper tier or lower tier establishments, depending on the quantity of dangerous substances stored on site. Depending on the type of material stored on site, a Seveso site has the potential to give rise to a major accident inside or outside the establishment.

Each Seveso site has a “consultation distance” which is defined as “a distance or area relating to an establishment, within which there are potentially significant consequences for human health or the environment from a major accident at the establishment” (COMAH Regulations).

The proposed development will not result in the establishment of, or modifications to a Seveso site.

The SK Biotek Ireland Ltd manufacturing plant is a lower tier Seveso site. It is located 500m southwest of the onshore development area at the Estuary Road and R132 roundabout, in Swords. As outlined in the Fingal County Development Plan (2023-2029), the SK Biotek Ireland Ltd has a consultation distance of 1km from its site boundary. The proposed development is within the 1km distance. SK Biotek is shown on Figure 7.4 in Volume 7A.

34.3.6 High-Pressure Natural Gas Pipelines

The onshore cable, laid in the R132, will cross Interconnector 2 at two locations. Interconnector 2 is a high-pressure natural gas pipeline which links the gas transmission systems in Ireland and Scotland. It extends from Beattock, north of Moffat in Scotland, to the Baldrumman AGI, in Co Dublin, via the pipeline landfall at Gormanstown in County Meath. It is a 900mm diameter, high strength steel pipeline operating at a pressure of 85bar.

The location of the northern crossing of Interconnector 2 is between Knock Cross business park and Knock Cross itself, south of Wx04 Balrothery Stream. The location of the southern crossing of Interconnector 2 is south of the Five Roads and Wx08 Courtlough Stream. The locations where the onshore cable crosses Interconnector 2 are shown on Figure 7.4 in Volume 7A.

The onshore cable route, laid in the R132, will cross Interconnector 1 south of the junction of the R132 with the L1155 Quickpenny Lane. Interconnector 1 is a high-pressure natural gas pipeline which links the gas transmission systems in Ireland and Scotland. It extends from Beattock, north of Moffat in Scotland, to the Ballough AGI, in Co Dublin, via the pipeline landfall at Loughshinny, in County Dublin. It is a 750mm diameter, high strength steel pipeline operating at a pressure of 85bar. The location where the onshore cable crosses Interconnector 1 is shown on Figure 7.4 in Volume 7A.

Interconnectors 1 and 2 are operated by Gas Networks Ireland (GNI). The crossing methods will be in accordance with the GNI Safety Advice for Working in the Vicinity of Gas Pipelines (2016).

34.3.7 East -West Electricity Interconnector (EWIC)

EWIC is a high voltage direct current electricity interconnector, with a power rating of 500MW, which links the electricity transmission grids of Ireland and Great Britain. EWIC connects the converter stations at Portan, Co Meath in Ireland to Shotton in Wales. EWIC, on an east-west alignment, crosses the onshore cable, laid in the R132, north of Blakes Cross, Co Dublin. The interconnector is at a depth of circa 10m below existing ground level at its intersection with the R132 and onshore cable. EWIC is shown on Figure 7.4 in Volume 7A.

34.3.8 Vulnerability of the Surrounding Area

The vulnerability of the environment, in the area surrounding the proposed development, is addressed in Chapters 10 to 33 of Volumes 3 to 5 of this EIAR.

34.3.9 Shipping and Navigation

The key navigational features which have been identified in proximity to the proposed development are described in the Shipping and Navigation Chapter (Volume 5, Chapter 17).

34.3.10 Unexploded Ordnance

During the construction of offshore wind farms, there is the potential to encounter Unexploded Ordnance (UXO) originating from World War I or World War II. In addition, the ECC overlaps with the Gormanston E1 Danger area, so there may be UXO associated with this range within the offshore development area. There is a health and safety risk where any UXOs may be located at or near the planned location of infrastructure and associated vessel activity. Management of UXO risk and UXO clearance are described in the Offshore Construction Chapter and the UXO Marine Mammal Management Plan within Volume 8, Appendix 8.1.

34.4 Characteristics of the Proposed Development

This section outlines the characteristics of the proposed development that are relevant to the identification and assessment of the effects of major accidents and disasters during each phase of the project. The proposed development includes infrastructure in both the offshore development area and the onshore development area which have been reviewed for potential sources of and vulnerability to major accidents and disasters.

The following is noted in terms of the characteristics of the proposed development, in respect of its design, construction, operation and decommissioning:

- **Design:** The proposed development has been designed in line with good industry practice and, mitigation against the risk of major accidents and/or disasters will be embedded through the design.
- **Construction:** The construction phase of the proposed development will be carried out in accordance with the relevant health and safety guidance and legislation, as well as the provisions of the Offshore EMP and Onshore CEMP (refer to Volume 8, Appendix 6.1 and Appendix 9.1, respectively).

- The construction works will be carried out in compliance with any safety features, such as safety zones, imposed by the planning conditions, should permission be granted. Mitigation against the risk of major accidents and disasters will be embedded in the construction strategy.
- Operation: The operational phase of the proposed development will be managed to minimise the risk of major accidents occurring. Information on maintenance and management of the proposed development is provided in the Offshore Description Chapter and the Onshore Description Chapter. Mitigation against the risk of major accidents and disasters will be embedded in the operational activities.
- Decommissioning: Decommissioning plant and machinery will be similar to that required for the construction phase of the proposed development. However, the workforce required will be smaller and the duration of the works will be shorter. Decommissioning activities will be carried out in accordance with the relevant health and safety guidance and legislation. The environmental management measures specified in the Offshore EMP and Onshore CEMP (refer to Volume 8, Appendix 6.1 and Appendix 9.1 respectively), which are relevant to the decommissioning activities, will be implemented and will reflect the relevant legislation and guidance available at the time of decommissioning. Mitigation against the risk of major accidents and disasters will be embedded in the decommissioning strategy.

The assessment described in Section 34.5 relies on the conclusions of the assessments carried out in the chapters identified in Section 34.2.6.1. From an offshore context, each of these assessments compared Project Option 1 and Project Option 2 (as described in the Offshore Description Chapter) to determine which project option generated the greatest magnitude of impact and subsequently the greatest significant effect. Therefore, the significance rating in the major accidents and disaster assessment adheres to the conclusions drawn in these assessments and should the alternative Project Option be carried forward, these impacts will be equal to or lesser than those described in the relevant assessments.

34.5 Potential Effects

34.5.1 Do-Nothing Scenario

If the proposed development does not proceed, there will be no change to the likelihood of occurrence or consequences of a major accident and/or disaster.

34.5.2 Construction Phase

Potential risk events during the construction phase have been identified and are outlined in the construction phase risk register in Table 34.5.

Table 34.5 Risk Register – Construction Phase

Risk ID	Potential Risk Event	Possible Cause
C1	Accidental UXO detonation in the offshore development area	<ul style="list-style-type: none"> • Interaction with previously unidentified UXO • Contractor error • Failure to advise of or abide by safety zones around identified UXO
C2	Vessel Collision	<ul style="list-style-type: none"> • Operator or system error • Navigational error • Severe weather • Engine failure
C3	Collapse of offshore structures i.e. working platforms.	<ul style="list-style-type: none"> • Contractor error • Structural error • Severe weather event • Vessel collision
C4	Fire and/or explosion at OSP with a secondary effect of fire suppressant powder or firewater reaching the marine environment.	<ul style="list-style-type: none"> • Equipment or infrastructure failure • Employee negligence • Vessel collision

Risk ID	Potential Risk Event	Possible Cause
	Tertiary risk of OSP parts reaching the marine environment.	<ul style="list-style-type: none"> Severe weather Other unforeseen event
C5	Helicopter/aircraft collision	<ul style="list-style-type: none"> Pilot error Navigational error Contractor error Severe weather event Other unforeseen event
C6	Fall from height from offshore working platforms/ vessels	<ul style="list-style-type: none"> Slips trips and falls. Employee error Severe weather
C7	Flooding of onshore working areas, causing silt run-off to nearby receptors (e.g. watercourse)	<ul style="list-style-type: none"> Extreme weather – periods of heavy rainfall
C8	Spill of pollutants into nearby receptors (e.g. water column, watercourse, groundwater, soil)	<ul style="list-style-type: none"> Spill or leaks of oils or hydrocarbons from construction machinery, vehicles or vessels. Release of bentonite into watercourses during Horizontal Direction Drilling (HDD) Extreme weather (rain, wind) Employee negligence
C9	Sinking/flooding of plant or machinery at watercourse crossings	<ul style="list-style-type: none"> Unsuitable ground conditions/contractor error in construction of temporary access roads Flash flooding Failure of dam if over-pumping used to construct watercourse crossing by open trench
C10	Fire and/or explosion onshore, with a secondary effect of fire water/foam/powder reaching nearby receptors (e.g. watercourse, groundwater, soil) Fire damaged material reaching water	<ul style="list-style-type: none"> Lightning Strike Spill or leak of flammable or explosive substance Electrical fault or faulty equipment Vehicle or Vessel collision Employee negligence Gas leak caused by puncture of high pressure gas transmission pipeline, due to damage while the onshore cable crossing is installed
C11	Vehicle collision (involving construction traffic or at temporary on-road works)	<ul style="list-style-type: none"> Driver error Object on road Failure of temporary road safety measures Severe weather
C12	Electrical shock at OSP and grid facility	<ul style="list-style-type: none"> Faulty equipment, workmanship, or failure to follow procedures
C13	Cliff collapse at landfall during horizontal directional drilling (HDD) activities	<ul style="list-style-type: none"> Contractor Error Severe weather event
C14	Trench collapse	<ul style="list-style-type: none"> Inadequate procedures or control measures Contractor error
C15	Incident at nearby Seveso site resulting in off-site environmental effects	<ul style="list-style-type: none"> Operator error
C16	Major crane/lifting equipment failures and operations (e.g. 800T piles, turbines, towers, transition pieces)	<ul style="list-style-type: none"> Equipment or infrastructure failure Contractor negligence Severe weather event
C17	Jack-up punch through	<ul style="list-style-type: none"> Leg/legs of the jack-up crane vessel penetrating into the formation underneath the spud can (the spud can provide sliding and bearing resistance to the jack up crane vessel when deployed into the seabed)

Risk ID	Potential Risk Event	Possible Cause
C18	Cable damage (both owned and not owned by North Irish Sea Array Windfarm Ltd)	<ul style="list-style-type: none"> • Anchors dropped or dragged • Fishing activities • Dropped scour protection (rocks)
C19	Leak or spill of fuel or lubricants offshore	<ul style="list-style-type: none"> • Operator error • Vessel collision
C20	Third party vessel collision with offshore structures	<ul style="list-style-type: none"> • Operator error • Severe weather event • Engine failure
C21	Damage to East-West Interconnector (EWIC) during the construction of the crossing	<ul style="list-style-type: none"> • Contractor error
C22	Damage to other onshore HV cables or HV overhead lines	<ul style="list-style-type: none"> • Contractor error
C23	Damage to Interconnector 1 or 2 during the construction of the crossing	<ul style="list-style-type: none"> • Contractor error
C24	HDD mud breakout at landfall or watercourse crossing	<ul style="list-style-type: none"> • Contractor error • Severe weather event
C25	Subsidence damage to M1 during HDD	<ul style="list-style-type: none"> • Contractor error • Severe weather event
C26	Subsidence damage to railway during HDD	<ul style="list-style-type: none"> • Contractor error • Severe weather event
C27	Damage to Uisce Éireann assets during the installation of the onshore cable route resulting in flooding	<ul style="list-style-type: none"> • Contractor error
C28	Damage to fishing vessel or gear, including sinking of fishing vessel due to fishing gear entanglement with rock protection or cables	<ul style="list-style-type: none"> • Operator error • Equipment failure

34.5.3 Operational Phase

Potential risk events related to the operational phase of the proposed development have been identified and are outlined in the operational phase risk register in Table 34.6.

Table 34.6 Risk Register – Operational Phase

Risk ID	Potential Risk Event	Possible Cause
O1	Lightning strike to wind turbine generator (WTG)	<ul style="list-style-type: none"> • Severe weather event
O2	Fall from height from offshore platforms	<ul style="list-style-type: none"> • Slips trips and falls • Employee error • Severe weather
O3	Collapse / damage of offshore structures i.e. OSP, WTGs	<ul style="list-style-type: none"> • Contractor error • Structural error • Severe weather event • Vessel collision
O4	Helicopter/aircraft collision with offshore structures	<ul style="list-style-type: none"> • Pilot error • Navigational error • Contractor error • Severe weather event • Other unforeseen event
O5	Vessel collision	<ul style="list-style-type: none"> • Operator or system error • Severe weather

Risk ID	Potential Risk Event	Possible Cause
O6	Fire and/or explosion in the OSP with a secondary effect of fire suppressant powder or firewater reaching the marine environment. Tertiary risk of turbine or OSP parts reaching the marine environment.	<ul style="list-style-type: none"> Equipment or infrastructure failure Employee negligence Vessel collision Severe weather
O7	Fire and/or explosion in onshore infrastructure with a secondary effect of fire suppressant powder reaching nearby receptors (e.g. watercourse, groundwater, soil)	<ul style="list-style-type: none"> Equipment or infrastructure failure Employee negligence Vehicle collision Severe weather
O8	Collapse/damage of onshore structures i.e. grid facility	<ul style="list-style-type: none"> Vehicular collision Severe weather
O9	Vehicle collision (involving maintenance traffic on public road)	<ul style="list-style-type: none"> Driver error Object on road Severe weather
O10	Electrical shock at offshore substation platform (OSP) and grid facility	<ul style="list-style-type: none"> Faulty equipment, workmanship, or failure to follow HV Safety Rules or procedures
O11	Cable or joint/termination failure	<ul style="list-style-type: none"> Internal fault Third party damage
O12	Incident at nearby Seveso site resulting in off-site environmental effects	<ul style="list-style-type: none"> Operator error
O13	Sulphur hexafluoride (SF6) leak from OSP, WTGs and/or grid facility	<ul style="list-style-type: none"> Faulty equipment/HV equipment failure Contractor error
O14	Spill of pollutants from the OSP and the grid facility into nearby sensitive receptors (e.g. sea, watercourses, groundwater, soil)	<ul style="list-style-type: none"> Spill or leaks of oils or hydrocarbons from machinery, vehicles or vessels Extreme weather (rain, wind)
O15	Spill of pollutants from maintenance vehicles or vessels required throughout the operational phase into nearby receptors (e.g. water column, watercourse, groundwater, soil)	<ul style="list-style-type: none"> Spill or leaks of oils or hydrocarbons from maintenance vehicles or vessels required throughout the operational phase Extreme weather (rain, wind) Employee negligence
O16	Cable damage (both owned and not owned by North Irish Sea Array Windfarm Ltd)	<ul style="list-style-type: none"> Anchors dropped or dragged Fishing activities Dropped scour protection (rocks)
O17	Third party vessel collision with offshore structures	<ul style="list-style-type: none"> Operator error Navigational error Severe weather conditions Vessel propulsion error
O18	Damage to fishing vessel or gear, including sinking of fishing vessel due to fishing gear entanglement with rock protection or cables	<ul style="list-style-type: none"> Operator error Equipment failure

34.5.4 Decommissioning

As mentioned in the Onshore Description Chapter, once the proposed development comes to the end of its operational life (35 years) it will be either be refurbished, replaced, or decommissioned.

It is anticipated that the decommissioning process will involve similar activities to the construction process, but these will be undertaken in reverse. Refer to Section 6.11 and Section 7.7 in the Offshore and Onshore Description Chapters (respectively) and Section 8.9 and Section 9.13 in the Offshore Chapter and Onshore Construction Chapters (respectively), for a description of the decommissioning activities.

The decommissioning activities will be greatly reduced in scope and will require a smaller workforce than for the construction phase. Potential risk events related to the decommissioning phase of the proposed development have been identified and are outlined in the decommissioning phase risk register in Table 34.7.

Table 34.7 Risk Register – Decommissioning Phase

Risk ID	Potential Risk Event	Possible Cause
D1	Vessel Collision	<ul style="list-style-type: none"> • Operator or system error • Severe weather
D2	Helicopter/aircraft collision	<ul style="list-style-type: none"> • Contractor error • Navigational failure • Navigational error • Severe weather event
D3	Fall from height from offshore working platforms	<ul style="list-style-type: none"> • Slips trips and falls • Employee error • Severe weather
D4	Collapse of offshore structures i.e. working platforms.	<ul style="list-style-type: none"> • Contractor error • Structural error • Severe weather event • Vessel collision
D5	Electrical shock during decommissioning of electrical infrastructure offshore or onshore	<ul style="list-style-type: none"> • Faulty equipment, workmanship or procedures
D6	Fire and/or explosion in offshore with a secondary effect of fire suppressant powder or firewater reaching the marine environment. Tertiary risk of turbine or OSP parts reaching the marine environment.	<ul style="list-style-type: none"> • Equipment or infrastructure failure • Employee negligence
D7	Sulphur hexafluoride (SF6) leak from OSP	<ul style="list-style-type: none"> • Faulty equipment • HV equipment failure • Contractor error
D8	Spill/leak of fuel or lubricants into sea	<ul style="list-style-type: none"> • Spill or leaks of oils or hydrocarbons from machinery, vehicles or vessels • Extreme weather (rain, wind)
D9	Accidental UXO detonation within the offshore development area	<ul style="list-style-type: none"> • Interaction with previously unidentified UXO; • Contractor error • Failure to advise of or abide safety zones erected around identified UXO
D10	Spill of pollutants into nearby receptors (e.g. water column, watercourse, groundwater, soil)	<ul style="list-style-type: none"> • Spill or leaks of oils or hydrocarbons from construction machinery, vehicles or vessels • Extreme weather (rain, wind) • Employee negligence
D11	Fire and/or explosion onshore, with a secondary impact of fire water/foam/powder reaching nearby receptors (e.g. watercourse, groundwater, soil) Fire damaged material reaching water	<ul style="list-style-type: none"> • Lightning strike • Spill or leak of flammable or explosive substance • Electrical fault or faulty equipment • Vehicle or vessel collision • Employee negligence
D12	Vehicle collision (involving decommissioning traffic)	<ul style="list-style-type: none"> • Driver error • Object on road • Failure of temporary road safety measures

Risk ID	Potential Risk Event	Possible Cause
		<ul style="list-style-type: none"> Severe weather
D13	Cable damage (both owned and not owned by North Irish Sea Array Windfarm Ltd) from anchors dropped or dragged	<ul style="list-style-type: none"> Anchors dropped or dragged Fishing activities
D14	Third party vessel collision with offshore structures	<ul style="list-style-type: none"> Operator error Severe weather event Engine failure
D15	Incident at nearby Seveso site resulting in off-site environmental effects	<ul style="list-style-type: none"> Operator error
D16	Major crane/lifting equipment failures and operations	<ul style="list-style-type: none"> Equipment or infrastructure failure Contractor negligence Severe weather event

34.5.5 Risk Assessment

The potential risk events identified in Sections 34.5.2, 34.5.3, and 34.5.4 have been assessed and the resulting risk analysis is presented in Table 34.8. All basis of consequence assessments as based upon the DoEHLG guidance presented in Table 34.2 and 34.3.

The risk register is based upon likely significant risks associated with the proposed development. The consequence rating assigned to each potential risk assumes that the proposed mitigation measures and safety procedures have failed to prevent the effect on the environment.

Table 34.8 Risk Assessment

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
Construction								
C1	Accidental Unexploded Ordinance (UXO) detonation within the offshore development area.	Interaction with previously unidentified UXO Contractor error Failure to advise of or abide by safety zones around identified UXO	Injury/loss of life Damage to sensitive ecosystems. Fouling of marine environment from debris of the explosion	1	The developer will be conducting pre-construction UXO surveys to identify the presence of UXO in the offshore development area. Therefore, the likelihood of accidental UXO detonation during construction is considered 'extremely unlikely'.	4	The consequence of an accidental detonation will be dependent on the nature of the UXO. However, the consequence of a detonation could be 'very serious' resulting in a loss of life to workers in the vicinity of the detonation zone. During construction, safety zones will be advised around the work areas to mitigate any potential injuries to marine users.	4
C2	Vessel Collision	Operator or system error Navigational error Severe weather Engine failure	Injury/loss of life Damage of marine environment from leaked oil /fluids Damage to offshore infrastructure	2	Following implementation and adherence to the safety measures as outlined in the Shipping and Navigation chapter, it is considered 'very unlikely' for a vessel collision to occur.	2	The consequence of an accidental collision with construction vessels will be dependent on the nature of the collision. A collision could result in a 'limited' number of people affected, a few serious injuries or loss of life to operators on any vessel involved in the collision. Should a collision occur, there is the potential for a pollution event to occur which would have a localised short-term effect on sensitive marine receptors.	4

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
C3	Collapse of offshore structures i.e. working platforms.	Contractor error; Structural error; Severe weather event; Vessel collision.	Injury/loss of life	2	<p>Collapse of offshore structures such as working platforms, due to a severe weather event or a technical fault is considered 'very unlikely' and not expected to occur, with very few incidents in associated organisations being recorded.</p> <p>The structures will be constructed, assembled and erected in accordance with industry good practice.</p> <p>Health and safety practices related to the construction of the offshore infrastructure of the proposed development will be carried out in accordance with the Safety, Health and Welfare at Work Act 2005, the Safety, Health and Welfare at Work (Construction) Regulations 2013, as amended, and other relevant Irish, EU and maritime safety legislation.</p>	3	However, in the event of a working platform failure or collapse, the consequence would be 'serious' with the potential for fatalities and/ or serious injuries to workers on the platform expected.	6

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
C4	Fire and/or explosion at OSP with a secondary effect of fire suppressant powder or firewater reaching the marine environment Tertiary risk of OSP parts reaching the marine environment.	Equipment or infrastructure failure Employee negligence Vessel collision Severe weather Other unforeseen event	Injury/loss of life Fouling of marine environment	2	<p>A fire and/or explosion during the construction phase of offshore infrastructure is considered 'very unlikely' as the as the quantities of flammable or explosive materials on site, which could leak or spill, during the construction phase will be limited.</p> <p>The Developer will implement a robust Health, Safety and Environmental supplier assessment process that will be used to ensure all contractors delivering work on the projects are fully competent to do so, in addition the Developer will also provide a set of HSE requirements to all tier-one suppliers to ensure the HSE expectations are understood and HSE objectives are aligned. The developer will also carry out an appropriate level of monitoring and supervision throughout the project to ensure works are carried out as per agreed HSE plans and processes.</p>	3	<p>In the event of a fire and/or explosion occurring, the consequence would be 'serious' resulting in a significant number of people being impacted with the potential for multiple fatalities.</p> <p>Fire-fighting materials or firewater would cause some local contamination of extended duration.</p>	6

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
					Through the Developers membership of the Global offshore wind health and Safety Organisation (G+) they are actively involved in identifying and implementing best practice guidance for the industry and as such they will ensure any health and safety improvements are applied to the project wherever possible. Appropriate site personnel will be trained as first aiders.			
C5	Helicopter/aircraft collision	Pilot error Navigational error Contractor error Severe weather event Other unforeseen event	Injury/loss of life Contamination of marine environment Damage to offshore components	1	It is standard practice that aeronautical risk assessments will be conducted prior to each search and rescue (SAR) flight by the SAR pilots. These will determine the suitability of weather conditions and will minimise the risk of helicopter crashes arising from severe weather. Commercial or leisure flights should only be performed when weather conditions are suitable, and this will minimise the risk of helicopter/aircraft crashes arising from severe weather.	3	If a helicopter / aircraft were to collide with offshore infrastructure the impact would be “serious” with a significant number of people being impacted with the possibility of multiple fatalities. It could also result in a pollution incident due to leakage of oil or other fluids that would impact on the marine environment.	3

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
					Following the implementation of the risk reduction measures outlined in Volume 3, Chapter 19: Aviation and Radar (hereafter referred to as the 'Aviation and Radar Chapter') along with embedded equipment design measures, it is considered 'extremely unlikely' for such an incident to occur.			
C6	Fall from height from offshore working platforms/vessels	Slips trips and falls Employee error Severe weather	Injury/loss of life	2	An employee falling from height during the construction phase of the proposed development is considered 'very unlikely'. The Developer will implement a robust Health, Safety and Environmental supplier assessment process that will be used to ensure all contractors delivering work on the projects are fully competent to do so, in addition the Developer will also provide a set of HSE requirements to all tier-one suppliers to ensure the HSE expectations are understood and HSE objectives are aligned.	2	Should the safety measures outlined in the Offshore EMP (Appendix 6.1) fail in preventing a fall from height, the consequence of the fall would be 'limited', resulting in a serious injury or potential fatality. However, this would be an isolated incident in which a very small number of people would be affected, and no further environmental impact is predicted.	4

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
					<p>The developer will also carry out an appropriate level of monitoring and supervision throughout the project to ensure works are carried out as per agreed HSE plans and processes.</p> <p>Through the Developers membership of the Global offshore wind health and Safety Organisation (G+) they are actively involved in identifying and implementing best practice guidance for the industry and as such they will ensure any health and safety improvements are applied to the project wherever possible.</p>			
C7	Flooding of onshore working areas, causing silt run-off to nearby receptors (e.g. watercourse)	Extreme weather – periods of heavy rainfall	<p>Sedimentation of nearby watercourses</p> <p>Damage to, or depletion of aquatic habitats and species</p>	2	Taking into consideration the elevation of the onshore grid facility and the lack of historic flooding events within the footprint of the proposed development, flooding of working areas caused by an extreme weather event during the construction phase is considered “very unlikely”.	3	Given the proximity and connectivity of the proposed development, especially the onshore cable route, to Rogerstown Estuary SAC and SPA and the Malahide Estuary SAC and SPA, flooding of the working areas during the construction phase would have a ‘serious’ effect in that silt run-off into these designated areas would be widespread and of an extended duration.	6

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
					Silt control measures as described in the Onshore CEMP (Volume 8, Appendix 9.1) will be in place, which will be able to cope with most weather events.			
C8	Spill of pollutants into nearby receptors (e.g. water column, watercourse, groundwater, soil)	<p>Spill or leaks of oils or hydrocarbons from construction machinery, vehicles or vessels</p> <p>Release of bentonite into watercourses during HDD activities</p> <p>Extreme weather (rain, wind)</p> <p>Employee negligence</p>	<p>Contamination of nearby watercourses</p> <p>Damage to, or depletion of aquatic habitats and species</p> <p>Contamination of groundwater resource</p> <p>Contamination of soils, which would have to be remediated or removed as waste</p>	2	<p>Spills of pollutants due to an extreme weather event or employee negligence during the construction phase is considered 'very unlikely', even allowing for climate change effects.</p> <p>Full details on the mitigation measures proposed to prevent spills and release of pollutants are presented in the Onshore CEMP (Appendix 9.1), the Land and Soils Chapter, and the water Chapter.</p> <p>Employees will be trained in pollution prevention and control as detailed in the Onshore CEMP (Appendix 9.1).</p>	3	<p>Given the proximity and connectivity of the proposed development, especially the onshore cable route, to Rogerstown Estuary SAC and SPA and the Malahide Estuary SAC and SPA, in the unlikely event of pollutants being discharged into nearby watercourses or the groundwater, the consequence would be 'serious' with widespread contamination of an extended duration.</p> <p>Bentonite dissipates very quickly in sea water should frac-out occur at the landfall.</p> <p>The response to spill or leak of pollutants is outlined in the Emergency Response Plan in the Onshore CEMP (See Volume 8, Appendix 9.1).</p>	6

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
C9	Sinking/flooding of plant or machinery at watercourse crossings	Unsuitable ground conditions/contractor error in construction of temporary access roads Flash flooding Failure of dam if over-pumping used to construct watercourse crossing by open trench	Injury/loss of life Contamination of nearby watercourses Damage to, or depletion of sensitive habitats Damage to construction machinery	2	The sinking or flooding of any plant and/or machinery at watercourse crossings is considered 'very unlikely'. The selection of watercourse crossing methodologies is outlined in the Onshore Construction Chapter and note that any HDD entry/exit pits will be situated 50m from the watercourse. Open cut trench is a common crossing technique and will be conducted as far as practical outside of periods that typically experience heavy rainfall. The Land and Soils chapter did not identify any ground instability at the crossings for which offline open-cut trench techniques are proposed.	1	Should a severe weather event occur, or the dam required for over pumping fail, the number of people affected will be limited to the number of workers in the area. Contamination of groundwater and/or watercourse could occur, but the quantities would be low as they would be limited to the materials required for the construction of the crossing. Should contamination of soil or water occur, the contamination would be localised effects of short duration which could be remediated with the emergency response procedures outlined in the Onshore CEMP and Offshore EMP (Appendix 9.1 and Appendix 6.1).	2
C10	Fire and/or explosion onshore, with a secondary effect of fire water/foam/powder reaching nearby receptors (e.g. watercourse, groundwater, soil) Fire damaged material reaching water.	Spill or leak of flammable or explosive substance Electrical fault or faulty equipment Vehicle collision Employee negligence	Injury/illness/loss of life Damage to, or depletion of habitats and species (incl. aquatic habitats and species) Contamination of groundwater resource Effects on ambient air quality	2	A fire and/or explosion onshore during the construction phase is considered 'very unlikely' as the quantities of flammable or explosive materials on site, which could ignite, will be very limited, and will be confined to the construction compounds and grid facility.	3	Should a fire and/or explosion occur onshore, a 'serious' effect is predicted in that a significant number of people in the vicinity could be affected with the potential for multiple fatalities and multiple serious or extensive injuries. Contamination of groundwater and/or a	6

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
		Gas leak caused by puncture of high-pressure gas transmission pipeline due to damage while the onshore cable crossing is installed	<p>Contamination of soils, which would have to be remediated or removed as waste.</p> <p>Generation of waste, as damaged buildings and equipment would have to be disposed of</p> <p>Visual impact of fire damaged building and equipment</p> <p>Damage to onshore infrastructure</p>		<p>In any areas with electrical equipment, or hydrocarbons, water will not be used for firefighting.</p> <p>The Developer will implement a robust Health, Safety and Environmental supplier assessment process that will be used to ensure all contractors delivering work on the projects are fully competent to do so, in addition the Developer will also provide a set of HSE requirements to all tier-one suppliers to ensure the HSE expectations are understood and HSE objectives are aligned.</p> <p>The developer will also carry out an appropriate level of monitoring and supervision throughout the project to ensure works are carried out as per agreed HSE plans and processes.</p>		<p>watercourse could occur, but the quantities of firefighting materials would not be large.</p> <p>Should contamination of soil occur, the contamination would be localised effects of short duration, which could be remediated.</p>	

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
					<p>Through the Developers membership of the Global offshore wind health and Safety Organisation (G+) they are actively involved in identifying and implementing best practice guidance for the industry and as such they will ensure any health and safety improvements are applied to the project wherever possible.</p> <p>Appropriate site personnel will be trained as first aiders. All fire safety requirements will be met, in co-ordination with the local county councils. The contractor will maintain an emergency response plan which will cover all foreseeable risks including fire. In preparing this plan the contractor will be required to liaise with the emergency services.</p> <p>A puncture of the high-pressure gas pipelines is considered to be 'very unlikely', given that the pipelines are constructed of high strength steel and a sufficient clearance from the cable installation works will be implemented.</p>			

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
					All works will be carried out in compliance with a GNI approved Method Statement and the GNI Code of Practice for: Working in the Vicinity of the Transmission Network.			
C11	Vehicle collision (involving construction traffic or at temporary on-road works)	Driver error Object on road Failure of temporary road safety measures Severe weather	Injury/loss of life Contamination of surface or groundwater, or soils, which would have to be removed as waste	2	A major road traffic accident during the construction phase is considered 'very unlikely'. A construction traffic management plan is included within the Onshore CEMP (Appendix 9.1). This will be a live document which will be updated as construction progresses. It will be implemented for the duration of the proposed works.	2	Should a major road traffic accident occur, a 'limited' effect is predicted in that a limited number of people would be affected. Further, should this event occur, there would be normal community functioning in the surrounding areas with just some inconvenience. A traffic accident could cause limited pollution of soil or an adjacent watercourse. Should contamination of soil occur, a 'limited' effect is predicted in that the incident could be classified as simple contamination with localised effects of short duration, which could be remediated.	4
C12	Electrical shock at the OSP and grid facility	Faulty equipment, workmanship or failure to follow procedures	Injury/loss of life	2	The risk of electrical shock during the construction phase is considered 'very unlikely'.	2	Should an electrical shock occur, a 'limited' effect is predicted in that a limited number of people would be affected.	4

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
					<p>The Developer will implement a robust Health, Safety and Environmental supplier assessment process that will be used to ensure all contractors delivering work on the projects are fully competent to do so, in addition the Developer will also provide a set of HSE requirements to all tier-one suppliers to ensure the HSE expectations are understood and HSE objectives are aligned. The developer will also carry out an appropriate level of monitoring and supervision throughout the project to ensure works are carried out as per agreed HSE plans and processes. Through the Developers membership of the Global offshore wind health and Safety Organisation (G+) they are actively involved in identifying and implementing best practice guidance for the industry and as such they will ensure any health and safety improvements are applied to the project wherever possible.</p>			

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
					Appropriate site personnel will be trained as first aiders.			
C13	Cliff collapse at landfall during horizontal directional drilling (HDD) activities	Contractor error Severe weather event	Damage to sensitive ecosystems. Loss of biodiversity	2	<p>The occurrence of cliff collapse from HDD is considered ‘very unlikely’ and not expected to occur, as the HDD design at the landfall site has ensured an appropriate depth of cover to minimise the risk of cliff collapse.</p> <p>The boundary of the HDD compound will be located within an agricultural field on the landward side of the coastline at least 80m from the edge of the cliffs. There will be no construction works between the HDD compound and the cliffs.</p> <p>This will mitigate any damage to the cliff Annex I habitats and reduce the potential for employees to be in the vicinity of any cliff collapse.</p> <p>Ground settlement, horizontal movement and vibration monitoring will be implemented during construction activities to ensure that the construction does not exceed the design limitations.</p>	4	<p>Should a cliff collapse occur, the consequence is considered ‘very serious’. The collapse of the cliff would result in the loss of Annex I habitats, which would be widespread and of extended duration.</p> <p>A small number of people on the beach might be affected.</p>	8

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
					<p>A risk assessment and method statement specific to HDD activities at the landfall site will be prepared by the contractor and communicated to all site personal involved in the activity.</p> <p>Only suitably qualified and trained personnel will be undertaking such works.</p> <p>The requirements of the Safety, Health and Welfare at Work Act 2005, the Safety, Health and Welfare at Work (Construction) Regulations 2013, as amended, and other relevant Irish, EU or maritime safety legislation will be complied with at all times.</p>			
C14	Trench collapse	Inadequate procedures or control measures Contractor error	Injury	2	The likelihood of a trench collapse during cable installation within the onshore cable route is considered 'very unlikely' with very few incidents recorded, and no ground instability is noted in the proposed development area in the Land and Soils Chapter.	1	In the event of a trench collapsing the consequence would be 'minor' resulting in a limited number of people in the area being affected.	2

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
					Open cut trench is a very common construction technique and trench collapse during construction is considered a very rare occurrence. Prior to the commencement of construction, the contractor will prepare task specific risk assessments and method statements.			
C15	Incident at nearby Seveso site resulting in off-site environmental effects	Operator error	Injury/loss of life Damage to onshore infrastructure	1	The proposed development lies within the consultation distance of one Seveso site, the SK Biotek facility, which is 500m from the nearest point of the boundary of the proposed development. As a Lower Tier site, the SK Biotek facility has stringent environmental and safety measures and systems in place and is subject to inspections by the Health and Safety Authority. Having regard to the mechanisms in place to mitigate and avoid a major accident or incident at the SK Biotek site, the comprehensive range of emergency response procedures in place in the event of these occurring,	3	Only a short section of the onshore cable route is located within the consultation zone. In the event of a major incident occurring at the SK Biotek facility, if construction was underway at that location there could be 'serious' consequence - injuries or fatalities at the onshore cable site and damage to the infrastructure.	3

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
					it is considered that the likelihood of a major incident occurring at the SK Biotek facility which will significantly impact the proposed development will be 'extremely unlikely'.			
C16	Major crane/lifting equipment failures and operations (e.g. 800T piles, turbines, towers, transition pieces)	Equipment or infrastructure failure Contractor negligence Severe weather event	Injury/loss of life	2	A major crane/lifting equipment failure and operations incident during the construction phase is considered 'very unlikely' due to operational control methodologies, regular testing and checking of equipment. All equipment will be erected and operated in line with industry good practice. The contractor will be required to ensure that all operators have the required certification and have been trained in safe working procedures, and that all health and safety legislation and good working practices are followed.	3	In the event of a major crane/lifting equipment failure the consequence would be 'serious' with fatalities or serious injuries to contractors predicted.	6
C17	Jack-up punch through		Damage to equipment/infrastructure. Injury/loss of life	2	An incident involving a jack-up punch through during the construction phase is considered 'very unlikely and not expected to occur given that industry good practice construction methodologies will be	3	However, in the event of a jack-up punch through incident, the consequence would be 'serious' with fatalities or serious injuries to contractors predicted.	6

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
		Leg/legs of the jack-up crane vessel penetrating into the formation underneath the spud can (the spud can provide sliding and bearing resistance to the jack up crane vessel when deployed into the seabed)			employed, with very few incidents in associated organisations being recorded. The contractor will be required to ensure that all operators have the required certification and have been trained in safe working procedures, and that all health and safety legislation and good working practices are followed.			
C18	Cable damage (both owned and not owned by North Irish Sea Array Windfarm Ltd)	Anchors dropped or dragged. Fishing activities Dropped scour protection (rocks)	Damage to infrastructure	2	Damage to cables is considered 'very unlikely' given the structures will be constructed, assembled, and erected in accordance with industry good practice.	1	In the event of damage to cables, the consequence would be 'minor' resulting in localised effects with minor disruption to community services or infrastructure	2
C19	Leak or spill of fuel or lubricants offshore	Operator error Vessel collision	Injury/loss of life Contamination of waterbody	2	Spills of pollutants due to an extreme weather event during the construction phase is considered 'very unlikely', even allowing for climate change effects. Following implementation and adherence to the safety measures as outlined in the Shipping and Navigation chapter, it is considered 'very unlikely' for a vessel collision to occur.	2	In the event of a spill of fuel or lubricants, the consequence would be 'limited' in that there is the potential for localised effects of short duration.	4

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
					Mitigation measures in relation to an offshore pollution event are outlined in the Offshore EMP (Appendix 6.1).			
C20	Third party vessel collision with offshore structures	Operator error Severe weather event Engine failure	Injury/loss of life Damage of marine environment from leaked oil /fluids Damage to offshore infrastructure	3	Following implementation and adherence to the safety measures as outlined in the Shipping and Navigation chapter, it is considered 'unlikely' for a vessel collision to occur.	2	The consequence of an accidental collision with offshore structures will be dependent on the nature of the collision. A collision could result in a 'limited' number of people affected, a few serious injuries or loss of life to operators on any vessel involved in the collision. Should a collision occur, there is the potential for a pollution event to occur which would have a localised short-term impact on sensitive marine receptors.	6
C21	Damage to EWIC during the construction of the crossing	Contractor error	Damage to infrastructure	2	Damage to EWIC is considered 'very unlikely' given that EWIC is at a significant depth below grade at the crossing point and the onshore cable crossing will be constructed in accordance with industry good practice construction.	3	In the event of damage to EWIC, the consequence would be 'serious' resulting in multiple fatalities, multiple serious or extensive injuries, significant hospitalisation and disruption to communities and businesses.	6

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
C22	Damage to other onshore HV cables or HV overhead lines	Contractor error	Damage to infrastructure	2	Damage to other onshore HV cables or HV overhead lines is considered 'very unlikely' given that infrastructure within the onshore development area will be constructed in accordance with industry good practice construction.	3	In the event of damage to onshore HV cables or HV overhead lines, the consequence would be 'serious' resulting in with multiple fatalities, multiple serious or extensive injuries, significant hospitalisation and potential effects of extended duration resulting in potential disruption to communities and businesses.	6
C23	Damage to Interconnector 1 or 2 during the construction of the crossing	Contractor error	Damage to infrastructure	2	Damage to Interconnector 1 or 2 is considered 'very unlikely' given that works will be undertaken in compliance with GNI guidance onshore cable will be constructed in accordance with industry good practice construction.	4	10 million to 25 million euro (in terms of costs of property/infrastructure damage as well as recovery costs or loss of economic production). Community functioning poorly, minimal services available.	8
C24	HDD mud breakout at landfall or watercourse crossing	Contractor error Severe weather event	Damage to sensitive ecosystems	2	The breakout material would be HDD mud, which would be bentonite, mixed in with rock chippings and finer particles of the subsoil or rock which underlies the beach or watercourse of which the HDD is being drilled through. Bentonite is a nontoxic natural clay.	1	In the event if a HDD mud breakout occurring, the consequence would be 'minor' in that there would be simple contamination. Bentonite is non-toxic, but there would be more silt in suspension which could be harmful to sensitive ecosystems.	2

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
					Only suitable trained contractors will be involved the HDD works. Employees will be trained in pollution prevention and control as detailed in the Onshore CEMP.			
C25	Subsidence damage to M1 during HDD	Contractor error Severe weather event	Traffic collision Pollutant spill (i.e. diesel from cars/trucks)	1	The likelihood of subsidence damage to the M1 during HDD is considered 'extremely unlikely' given the depth of the HDD bores under the motorway surface and use of industry good practice in HDD operations. Appropriate studies have been carried out to ensure it is feasible and safe to carry out HDD at this location.	3	In the event of subsidence damage to the M1 during HDD, the consequence would be 'serious' in that there is the potential for numerous fatalities and injuries along with simple contamination and damage to infrastructure, and loss of economic production.	3
C26	Subsidence damage to railway during HDD	Contractor error Severe weather event	Derailment of train Pollutant spill (i.e. diesel)	1	The likelihood of subsidence damage to the railway during HDD is considered 'extremely unlikely' given the depth of the HDD bores under the railway and the use of industry good practice in HDD operations. Appropriate studies have been carried out to ensure it is feasible and safe to carry out HDD at this location.	4	In the event of subsidence damage to the railway during HDD, the consequence would be 'very serious' in that there is the potential for numerous fatalities (between 5 to 50) and injuries (up to 100 injuries) along with heavy contamination.	4

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
C27	Damage to Uisce Éireann assets during the installation of the onshore cable route resulting in flooding	Contractor error	Damage to infrastructure; Sedimentation of nearby watercourses as a result of the flooding.	2	The likelihood of damage to Uisce Éireann assets is considered 'very unlikely' given that the construction works will be carried out in accordance with industry good practice.	1	In the event of damage to Uisce Éireann assets, the consequence would be 'minor' in that a small number of people would be affected and minor localised disruption to community services or infrastructure. No contamination is predicted.	2
C28	Damage to fishing vessel or gear, including sinking of fishing vessel due to fishing gear entanglement with rock protection or cables (if cable protection erodes over time)	Operator error Equipment failure	Damage to infrastructure Harm to human life	1	Damage to fishing vessel or gear is considered 'extremely unlikely' given that the rock protection will be placed and maintained in accordance with industry good practice.	3	In the event of damage to a fishing vessel or gear, the consequence would be 'serious' resulting in potential effects of extended duration resulting in potential disruption to communities and businesses and the potential for numerous fatalities and injuries.	3
Operation								
O1	Lightning strike to WTG	Severe weather event.	Injury/loss of life. Damage to WTG structure and/or electrical systems. Damage to marine environments resulting from damaged equipment.	2	To minimise the impact of lightning strikes, lightning protection measures will form an integral component of WTG electrical and structural design. The design will comply with international standards such as IEC 614200-24 Lightning Protection of Wind Turbines.	2	Given the WTGs will be unmanned, and the array area is located approximately 11km from land, the consequence of a lightning strike during the operational phase is 'limited', and the potential for 'a few serious injuries' would only be during maintenance activities.	4

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
					A lightning strike in the Irish Sea is considered unlikely. The likelihood of occurrence is “very unlikely”.			
O2	Fall from height from offshore platforms	Slips trips and falls Employee error Severe weather	Injury/loss of life	1	Given the WTGs and the OSP will be unmanned and only planned site visits undertaken, subject to and in accordance with dynamic risk assessments and method statement, the likelihood of a fall from height is ‘extremely unlikely’ and may only occur in exceptional circumstances.	3	In the event of a fall from height occurring, given the location of the WTGs and OSP, the consequence would be ‘serious’, potentially resulting in less than 5 fatalities. or a number of serious injuries. This would be an isolated incident with no environmental impacts	3
O3	Collapse / damage of offshore structures i.e. OSP, WTG.	Contractor error Structural error Severe weather event Vessel collision.	Damage to marine environments resulting from damaged equipment Injury/loss of life	2	Collapse or damage to offshore infrastructure beyond the typical wear and tear is considered ‘extremely unlikely’ given the structures will be designed, constructed, assembled, and erected in accordance with industry good practice measures and constructed by suitably qualified and trained personnel.	3	However, in the event the collapse of offshore structures, the consequence would be ‘serious’ with the potential for fatalities and/ or serious injuries to workers on the platform expected.	6
O4	Helicopter/aircraft collision with offshore structures	Pilot error Navigational error Contractor error Severe weather event Other unforeseen event	Injury/loss of life Contamination of marine environment Damage to offshore components	1	It is standard practice that aeronautical risk assessments will be conducted prior to each SAR flight by the SAR pilots.	3	If a helicopter/aircraft were to collide with offshore infrastructure the impact would be ‘serious’ with a significant number of people being impacted with the possibility of multiple fatalities.	3

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
					<p>These will determine the suitability of weather conditions and will minimise the risk of helicopter crashes arising from severe weather. Commercial or leisure flights should only be performed when weather conditions are suitable, and this will minimise the risk of helicopter/aircraft crashes arising from severe weather.</p> <p>Following the implementation of the risk reduction measures outlined in the Aviation and Radar Chapter along with embedded equipment design measures, it is considered 'extremely unlikely' for such an incident to occur.</p>		It could also result in a pollution incident due to leakage of oil or other fluids that would impact on the marine environment.	
O5	Vessel Collision	Operator or system error Severe weather	<p>Injury/loss of life</p> <p>Fouling of marine environment from leaked oil/fluids</p> <p>Damage to sensitive ecosystems</p> <p>Damage to offshore infrastructure</p>	3	Given the WTGs and OSP will be unmanned and only planned site visits undertaken, subject to and in accordance with dynamic risk assessments and method statement, the likelihood a maintenance vessel collision due to severe weather is 'unlikely' and is not expected to occur.	2	<p>The consequence of an accidental collision with structures or other marine users will be dependent on the nature of the collision. A collision would be 'limited' and could result in a limited number of people being affected.</p> <p>There is also the potential for loss of life to operators on any vessel involved in the collision.</p>	6

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
					Following implementation and adherence to the safety measures as outlined in the Shipping and Navigation chapter, it is considered 'unlikely' for a third-party vessel collision to occur.		Should a collision occur, there is the potential for simple localised contamination to occur which would impact on sensitive marine receptors.	
O6	Fire and/or explosion in the OSP sections with a secondary effect of fire suppressant powder or firewater reaching the marine environment. Tertiary risk of turbine or OSP parts reaching the marine environment.	Equipment or infrastructure failure Employee negligence Vessel collision Severe weather	Injury/loss of life Fouling of marine environment Effects on ambient air quality Generation of waste, as damaged buildings and equipment would have to be disposed of;	1	A fire and/or explosion in the offshore environment during the operational phase is considered 'extremely unlikely'. The potential risk relates primarily to the OSP and the working areas within the WTGs. Prior to commissioning, the contractor will be required to ensure that all fire safety and detection equipment and systems have been designed and installed to industry good practice. During commissioning all systems will be validated. It is noted that fire suppression systems at the OSP and WTGs will be non-water based. Personnel undertaking inspections and maintenance works will be fully trained in safe working procedures. Appropriate operations personnel will be trained as fire marshals.	2	Given the WTGs and OSP will be unmanned should a fire and/or explosion occur, a 'limited' number of people will be affected. The secondary effect of the firefighting materials or firewater entering the marine environment would likely result in simple contamination with localised effect and short duration.	2

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
					Taking the above into consideration the likelihood of a fire/ explosion occurring is 'extremely unlikely'.			
O7	Fire and/or explosion in onshore infrastructure with a secondary effect of fire suppressant powder reaching nearby receptors (e.g. watercourse, groundwater, soil)	Equipment or infrastructure failure Employee negligence Vehicle collision Severe weather	<p>Injury/illness/loss of life</p> <p>Damage to, or depletion of habitats and species (incl. aquatic habitats and species)</p> <p>Effects on ambient air quality</p> <p>Contamination of soils, which would have to be remediated or removed as waste.</p> <p>Generation of waste, as damaged buildings and equipment would have to be disposed of</p> <p>Visual impact of fire damaged building and equipment</p>	2	<p>A fire and/or explosion in the onshore environment during the operational phase is considered 'very unlikely'. The potential risk relates primarily to the grid facility.</p> <p>Prior to the commissioning of the proposed development, the contractor will be required to ensure that all fire safety and detection equipment and systems have been designed and installed to industry good practice. During commissioning all systems will be validated. It is noted that fire suppression systems at the grid facility station will be non-water based.</p> <p>Personnel undertaking inspections and maintenance works will be fully trained in safe working procedures. Appropriate operations personnel will be trained as fire marshals.</p>	2	<p>Given that the grid facility will be unmanned, operated remotely and due to its proximity from residential properties the consequence of a fire explosion is "limited" with a limited number of people affected and a few serious injuries with hospitalisation and medical treatment required.</p> <p>The secondary effect of the firefighting materials entering watercourse would likely result in simple contamination with localised effect and short duration.</p> <p>Should contamination of soil occur, there would be localised effects of short duration, which could be remediated.</p> <p>Should contamination of surface water within the grid facility occur, this would be contained within the drainage system, tested, and disposed of appropriately without causing pollution to surface waters.</p>	4

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
O8	Collapse/damage of onshore structures i.e. grid facility	Vehicular collision Severe weather	Injury/loss of life Damage to the proposed development	1	Due to on-site speed restrictions and infrequent vehicular movements at the grid facility site, it is not predicted that any collision of vehicles with the structures on site would result in significant damage/collapse. It is considered 'extremely unlikely' that severe weather would cause significant damage or collapse of the structures at the grid facility site, even allowing for climate change effects.	2	In the event of structural damage, a 'limited' effect would occur in that a limited number of people would be affected with a few serious injuries with hospitalisation and medical treatment likely to be required. For normal operations there will only be small crews of maintenance staff on site during the operational phase.	2
O9	Vehicle collision (involving maintenance traffic on public road)	Driver error Object on road Severe weather	Injury/loss of life	1	The risk of a major road traffic accident during the operational phase is considered "extremely unlikely". A very small number of vehicles will access the grid facility site or onshore cable route to facilitate servicing/maintenance of equipment /infrastructure during the operational phase. As such, it can be determined that there is a little opportunity for a vehicle collision to occur.	2	Should a road traffic accident occur, a 'limited' effect is predicted resulting in a single fatality or a few serious injuries with hospitalisation and medical treatment required. A traffic accident could cause limited pollution of soil or an adjacent watercourse.	2

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
							<p>Should contamination of soil occur, a 'limited' effect is predicted in that the incident could be classified as simple contamination with localised effects of short duration, which could be remediated.</p> <p>Lightning strikes, lightning protection measures will form an integral component of WTG electrical and structural design.</p> <p>The design will comply with international standards such as IEC 614200-24 Lightning Protection of Wind Turbines</p>	
O10	Electrical shock at the OSP and grid facility	Faulty equipment, workmanship or failure to follow HV Safety Rules or procedures	Injury/loss of life	1	The risk of electrical shock during the operation of the proposed development is considered 'extremely unlikely'. The potential risk relates primarily to the OSP and the grid facility. Prior to commissioning, the contractor will be required to ensure that all the equipment and systems have been designed and installed to industry good practice,	2	<p>Very limited workforce exposed to the hazard. There will be only occasional maintenance staff in the OSP and grid facility during operation.</p> <p>The inspection and maintenance crews will be small.</p> <p>However, with high voltage equipment the risk to individual life would be great should an electrical shock occur. The result could include a single fatality or a few serious injuries with hospitalisation and</p>	2

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
					and all operators completing maintenance will operate under Operational Safety Rules so the risk of shock is minimal.		medical treatment required.	
O11	Cable or joint/termination failure	Internal fault Third party damage	Injury/loss of life	2	<p>Cable/joint failure due to an internal fault is considered 'very unlikely' following industry good practice in the manufacturing and installation. The most likely cause for a cable failure would be due to third party damage.</p> <p>The cables will be marked with warning tape, placed above the cables in the trench, and the route will be marked with above ground marker posts, in accordance with industry good practice.</p> <p>The road authority will have drawings showing the cable location in the public roads and the landowners will be furnished with similar drawings for the off-road sections of cable. The offroad sections will also have cable markers present to identify the cable route for farmers/contractors.</p>	2	Should a cable or joint terminate or fail, a subsequent electrical shock may occur in which a 'limited' effect is predicted. This is on account of the low number of people that would potentially be affected by the failure.	4

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
O12	Incident at nearby Seveso site resulting in off-site environmental effects	Operator error	Damage to infrastructure	1	<p>The proposed development lies within the consultation distance of one Seveso site, the SK Biotek facility, which is 500m from the nearest point of the boundary of the proposed development. As a lower tier site, the facility has stringent environmental and safety measures and systems in place and is subject to regular inspections from the Health and Safety Authority.</p> <p>Having regard to the mechanisms in place to mitigate and avoid a major accident or incident at the SK Biotek site, the comprehensive range of emergency response procedures in place in the event of these occurring, it is considered that the likelihood of a major incident occurring at the SK Biotek facility which will significantly impact the proposed development will be 'extremely unlikely'.</p>	1	A short length of the onshore cable is located 500m from SK Biotek. The onshore cable is buried in a trench. In the event of a major incident at the SK Biotek facility, it is likely that there would be no more than 'minor' consequence for the proposed development.	1
O13	Sulphur hexafluoride (SF6) leak from OSP, WTGs and/or grid facility	Faulty equipment/HV equipment failure Contractor error	Negative effects to air quality and climate Significant global warming effects	2	A substantial SF6 leak during the operational phase is considered 'very unlikely'.	2	SF6 is a very potent GHG. Further information on SF6 is included in Volume 5, Chapter 28: Climate.	4

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
					<p>The design and manufacture of the equipment follows industry good practice to contain the gas and complies with relevant standards. The switchgear will be equipped with a pressure or density monitoring device.</p> <p>Staff or any sub-contractors involved in equipment installation, servicing or disposal will be trained to ensure they understand the techniques required to minimise the generation of fugitive emissions and avoid large quantities leaking.</p>		The consequence of a sulphur hexafluoride leak is considered to be 'limited' in that there is a potential for effects on climate, however it is anticipated that in the event of a leak, the volume of SF6 released would not be significant.	
O14	Spill of pollutants from the OSP and the grid facility into nearby sensitive receptors (e.g. sea, watercourses, groundwater, soil)	<p>Spill or leaks of oils or hydrocarbons from machinery, vehicles or vessels</p> <p>Extreme weather (rain, wind)</p>	<p>Contamination of sea and nearby watercourses</p> <p>Damage to, or depletion of aquatic habitats and species</p> <p>Contamination of groundwater resource</p> <p>Contamination of soils, which would have to be remediated or removed as waste</p>	2	Taking into consideration the limited volume of chemicals, fuels, oils and pollutants likely to be stored or used at the OSP and grid facility, and their storage in designated bunded areas, the likelihood of a spill or leak is 'very unlikely'.	3	Given the proximity of the OSP and grid facility to waterbodies the consequence of a spill or leak would be 'serious' with contamination being widespread and of extended duration.	6
O15	Spill of pollutants from maintenance vehicles or vessels throughout the operational phase into nearby receptors (e.g. water	Spill of leaks or oils or hydrocarbons from maintenance vehicles or vessels required throughout the operational phase	<p>Contamination of nearby watercourses</p> <p>Damage to, or depletion of aquatic habitats and species</p>	2	Spills of pollutants due to an extreme weather event during the operational phase is considered 'very unlikely', even allowing	3	Given the proximity and connectivity of the proposed development, especially the landfall to the North West Irish Sea cSPA,	6

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
	column, watercourse, groundwater, soil)	Extreme weather (rain, wind) Employee negligence	Contamination of groundwater resource Contamination of soils, which would have to be remediated or removed as waste		for climate change effects. Full details on the mitigation measures proposed to prevent spills and release of pollutants are presented in the Land and Soils Chapter, the Marine Water and Sediment Quality Chapter and the Water Chapter. Employees will be trained in pollution prevention and control.		and of the onshore cable route to Rogerstown Estuary SAC and SPA and the Malahide Estuary SAC and SPA, in the unlikely event of pollutants being discharged into nearby watercourses or the groundwater, the consequence would be 'serious' with widespread contamination of an extended duration. The response to spill or leak of pollutants are presented in the relevant EIAR chapters the Land and Soils Chapter, the Marine Water and Sediment Quality Chapter and the Water Chapter.	
O16	Cable damage (both owned and not owned by North Irish Sea Array Windfarm Ltd)	Anchors dropped or dragged Fishing activities Dropped scour protection (rocks)	Damage to infrastructure	2	Damage to cables beyond the typical wear and tear is considered 'very unlikely' given the structures will be constructed, assembled, erected and maintained in accordance with industry good practice.	1	In the event of damage to cables, the consequence would be 'minor' resulting in localised effects with minor disruption to community services or infrastructure.	2
O17	Third party vessel collision with offshore structures	Operator error Navigational error Severe weather conditions Vessel propulsion error	Injury/loss of life Fouling of marine environment from leaked oil/fluids Damage to sensitive ecosystems	3	The safety measures as outlined in the Shipping and Navigation chapter will be implemented.	2	The consequence of an accidental collision by a third party with offshore structures would be dependent on the nature of the collision. A collision would be 'limited'.	6

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
			Damage to offshore infrastructure		The likelihood of a third-party collision with an offshore structure is considered 'unlikely'		There is also the potential for loss of life to operators on the vessel involved in the collision. Should a collision occur, there is the potential for simple localised contamination to occur which would impact on sensitive marine receptors.	
O18	Damage to fishing vessel or gear, including sinking of fishing vessel due to fishing gear entanglement with rock protection or cables	Operator error Equipment failure	Injury/loss of life	1	Entanglement of the cable rock protection is 'extremely unlikely' given that it will be placed and maintained in accordance with industry good practice.	3	In the event of damage to fishing gear or sinking of a fishing vessel, the consequence would be 'serious' resulting the potential for numerous fatalities and injuries.	3
Decommissioning								
D1	Vessel Collision	Operator or system error Severe weather	Injury/loss of life Fouling of marine environment from leaked oil/fluids Damage to sensitive ecosystems Damage to offshore infrastructure	2	Following implementation and adherence to the safety measures as outlined in the Shipping and Navigation chapter, it is considered 'very unlikely' for a vessel collision to occur.	2	The consequence of an accidental collision with decommissioning vessels will be dependent on the nature of the collision. A collision could result in serious injuries or loss of life to operators on any vessel involved in the collision. Should a collision occur, there is the potential for a pollution event to occur which would impact on sensitive marine receptors.	4

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
							However, safety zones will be clearly communicated to all marine users which will reduce the potential for collisions to occur.	
D2	Helicopter/aircraft collision	Contractor error Navigational failure Navigational error Severe weather event	Injury/loss of life Contamination of marine environment Damage to offshore components	1	Its standard practice that aeronautical risk assessments will be conducted prior to each SAR flight by the SAR pilots. These will inform on the suitability of weather conditions and will minimise the risk of helicopter crashes arising from severe weather. Commercial or leisure flights should only be performed when weather conditions are suitable, and this will minimise the risk of helicopter/aircraft crashes arising from severe weather. Following the implementation of the risk reduction measures outlined in the Aviation and Radar chapter along with embedded equipment design measures, it is considered 'extremely unlikely' for such an incident to occur.	3	If a helicopter/aircraft were to collide with offshore infrastructure the impact would be 'serious' with the potential for a significant number of people being impacted and multiple fatalities. It could also result in a pollution incident due to leakage of oil or other fluids that would impact on the marine environment.	3

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
D3	Fall from height from offshore working platforms	Slips trips and falls Employee error Severe weather	Injury/loss of life	2	<p>An employee falling from height during the decommissioning phase of the proposed development is considered to be ‘very unlikely’.</p> <p>The Developer will implement a robust Health, Safety and Environmental supplier assessment process that will be used to ensure all contractors delivering work on the projects are fully competent to do so, in addition the Developer will also provide a set of HSE requirements to all tier-one suppliers to ensure the HSE expectations are understood and HSE objectives are aligned.</p> <p>The developer will also carry out an appropriate level of monitoring and supervision throughout the project to ensure works are carried out as per agreed HSE plans and processes.</p>	3	<p>In the event the safety measures fail in preventing a fall from height, the fall would result in a serious injury or fatality.</p> <p>However, this would be an isolated incident in which a very small number of people would be affected, and no further environmental impact would be present.</p>	6

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
					Through the Developers membership of the Global offshore wind health and Safety Organisation (G+) they are actively involved in identifying and implementing best practice guidance for the industry and as such they will ensure any health and safety improvements are applied to the project wherever possible.			
D4	Collapse of offshore structures i.e. working platforms.	Contractor error Structural error Severe weather event Vessel collision	Injury/loss of life	2	Collapse of offshore structures such as working platforms, due to a severe weather event or a technical fault is considered 'extremely unlikely' and not expected to occur with very few incidents in associated organisations being recorded.	3	In the event a working platform collapses the consequence would be "serious" with fatalities and/ or serious injuries to contractors predicted.	6
D5	Electrical shock during decommissioning of electrical infrastructure offshore or onshore	Faulty equipment, workmanship or procedures	Injury/loss of life	1	The risk of electrical shock during decommissioning phase is considered 'extremely unlikely'. Th workforce for the decommissioning phase will be significantly reduced in comparison to the construction phase.	2	Should an electrical shock occur, a 'limited' effect is predicted in that a limited number of people would be affected.	2

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
					<p>The Developer will implement a robust Health, Safety and Environmental supplier assessment process that will be used to ensure all contractors delivering work on the projects are fully competent to do so, in addition the Developer will also provide a set of HSE requirements to all tier-one suppliers to ensure the HSE expectations are understood and HSE objectives are aligned. The developer will also carry out an appropriate level of monitoring and supervision throughout the project to ensure works are carried out as per agreed HSE plans and processes. Through the Developers membership of the Global offshore wind health and Safety Organisation (G+) they are actively involved in identifying and implementing best practice guidance for the industry and as such they will ensure any health and safety improvements are applied to the project wherever possible.</p>			

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
					Appropriate site personnel will be trained as first aiders.			
D6	<p>Fire and/or explosion in offshore with a secondary effect of fire suppressant powder or firewater reaching the marine environment.</p> <p>Tertiary risk of turbine or OSP parts reaching the marine environment.</p>	<p>Equipment or infrastructure failure</p> <p>Employee negligence</p>	<p>Injury/loss of life</p> <p>Fouling of marine environment</p>	2	<p>A fire and/or explosion during the decommissioning phase is considered 'very unlikely'.</p> <p>The quantities of flammable or explosive materials on site, which could leak or spill, during the decommissioning phase will be very limited, and will be confined to the OSP. In any areas with electrical equipment, or hydrocarbons, water will not be used for firefighting.</p> <p>The Developer will implement a robust Health, Safety and Environmental supplier assessment process that will be used to ensure all contractors delivering work on the projects are fully competent to do so, in addition the Developer will also provide a set of HSE requirements to all tier-one suppliers to ensure the HSE expectations are understood and HSE objectives are aligned.</p>	3	<p>In the event of a fire and/or explosion occurring, the consequence would be 'serious' resulting in a significant number of people being impacted, with the potential for multiple facilities.</p> <p>Fire-fighting materials or firewater would cause some local contamination of extended duration.</p>	6

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
					<p>The developer will also carry out an appropriate level of monitoring and supervision throughout the project to ensure works are carried out as per agreed HSE plans and processes.</p> <p>Through the Developers membership of the Global offshore wind health and Safety Organisation (G+) they are actively involved in identifying and implementing best practice guidance for the industry and as such they will ensure any health and safety improvements are applied to the project wherever possible.</p> <p>Appropriate site personnel will be trained as first aiders and fire marshals.</p> <p>The decommissioning contractor will be required to maintain an emergency response plan which will cover all foreseeable risks including fire.</p> <p>In preparing this plan the decommissioning contractor will be required to liaise with the emergency services.</p>			

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
D7	Sulphur hexafluoride (SF6) leak from OSP	Faulty equipment HV equipment failure Contractor error	Negative effects on climate Significant global warming effect	2	A substantial SF6 leak during the decommissioning phase is considered 'very unlikely'. The design and manufacture of the equipment follows industry good practice to contain the gas and complies with relevant standards. Depending on the size of the HV, switchgear will be equipped with a pressure or density monitoring device. Staff or any sub-contractors involved in equipment disposal will be trained to ensure they understand the techniques required to minimise the generation of fugitive emissions and avoid large quantities leaking.	2	SF6 is a very potent greenhouse gas. Further information on SF6 is included in Volume 5, Chapter 28: Climate. The consequence of a sulphur hexafluoride leak is considered to be 'limited' in that there is a potential for effects on climate, however it is anticipated that in the event of a leak, the volume of SF6 released would not be significant.	4
D8	Spill/leak of fuel or lubricants into sea	Spill or leaks of oils or hydrocarbons from machinery, vehicles or vessels Extreme weather (rain, wind)	Contamination of sea and nearby watercourses Damage to, or depletion of aquatic habitats and species Contamination of soils, which would have to be remediated or removed as waste	2	The likelihood of a spill or leak is considered 'very unlikely' during the decommissioning phase, and potential effects will be mitigated as outlined in the same manner as that outlined in the Offshore EMP for the construction phase (Volume 8, Appendix 6.1).	3	Given the proximity of the offshore infrastructure and grid facility to waterbodies the consequence of a spill or leak would be 'serious' with contamination being widespread and of extended duration.	6

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
D9	Accidental UXO detonation within the offshore development area	Interaction with previously unidentified UXO Contractor error Failure to advise of or abide safety zones erected around identified UXO	Injury/loss of life Damage to sensitive ecosystems Fouling of marine environment from debris of explosion	1	The developer will be conducting pre-construction UXO surveys to identify the presence of UXO within the offshore development area. Therefore, the likelihood of accidental UXO detonation during decommissioning is considered 'extremely unlikely'.	4	The consequence of an accidental detonation will be dependent on the nature of the UXO. However, the consequence of a detonation could be 'very serious resulting in a loss of life to workers in the vicinity of the detonation zone. During decommissioning, safety zones will be advised around the work areas to mitigate any potential injuries to marine users.	4
D10	Spill of pollutants into nearby receptors (e.g. water column, watercourse, groundwater, soil)	Spill or leaks of oils or hydrocarbons from construction machinery, vehicles or vessels Extreme weather (rain, wind) Employee negligence	Contamination of nearby watercourses Damage to, or depletion of aquatic habitats and species Contamination of groundwater resource Contamination of soils, which would have to be remediated or removed as waste	2	Spills of pollutants due to an extreme weather event during the decommissioning phase is considered 'very unlikely', even allowing for climate change effects. The likelihood of a spill or leak is considered 'very unlikely' during the decommissioning phase, and potential effects will be mitigated in the same manner as that outlined in the Offshore EMP for the construction phase (Volume 8, Appendix 6.1)	3	Given the proximity and connectivity of the proposed development, especially the onshore cable route, to Rogerstown Estuary SAC and SPA and the Malahide Estuary SAC and SPA, in the unlikely event of pollutants being discharged into nearby watercourses or the groundwater, the consequence would be 'serious' with widespread contamination of an extended duration.	6

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
D11	Fire and/or explosion onshore, with a secondary impact of fire water/foam/powder reaching nearby receptors (e.g. watercourse, groundwater, soil). Fire damaged material reaching water.	Lightning strike Spill or leak of flammable or explosive substance Electrical fault or faulty equipment Vehicle or vessel collision Employee negligence	Damage to, or depletion of habitats and species (incl. aquatic habitats and species) Contamination of groundwater resource Effects on ambient air quality Contamination of soils, which would have to be remediated or removed as waste Injury/illness/loss of life Generation of waste, as damaged buildings and equipment would have to be disposed of Visual impact of fire damaged building and equipment Damage to onshore infrastructure	2	The quantities of flammable or explosive materials on site, which could leak or spill, during the decommissioning phase will be very limited. In any areas with electrical equipment, or hydrocarbons, water will not be used for firefighting. The Developer will implement a robust Health, Safety and Environmental supplier assessment process that will be used to ensure all contractors delivering work on the projects are fully competent to do so, in addition the Developer will also provide a set of HSE requirements to all tier-one suppliers to ensure the HSE expectations are understood and HSE objectives are aligned. The developer will also carry out an appropriate level of monitoring and supervision throughout the project to ensure works are carried out as per agreed HSE plans and processes.	2	Should a fire and/or explosion occur, a limited number of people near the area could be affected. Contamination of groundwater and/or a watercourse could occur, but the quantities of firefighting materials would not be large. Should contamination of soil occur, the contamination would be localised effects of short duration, which could be remediated.	4

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
					Through the Developers membership of the Global offshore wind health and Safety Organisation (G+) they are actively involved in identifying and implementing best practice guidance for the industry and as such they will ensure any health and safety improvements are applied to the project wherever possible. Appropriate site personnel will be trained as first aiders.			
D12	Vehicle collision (involving decommissioning traffic)	Driver error Object on road Failure of temporary road safety measures Severe weather	Injury/loss of life Contamination of surface or groundwater, or soils, which would have to be removed as waste	2	A major road traffic accident during the decommissioning phase is considered 'very unlikely'. Decommissioning traffic will be managed as outlined in the Decommissioning Management Plan. This will be a live document which will be updated as construction progresses. It will be implemented for the duration of the proposed works.	2	Should a major road traffic accident occur, a 'limited' effect is predicted in that a limited number of people would be affected. Further, should this event occur, there would be normal community functioning in the surrounding areas with just some inconvenience. A traffic accident could cause limited pollution of soil or an adjacent watercourse.	4

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
							Should contamination of soil occur, a limited effect is predicted in that the incident could be classified as simple contamination with localised effects of short duration, which could be remediated.	
D13	Cable damage (both owned and not owned by North Irish Sea Array Windfarm Ltd)	Anchors dropped or dragged Fishing activities	Damage to infrastructure	2	Damage to cables beyond the typical wear and tear is considered 'very unlikely' given the structures will be constructed, assembled, and erected in accordance with industry good practice.	1	In the event of damage to cables, the consequence would be 'minor' resulting in localised effects with minor disruption to community services or infrastructure.	2
D14	Third party vessel collision with offshore structures	Operator error Severe weather event Engine failure	Injury/loss of life Damage of marine environment from leaked oil /fluids Damage to offshore infrastructure	3	Following implementation and adherence to the safety measures as outlined in the Shipping and Navigation chapter, it is considered 'unlikely' for a vessel collision to occur.	2	The consequence of an accidental collision with decommissioning vessels will be dependent on the nature of the collision. A collision could result in serious injuries or loss of life to operators on any vessel involved in the collision. Should a collision occur, there is the potential for a pollution event to occur which would impact on sensitive marine receptors. However, safety zones will be clearly communicated to all marine users which will reduce the potential for collisions to occur.	6

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
D15	Incident at nearby SEVESO site resulting in off-site environmental effects	Operator error	Injury/loss of life	1	<p>The proposed development lies within the consultation distance of one Seveso site, The SK Biotek facility, which is 500m from the nearest point of the boundary of the proposed development.</p> <p>As a Lower Tier site the SK Biotek facility has stringent environmental and safety measures and systems in place and is subject to regular inspections from by the Health and Safety Authority.</p> <p>Having regard to the mechanisms in place to mitigate and avoid a major accident or incident at the SK Biotek site, the comprehensive range of emergency response procedures in place in the event of these occurring, it is considered that the likelihood of a major incident occurring at the SK Biotek facility which will significantly impact the proposed development will be 'extremely unlikely'.</p>	3	Given that only a short section of the onshore cable route is located within the consultation zone, in the event of a major incident occurring at the SK Biotek facility, there could be a 'serious' injury at the onshore cable site if decommissioning was underway at that location and damage to the infrastructure.	3

Risk ID	Potential Risk Event	Possible Cause	Environmental Effect	Likelihood Rating (1-5)	Basis of Likelihood	Consequence Rating (1-5)	Basis of Consequence	Risk Score (Consequence x Likelihood)
D16	Major crane/lifting equipment failures and operations	Equipment or infrastructure failure Contractor negligence Severe weather event	Injury/loss of life	2	A major crane/lifting equipment failure and operations incident during the construction phase is considered 'very unlikely' due to operational control methodologies, regular testing and checking of equipment. All equipment will be erected and operated in line with industry good practice. The contractor will be required to ensure that all operators have the required certification and have been trained in safe working procedures, and that all health and safety legislation and good working practices are followed.	3	In the event of a major crane/lifting equipment failure the consequence would be 'serious' with fatalities or serious injuries to contractors predicted.	6

The results from the risk assessment have been applied to Table 34.9.

Table 34.9 Risk Matrix

Likelihood	5 – Very likely					
	4 – Likely					
	3 – Unlikely					
	2 – Very unlikely	C9, C14, C24, C27	C2, C6, C11, C12, C19, C20, O1, O5, O7, O11, O13, O17, D1, D7, D11, D12, D14	C3, C4, C7, C8, C10, C16, C17, C18, C21, C22, O14, O15, O16, D3, D4, D6, D8, D10, D13, D16	C13, C23	
	1 – Extremely unlikely	O12	O6, O8, O9, O10, D5	C5, C15, C25, C28, O2, O4, O18, D2, D15	C1, C26, O3, D9	
		1 -Minor	2 – Limited	3- Serious	4 – Very Serious	5 – Catastrophic
	Consequence of Impact					

34.5.6 Conclusion with Respect to Risk of Major accidents and/or Disasters

From examining the plausible risks presented in Table 34.9, Risk events C1 to C12, C14 to C22, C24 to C28, O1 to O16 and D1 to D16 are in the green zone, low risk events, and below the threshold of significance set for the purposes of this assessment.

Risk events C13 and C23 are in the amber zone ('medium' risk event). These are therefore brought forward for further consideration and assessment of mitigation measures. Both of these risks fall within the construction phase. No operational or decommissioning phase risk events are in the amber zone and are therefore not considered further. No risk events are in the high-risk category.

34.6 Mitigation and Monitoring Measures

Two risk events are identified as falling in the amber zone, i.e. medium risk (which are deemed to present a risk of significant effects as described in Section 34.2.6.5), based on the absence of control measures to limit the consequence.

Risk event C13 is a cliff collapse at landfall during HDD activities. This would have the consequence of the loss of an Annex 1 habitat. With adequate control measures including workforce training and adherence to good industry practice, the consequence should be minimised. No additional mitigation measures are proposed.

Risk event C23 is damage to Interconnector 1 or 2 during the construction of the onshore cable crossing. This event could result in significant loss of life or serious injury, and serious economic and societal consequences. With adequate control measures including workforce training, adherence to good industry practice and compliance with the GNI guidance, the consequence should be minimised. No additional mitigation measures are proposed.

34.7 Residual Effects

It is considered that the control measures which will be in place will limit the consequences of the two medium risk events identified in the assessment. Therefore, no likely significant negative residual effects are predicted for the construction, operational or decommissioning phases of the proposed development.

As previously stated, both project partners Statkraft and CIP operate a zero-harm philosophy across all their projects and have through their existing portfolios developed a series of dedicated standards, policies, procedures and processes to ensure all foreseeable consequences and impacts of their actions are mitigated so far as reasonably practicable. The Developer commits to working collaboratively with all stakeholders to deliver the proposed development safely and responsibly.

34.8 Transboundary Effects

No transboundary effects in relation to risks of major accidents and/or disasters have been identified, taking into account the information provided in other EIAR Chapters including the Shipping and Navigation Chapter, the Aviation and Radar Chapter and Volume 3, Chapter 20: Infrastructure and Other Users.

34.9 Cumulative Effects

A long list of “other projects” which were deemed to be potentially relevant to be included in the cumulative impact assessment was compiled (see Volume 6, Chapter 38: Cumulative and Inter-related Effects (hereafter referred to as the ‘Cumulative and Interrelated Effects Chapter’)). A screening exercise of the “long list” was carried out to determine whether each of project has the potential to give rise to likely significant cumulative effects from a risk of major accidents and/or disaster perspective with the proposed development. Many of the other projects were screened out for a number of reasons including the location, scale and nature of the project. Those projects which were “screened in” were carried forward for assessment.

The assessment concluded that there are no likely significant direct or indirect cumulative effects with the potential to cause a major accident or disaster or result in the proposed development being vulnerable to a major accident or disaster during the construction, operation or decommissioning phases of the proposed development.

34.10 References

Commission for Regulation of Utilities guidance on safety cases on the website:

<https://www.cru.ie/professional/safety/gas-safety-framework/#safety-cases>, accessed January 2024.

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Environmental Protection Agency (2014) Guidance on Assessing and Costing Environmental Liabilities

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Fingal County Council (2011) Major Emergency Plan of Fingal County Council 2011

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Louth County Council (2024) Draft Louth County Council Climate Action Plan 2024-2029

Louth County Council: Information on Major Emergency Planning by Louth County Council from louthcoco.ie

Meath County Council (2024) Meath County Council Climate Action Plan 2024-2029

Nolan, P and Flanagan, J High Resolution Climate Projections for Ireland – A Multi-model Ensemble Approach, Environmental Protection Agency 2020

Directives and Legislation

EIA Directive: Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment.

Directive 2012/18/EU of the European Parliament and of the Council of 4 July 2012 on the control of major accident hazards involving dangerous substances, amending and subsequently repealing Council Directive 96/82/EU.

S.I. No. 138/2012 - Building Regulations (Part A Amendment) Regulations 2012;

S.I. No. 209/2015 – Chemical Act (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2015;

S.I. No. 291 of 2013 - Safety, Health and Welfare at Work (Construction) Regulations 2013 (hereafter referred to as the Safety, Health and Welfare (Construction) Regulations);

S.I. No. 299/2007 - Safety, Health and Welfare at Work (General Application) Regulations 2007 (hereafter referred to as the Safety, Health and Welfare at Work (General Application) Regulations);

Number 10 of 2005 - Safety, Health and Welfare at Work Act 2005 (hereafter referred to as the Safety, Health and Welfare at Work Act); and

Number 10 of 1996 – Waste Management Act, 1996 (as amended).