



# Technical Appendix 5.1

## Major Accidents and Disasters Screening

This page is intentionally blank

# REPORT

## **Green Volt Offshore Windfarm Environmental Impact Assessment**

### Appendix 5.1: Major Accidents and Disasters Screening

Client: Green Volt Offshore Windfarm Ltd

Reference: PC2483-RHD-ZZ-XX-RP-Z-0029

Status: Final/P01

Date: 18 January 2023

**HASKONINGDHV UK LTD.**

74/2 Commercial Quay  
Leith  
Commercial Street  
Edinburgh  
EH6 6LX  
Water & Maritime  
VAT registration number: 792428892

+44 131 5550506 **T**  
info.edinburgh@uk.rhdhv.com **E**  
royalhaskoningdhv.com **W**

Document title: Green Volt Offshore Windfarm Environmental Impact Assessment

Subtitle: Appendix 5.1: Major Accidents and Disasters Screening

Reference: PC2483-RHD-ZZ-XX-RP-Z-0029

Status: 01/Final

Date: 18 January 2023

Project name: Green Volt Offshore Windfarm

Project number: PC2483

Classification

Open

*Unless otherwise agreed with the Client, no part of this document may be reproduced or made public or used for any purpose other than that for which the document was produced. HaskoningDHV UK Ltd. accepts no responsibility or liability whatsoever for this document other than towards the Client.*

*Please note: this document contains personal data of employees of HaskoningDHV UK Ltd.. Before publication or any other way of disclosing, consent needs to be obtained or this document needs to be anonymised, unless anonymisation of this document is prohibited by legislation.*

## Revision history

Revision	Date	Description	Prepared	Checked	Approved
1	11/03/2022	First draft	RL (Royal HaskoningDHV)	JM and PP (Royal HaskoningDHV)	VC (Flotation Energy)
2	5/10/2022	Second draft	RL (Royal HaskoningDHV)	JM and PP (Royal HaskoningDHV)	VC (Flotation Energy)
3	09/01/2023	Final for submission	PP (Royal HaskoningDHV)	CM (Royal HaskoningDHV)	VC (Flotation Energy)

## Table of Contents

<b>APPENDIX 5.1: MAJOR ACCIDENTS AND DISASTERS SCREENING</b>	<b>1</b>
<b>1 Introduction</b>	<b>1</b>
<b>2 Legislation, Guidance and Policy</b>	<b>2</b>
2.1 Relevant Legislation	2
2.2 Relevant Guidance	2
2.3 Relevant Policy	3
<b>3 Consultation</b>	<b>4</b>
<b>4 Assessment Methodology</b>	<b>5</b>
4.1 Impact Assessment Methodology	5
<b>5 Screening and Assessment of Major Accidents and Disasters</b>	<b>9</b>
5.1 Stage 1	9
5.2 Stage 2	12
5.3 Stage 3	13
5.4 Stage 4	18
<b>6 Summary</b>	<b>18</b>
<b>7 References</b>	<b>21</b>

## Table of Tables

Table 3.1 Consultation Responses Relevant to Major Accidents and Disasters	4
Table 4.1 Receptors Requiring Consideration for Major Accidents and Disasters for the Project	7
Table 5.1 Longlist of Risks	10
Table 5.2 Embedded mitigation measures for Navigational Risk	14
Table 6.1 Summary of Potential Hazards Relating to the Project	18

## Acronyms

<b>Acronvm</b>	<b>Acronvm description</b>
AIS	Automatic Identification Svstems
ALARP	As Low As Reasonabl v Practicable
AONB	Areas of Outstanding Natural Beautv
BAP	Biodiversitv Action Plan
CaP	Cable Plan
CBRN	Chemical. Biological. Radiological and Nuclear
CEMP	Construction Environmental Managemnt Plan
COMAH	Control of Maior Accident Hazards
cUXO	Confirmed Unexploded Ordnance
DLSP	Desian Specification and Lavout Plan
EIA	Environmental Impact Assessment
ERCP	Emeraencv Response and Cooperation Plan
ESA	Environmentallv Sensitive Area
FLO	Fisheries Liaison Officer
GPS	Global Positioning Svstem
HDD	Horizontal Directional Drilling
HPI	Habitats of Principal Importance
HRA	Habitats Reaulations Appraisal
HSE	Health and Safetv Executive
IEMA	Institute of Environmental Managemnt and Assessment
ISO	International Standards Organization
LNR	Local Nature Reserves
LSE	Likelv Significant Effects

LWS	Local Wildlife Sites
MCA	Maritime and Coastguard Agency
MCZ	Marine Conservation Zones
MPS	Marine Policy Statement
MS-LOT	Marine Scotland Licensing Operations Team
N/A	Not applicable
NLB	Northern Lighthouse Board
NNR	National Nature Reserves
OMAR	Offshore Major Accident Regulator
OPRED	Offshore Petroleum Regulator for Environment and Decommissioning
POUXO	Potential Unexploded Ordnance
SAC	Special Areas of Conservation
SAR	Search and Rescue
SINC	Sites of Importance for Nature Conservation
SNCI	Sites of Nature Conservation Importance
SPA	Special Protection Areas
SSSI	Sites of Special Scientific Interest
TPV	Third Party Verification
UK	United Kingdom
UKCP	UK Climate Projections
UKHO	UK Hydrographic Office
UXO	Unexploded Ordnance



## Glossary

<b>Term</b>	<b>Description</b>
Applicant	Green Volt Offshore Windfarm Ltd.
Buzzard	Buzzard Platform Complex.
Buzzard Export Cable Corridor	The area in which the export cables will be laid, from the perimeter of the Windfarm Site to Buzzard Platform Complex.
Green Volt Offshore Windfarm	Offshore windfarm including associated onshore and offshore infrastructure development (Combined On and Offshore Green Volt Projects).
Horizontal Directional Drilling	Mechanism for installation of export cable at landfall.
Inter-array cables	Cables which link the wind turbines to each other and the offshore substation platform.
Landfall Export Cable Corridor	The area in which the export cables will be laid, from the perimeter of the Windfarm Site to landfall.
Mean High Water Springs	At its highest and 'Neaps' or 'Neap tides' when the tidal range is at its lowest. The height of Mean High Water Springs (MHWS) is the average throughout the year, of two successive high waters, during a 24-hour period in each month when the range of the tide is at its greatest (Spring tides).
Moorings	Mechanism by which wind turbine generators are fixed to the seabed.
NorthConnect Parallel Export Cable Corridor Option	Landfall Export Cable Corridor between NorthConnect Parallel Landfall and point of separation from St Fergus South Export Cable Corridor Option.
NorthConnect Parallel Landfall	Southern landfall option where the offshore export cables come ashore.
Offshore Development Area	Encompasses i) Windfarm Site, including offshore substation platform ii) Offshore Export Cable Corridor to Landfall, iii) Export Cable Corridor to Buzzard Platform Complex.
Offshore export cables	The cables which would bring electricity from the offshore substation platform to the Landfall or to the Buzzard Platform Complex.
Offshore Export Cable Corridors Offshore infrastructure	The proposed offshore area in which the export cables will be laid, from offshore substation to landfall or to the Buzzard Platform Complex. All of the offshore infrastructure, including wind turbine generators, offshore substation platform and all inter-array and export cables.
Offshore substation platform	A fixed structure located within the Windfarm Site, containing electrical equipment to aggregate the power from the wind turbine generators and convert it into a more suitable form for export to shore.
Onshore Export Cable Corridor	The proposed onshore area in which the export cables will be laid, from landfall to the onshore substation.

Project	Green Volt Offshore Windfarm project as a whole, including associated onshore and offshore infrastructure development.
Safety zones	An area around a structure or vessel which must be avoided.
St Fergus South Export Cable Corridor Option	Landfall Export Cable Corridor between St Fergus South Landfall and point of separation from NorthConnect Parallel Export Cable Corridor Option.
St Fergus South Landfall	Northern landfall option where the offshore export cables come ashore.
Windfarm Site	The area within which the wind turbine generators, offshore substation platform and inter-array cables will be present.

## APPENDIX 5.1: MAJOR ACCIDENTS AND DISASTERS SCREENING

### 1 Introduction

1. This appendix of the **Offshore Environmental Impact Assessment (EIA) Report** presents a screening of the major accidents and disasters with the potential to occur in relation to the Project (in this instance the Project refers to the offshore elements of the Green Volt Offshore Windfarm only, up to Mean High Water Springs (MHWS)), as well as descriptions of the processes and measures to be implemented to ensure no significant effects arise in the event of a major accident or disaster. Information on the project is provided in **Chapter 5: Project Description** and sections of the following chapters of the **Offshore EIA Report** are relevant:
  - **Chapter 7: Marine Geology, Oceanography and Physical Processes;**
  - **Chapter 8: Marine Sediment and Water Quality;**
  - **Chapter 9: Benthic Ecology;**
  - **Chapter 10: Fish and Shellfish Ecology.**
  - **Chapter 11: Marine Mammal Ecology;**
  - **Chapter 12: Offshore and Intertidal Ornithology;**
  - **Chapter 13: Commercial Fisheries;**
  - **Chapter 14: Shipping and Navigation;**
  - **Chapter 16: Aviation and Radar;**
  - **Chapter 17: Infrastructure and Other Marine Users; and**
  - **Chapter 18: Climate Change.**
  
2. The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (the EIA Regulations 2017) and The Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended) require significant risks to the receiving communities and environment, for example through major accidents or disasters, to be considered. Similarly, significant effects arising from the vulnerability of the Project to major accidents or disasters should be considered.
  
3. The following definitions are relevant to this appendix of the **Offshore EIA Report** (Institute of Environmental Management and Assessment (IEMA), 2020):
  - 'Major accidents' are defined as '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.' (IEMA 2020).
  - A 'disaster' is a sudden accident or natural catastrophe that causes great damage or loss of life. These can be natural or can be man-made hazards (e.g. caused by accidental loss of containment) or external hazards (e.g. act of terrorism) which result in consequences for people or the environment.
  - A 'receptor' refers to the specific component of the environment that could be adversely affected if the source reaches it. Environmental receptor is specifically defined as: features of the

environment that are subject to assessment under Part 3 of the Marine works EIA Regulations (2007), namely *'population, human health, biodiversity (for example, fauna and flora), land (for example, land take), soil (for example, organic matter, erosion, compaction, sealing), water (for example, hydromorphological changes, quantity and quality), air, climate (for example, greenhouse gas emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape.'* For the purposes of this assessment the receptors relevant to the Project have been group into the following: population and human health, designated Sites (International, National and Other), scarce habitats widespread habitat, particular species, marine environment.

- 'Serious danger to human health' relates to the people present in the potentially affected areas, either permanently or for prolonged periods of time. This excludes workers operating at the facility.
- 'Serious damage to human populations' is harm which would be considered substantial e.g., deaths, multiple serious injuries or a substantial number requiring medical attention.
- 'Serious damage to the environment' is loss or significant detrimental impact on populations of species or organisms, harm or loss of valued sites (including designated sites), valued cultural heritage sites, contamination of drinking water supplies, ground or groundwater, or permanent or long-lasting harm to environmental receptors that cannot be restored through minor clean-up or restoration efforts.
- 'As Low As Reasonably Practicable' (ALARP) is used in assessment of major accidents and disasters involves 'weighing a risk against the trouble, time and money needed to control it' noting that 'ALARP describes the level to which we expect to see risks controlled'.

## 2 Legislation, Guidance and Policy

4. The following legislation, guidance and policy documents are relevant to major accidents and disasters. Further information on the legal framework is presented in **Chapter 3: Policy and Legislative Context** of the **Offshore EIA Report**.

### 2.1 Relevant Legislation

5. The screening and assessment of major accidents and disasters has been developed with reference to the following legislation:
  - Health and Safety at Work etc. Act 1974;
  - The Management of Health and Safety at Work Regulations 1999;
  - Construction (Design and Management) Regulations 2015;
  - Offshore Installations (Offshore Safety Directive) (Safety Case etc.) Regulations 2015;
  - The Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended); and
  - The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended) (Scotland).

### 2.2 Relevant Guidance

6. The screening and assessment of major accidents and disasters has been developed with reference to the following guidance:
  - The International Standards Organization's ISO 31000: 2009.Risk Management – principles and guidelines;

- Institute of Environmental Management and Assessment (IEMA), 2016. EIA Quality Mark Article: Assessing Risks of Major Accidents / Disasters in EIA;
- IEMA, 2020. Major Accidents and Disasters in EIA: A Primer;
- IEMA, 2017. EIA Quality Mark Article: What is this MADness?;
- Guidelines for Environmental Risk Assessment and Management Green Leaves II, 2011, Prepared by Defra and the Collaborative Centre of Excellence in Understanding and Managing Natural and Environmental Risks, Cranfield University;
- Health and Safety Executive, 2015. Control of Major Accident Hazards (COMAH) Regulations<sup>1</sup>;
- Offshore Major Accident Regulator (OMAR) Memorandum of Understanding between The Offshore Petroleum Regulator for Environment and Decommissioning (OPRED) and The Health and Safety Executive; and
- Health and Safety Executive, 2015. OMAR guidance on The Offshore Installations (Offshore Safety Directive)(Safety Case etc) Regulations 2015.

## 2.3 Relevant Policy

7. Policy documents used in this screening and assessment of major accidents and disasters:
  - The Civil Contingencies Act 2004 (“the Act”) and the Civil Contingencies Act 2004 (Contingency Planning) (Scotland) Regulations 2005 (“the Regulations”); and
  - The UK Marine Policy Statement (‘the MPS’) (Department for Environment, Food & Rural Affairs, 2011).
8. The United Kingdom (UK) MPS sets out the framework for preparing marine plans and decision making concerning the marine environment. The Scottish Government has produced a National Marine Plan in accordance with these UK policies (Scottish Government, 2015). This plan covers the management of Scottish waters both inshore (less than 12 nautical miles (nm)) and offshore (between 12 and 200 nm) (Scottish Government, 2015). Within Scotland’s National Marine Plan are a range of strategic policies for which management decisions will be made across the main marine sectors. These policies include general overarching policies, and policies specific to offshore wind and marine renewable energy.
9. The following general policies are relevant to major accidents and disasters:
  - *GEN 4 Co-existence: Proposals which enable coexistence with other development sectors and activities within the Scottish marine area are encouraged in planning and decision making processes, when consistent with policies and objectives of this Plan.*
  - *GEN 5 Climate change: Marine planners and decision makers must act in the way best calculated to mitigate, and adapt to, climate change... Marine planners and decision makers should be satisfied that developers and users have sufficient regard to the impacts of a changing climate and, where appropriate, provide effective adaptation to its predicted effects. Offshore and coastal developments should be appropriately sited and designed, and use technologies and equipment appropriate for local conditions, now and in the future, giving particular consideration to vulnerability, scale and longevity of operation. The Scottish Climate Change Adaptation Programme should be complied with. Where appropriate, marine planning authorities should be satisfied that adequate risk management and contingency plans are in place, particularly in relation to potential changes in sea temperatures, sea level rise, storminess and extreme water levels, using the best scientific evidence available at the time.*

---

<sup>1</sup> The COMAH Regulations apply to onshore facilities but provide applicable definitions to this screening and assessment.

- *GEN 9 Natural heritage: Development and use of the marine environment must:*
  - (a) *Comply with legal requirements for protected areas and protected species;*
  - (b) *Not result in significant impact on the national status of Priority Marine Features; and*
  - (c) *Protect and, where appropriate, enhance the health of the marine area.*

### 3 Consultation

10. Green Volt Offshore Windfarm Ltd (the Applicant) has sought opinions from key stakeholders through scoping and consultation regarding the **Offshore Scoping Report** (Royal HaskoningDHV, 2021) (**Appendix 1.2**) and the **Offshore Habitats Regulations Appraisal (HRA) Screening Report** (Royal HaskoningDHV, 2021) (**Appendix 3.1**). The consultation responses relevant to major accidents and disasters are presented in **Table 3.1**.

Table 3.1 Consultation Responses Relevant to Major Accidents and Disasters

Consultee	Date / Document	Comment	Response / where addressed in this EIA Report
Ministry of Defence	14 February 2022 Representation to MS-LOT during consultation on Offshore Scoping Opinion	The potential presence of unexploded ordnance (UXO) has been identified as a relevant consideration in Section 7.7.2.7. The potential presence of UXO and disposal sites is also a relevant consideration to the installation of cables and other intrusive works that may be undertaken in the maritime environment.	UXO risk and mitigation is considered in <b>Appendix 5.3 UXO – Threat and Risk Assessment</b> .
Marine Scotland Licensing Operations Team (MS-LOT)	April 2022, Marine Scotland - Licensing Operations Team: Scoping Opinion for Green Volt Offshore Windfarm	The EIA Report must include a description and assessment of the likely significant effects (“LSE”) deriving from the vulnerability of the Proposed Development to major accidents and disasters. The Developer should make use of appropriate guidance, including the recent Institute of Environmental Management and Assessment (“IEMA”) ‘Major Accidents and Disasters in EIA: A Primer’, to better understand the likelihood of an occurrence and the Proposed Development’s susceptibility to potential major accidents and hazards. The description and assessment should consider the vulnerability of the Proposed Development to a potential accident or disaster and also the Proposed Development’s potential to cause an accident or disaster	LSE are considered below in <b>Section 5</b> .  The IEMA document ‘Major Accidents and Disasters in EIA: A Primer’ has been used to understand the likelihood of an occurrence and the Projects susceptibility to potential major accidents and hazards. This is further described within <b>Section 4</b> below.
MS-LOT	April 2022, Marine Scotland - Licensing Operations Team: Scoping Opinion for Green Volt Offshore Windfarm	The Scottish Ministers advise that existing sources of risk assessment or other relevant studies should be used to establish the baseline rather than collecting survey data and note the IEMA Primer provides further advice on this. This should include the review of the identified hazards from your baseline assessment, the level of risk attributed to the identified hazards and the relevant receptors to be considered.	Baseline information is discussed in <b>Section 4.1.2</b> .  A review of hazards and relevant receptors is included in <b>Section 5</b> .
MS-LOT	April 2022, Marine Scotland - Licensing Operations Team: Scoping Opinion for Green Volt Offshore Windfarm	The assessment must detail how significance has been defined and detail the inclusions and exclusions within the assessment. Any mitigation measures that will be employed to prevent, reduce or control significant effects should be included in the EIA Report.	Where applicable, the assessment draws on other assessments within the EIA, including <b>Chapter 14: Shipping and Navigation and Appendix 5.3 UXO – Threat and Risk Assessment</b> , which detail how significance has been defined.

Consultee	Date / Document	Comment	Response / where addressed in this EIA Report
			<p>A screening process has been undertaken in <b>Section 5</b>.</p> <p>Embedded mitigation measures are discussed in <b>Section 5</b>.</p>
MS-LOT	April 2022, Marine Scotland - Licensing Operations Team: Scoping Opinion for Green Volt Offshore Windfarm	The EIA Report must also include consideration of the options which will be assessed in relation to UXO clearance, the differences amongst them and an assessment of the environmental effects of these options. In this regard, the Scottish Ministers advise that the EIA Report must include a worst case of high order detonation in terms of impact and mitigation, unless there is robust supporting evidence that can be presented to show consistent performance of the preferred low order or deflagration method.	<p>This hazard, along with the impacts, mitigation and evaluation of the residual risk is discussed in the <b>Offshore EIA Report</b> and in the <b>Appendix 5.3: Unexploded Ordnance Threat and Risk Assessment</b>. Further detail on disturbance of UXO and underwater noise and impacts and mitigation is also included in <b>Chapter 10: Fish and Shellfish Ecology</b> and <b>Chapter 11: Marine Mammal Ecology</b>. Further detail in this Appendix is provided in <b>Section 5.3.6</b>.</p>

## 4 Assessment Methodology

### 4.1 Impact Assessment Methodology

11. For the assessment of major accidents and disasters within EIA there is no standard methodology, but IEMA have prepared 'Major Accidents and Disasters in EIA: A Primer' (IEMA, 2020) which provides guidance on a risk-based approach. This screening assessed the likelihood of the significant threat or hazard occurring, and the mitigation embedded to ensure a risk is ALARP (or avoided completely). The risks were identified in respect of the potential vulnerability of the Project to disaster risks, and the potential of the project to cause major accidents or disasters.
12. The following steps were undertaken during the site-specific risk assessment:
  - Stage 1: Identify the hazards in a long list of possible major accidents and events. Major accidents with little relevance to the project were not included (e.g., volcanic eruptions). Sources included the UK Government National Risk Register – 2020 edition. This stage also involved identification of the receptors in the existing environment.
  - Stage 2: Screening exercise to determine which risks are relevant to the Project and require further assessment.
  - Stage 3: Risk evaluation - definition of the potential impacts that may occur from the risks and classification of the likelihood that the events may occur. Identification and evaluation of prevention, minimisation and/or mitigation measures.

- Stage 4: Determination of whether the risk has been mitigated ALARP and the identification of any residual risk, and the consequences upon the receptors in the event of a major accident or disaster.

#### 4.1.1 Risk Evaluation

13. Major accidents and disasters, by definition, are those with the potential to have serious consequences for the receptors affected. The thresholds of what constitutes a major accident or disaster varies by receptor, and the definitions of the thresholds for the relevant receptors is provided in **Table 4.1**.
14. The likelihood of a serious event occurring is examined when determining whether a hazard constitutes a major accident or disaster. Events of high consequence with a high likelihood of occurring are determined to be high risk are unacceptable for any development and are designed out (an example may be infrastructure that did not comply with design codes causing a major failure). These are therefore outside the scope of this assessment. Low impact events which do not meet the criteria listed in **Table 4.1** are not considered a major accident or disaster and are therefore outside of the scope of this assessment.
15. The assessment therefore will focus largely on low likelihood, but potentially high consequence events. Events relating to a planned or known activity, such as noise and vibration from piling, are covered within relevant chapters of the **Offshore EIA Report**, where assessment of the impacts and mitigation is provided. This appendix will identify potential low likelihood, high consequence events with the potential to occur in the Project area that may be determined to constitute a major accident or disaster. It will also set out the Project's embedded and additional mitigation in place and assess whether impacts have been reduced ALARP or avoided.

#### 4.1.2 Scope

##### Study Area

16. The Study Area for the individual hazards has been determined in relation to the impact pathways, the distances to the receptors or from examination of the scale of impacts from examples of historic incidents where available. The geographic scope may reach beyond the Project site boundary where there is potential for interaction. Professional judgement has informed the scope relating to the hazards with the potential for interaction with the Project. The Project red line boundary is provided in **Figure 5.1** of the **Offshore EIA Report**.
17. The temporal scope relates to the lifespan of the Project, through construction, operation and maintenance (O&M), and decommissioning.

##### Potential Receptors

18. The potential receptors relevant to this screening and assessment are provided with definitions in **Table 4.1**. The level of harm considered to represent a major accident or disaster is also presented. The thresholds have been determined using industry best practice based upon a) criteria for notification of a major accident to the European Commission under Article 18(1) of Seveso III Directive<sup>2</sup> and Regulation 26 of the COMAH Regulations 2015 (cited in IEMA, 2020) and b) DETR (1999).

---

<sup>2</sup> The Seveso III Directive (Directive 2012/18/EU) is the main EU legislation dealing specifically with the control of onshore major accident hazards involving dangerous substances.



Table 4.1 Receptors Requiring Consideration for Major Accidents and Disasters for the Project

Receptor Group	Receptors Included	Major Accident or Disaster Threshold
Population and human health	<p>Recreational and third-party commercial sea users (including shipping or fisheries)</p> <p>Construction workers, operations and maintenance workers</p>	<p>For the public:</p> <ul style="list-style-type: none"> <li>Substantial number (5+) of people requiring medical attention or any serious/life-changing injuries. Potential for localised interruption to utilities and damage to infrastructure.</li> </ul> <p>For workers:</p> <ul style="list-style-type: none"> <li>Multiple life changing injuries or fatalities.</li> </ul>
Designated Sites (International, National and Other)	<p>Special Areas of Conservation (SAC), Special Protection Areas (SPA), Ramsar Sites, Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNR), Marine Conservation Zones (MCZ), National Parks, Environmentally Sensitive Areas (ESA), Areas of Outstanding Natural Beauty (AONB), Local Nature Reserves (LNR), Local Wildlife Sites (LWS) also known locally as County Wildlife Site, Sites of Importance for Nature Conservation (SINC), and Sites of Nature Conservation Importance (SNCI)</p>	<p>For NNRs, SSSIs, MNRs, the thresholds are:</p> <ul style="list-style-type: none"> <li>Greater than 0.5 ha adversely affected, or greater than 10% of the area of the site affected (whichever is the lesser), or</li> <li>Greater than 10% of an associated linear feature adversely affected, or</li> <li>Greater than 10% of a particular habitat or population of individual species adversely affected.</li> </ul> <p>For SACs, SPAs, and Ramsar sites, the thresholds are:</p> <ul style="list-style-type: none"> <li>Greater than 0.5 ha or 5% of the area of the site adversely affected (whichever is the lesser), or Greater than 5% of an associated linear feature adversely affected, or</li> <li>Greater than 5% of a particular habitat or population of individual species adversely affected.</li> </ul> <p>For other designated land the threshold is:</p> <ul style="list-style-type: none"> <li>Greater than 10% or 10 ha of land damaged, whichever is the lesser.</li> </ul>
Scarce Habitats	Biodiversity Action Plan (BAP) habitats and Habitats of Principal Importance (HPI).	Damage to 10% of the area of the habitat or 2 hectares, whichever is the lesser.
Widespread habitat	Land/water used for agriculture, forestry, fishing or aquaculture.	<ul style="list-style-type: none"> <li>Contamination of 10 ha or more of land which, for one year or more, prevents the growing of crops or the grazing of domestic animals or renders the area inaccessible to the public because of possible skin contact with dangerous substances, or</li> <li>Contamination of any aquatic habitat which prevents fishing or aquaculture or which similarly renders it inaccessible to the public.</li> </ul>
Particular species	Particular species covers all species, both flora and fauna, found in the UK and includes common species, red data book species and other protected or priority species, including rare species.	<ul style="list-style-type: none"> <li>For common species, where reliable estimates of population numbers exist, the death of, or serious sub-lethal effects within, 1% of any species would be significant.</li> <li>For common plant species, the death of, or serious sub-lethal effects within, 5% of the ground cover would be considered a major accident.</li> <li>For species listed in the Habitats</li> </ul>

Receptor Group	Receptors Included	Major Accident or Disaster Threshold
		<p>directive annexes, the Annexes of the Birds directive, the schedules of the Wildlife and countryside Act 1981 (and amendments), all Red Data Book species and priority species under the UK biodiversity Action Plan, the threshold may be lower than 1% or 5%, and liaison with the appropriate statutory conservation organisation should be used to determine the appropriate threshold.</p> <p>Moreover, for all species, where reliable estimates of population numbers do not exist, liaison with the statutory authority will be necessary to determine appropriate thresholds.</p> <p>Any loss of a Red Data Book species (or a Red Data Book species site).</p>
Marine environment	Non-estuarine marine waters, sub-littoral zones, benthic community adjacent to the coast and fish spawning grounds.	<p>Permanent or long-term damage to</p> <ul style="list-style-type: none"> <li>• An area of 2 ha or more of the littoral or sub-littoral zone, or the coastal benthic community, or the benthic community of any fish spawning ground, or</li> <li>• An area of 100 ha or more of the open sea benthic community.</li> </ul> <p>Or a count of</p> <ul style="list-style-type: none"> <li>• 100 or more dead sea birds (not gulls), or</li> <li>• 500 dead sea birds of any species, or</li> <li>• 5 dead or significantly injured/impaired sea mammals of any species.</li> </ul>

### Assumptions and Limitations

19. This assessment is based on the design as set out in **Chapter 5: Project Description**. There were no limitations affecting this assessment.

### Existing Environment

20. The existing environment has been characterised in the following chapters of the **Offshore EIA Report**:
- **Chapter 7: Marine Geology, Oceanography and Physical Processes;**
  - **Chapter 8: Marine Sediment and Water Quality;**
  - **Chapter 9: Benthic Ecology;**
  - **Chapter 10: Fish and Shellfish Ecology;**
  - **Chapter 11: Marine Mammal Ecology;**
  - **Chapter 12: Offshore and Intertidal Ornithology;**
  - **Chapter 13: Commercial Fisheries;**
  - **Chapter 14: Shipping and Navigation;**

- **Chapter 16: Aviation and Radar;**
  - **Chapter 17: Infrastructure and Other Marine Users;**
  - **Chapter 19: Climate Change; and**
  - **Chapter 21: Socioeconomics and Tourism.**
21. Future baseline for the Project relevant to major accidents and disasters will evolve relating to several likely factors over the Project lifecycle. Climate change is likely to lead to changes in rainfall and temperature, increased occurrences of extreme weather, and rising sea levels. Predictions for changes in climate until the end of the 21<sup>st</sup> century are available from The UK Climate Projections (UKCP, 2021). The impacts of climate change are set out in more detail in **Chapter 18: Climate Change** of the **Offshore EIA Report**.
22. There are likely to be advances in technology over the Project lifecycle, with potential for further reductions in risks to safety and the environment, or to introduce new hazards with the introduction of novel technology. Novel technologies would be implemented following appropriate risk assessment processes.
23. In terms of shipping and navigation risks, the **Navigational Risk Assessment (Appendix 14.1 of the Offshore EIA Report)** assumes potential increases of 10 and 20% within the commercial, recreational and fishing traffic modelling. The consideration of a range of conservative values is considered as covering potential increases over the course of the Project's operational lifespan. This includes assumptions regarding offshore industries and the Aberdeen Harbour expansion. This assessment includes consideration of the allision, collision and re-routing cumulatively, with all effects either tolerable or broadly acceptable.

## 5 Screening and Assessment of Major Accidents and Disasters

### 5.1 Stage 1

24. This section describes and identifies the likely significant effects (LSE) deriving from the vulnerability of the Project to major accidents and disasters. Hazards with the potential to cause major accidents and disasters during construction, operation and decommissioning, and justification for inclusion in the short list of risks for further assessment are provided in **Table 5.1**. Also included in the assessment are instances where the Project increases the probability of a hazard occurring, or where the consequences of a hazard may be exacerbated by the Project. Risks were identified using the National Risk Register, professional judgement, and a review of available literature. In relation to Shipping and Navigation, a Hazard Workshop was held in May 2022, stakeholders that participated were as follows:
- Maritime and Coastguard Agency (MCA);
  - Northern lighthouse Board (NLB);
  - Royal National Lifeboat Institution;
  - Royal Yachting Association Scotland;
  - Cruising Association;
  - Project Fisheries Liaison Officer (FLO);
  - Aberdeen Harbour Board;
  - Scotline; and
  - North Star Shipping.

Table 5.1 Longlist of Risks

Hazard	Relevant for Shortlist	Justification	Receptors
<b>Malicious Attacks</b>			
Attacks on publicly accessible locations	No	The Project is no more vulnerable to this type of hazard than any other development	Not Applicable (N/A)
Attacks on infrastructure	No		N/A
Attacks on transport	No		N/A
Cyber Attacks	No		N/A
Smaller scale Chemical, Biological, Radiological and Nuclear (CBRN) attacks	No		N/A
Medium scale CBRN attacks	No		N/A
Larger scale CBRN attacks	No		N/A
Undermining the democratic process	No		N/A
<b>Serious and Organised Crime</b>			
Serious and organised crime – vulnerabilities	No	The Project is no more vulnerable to this type of hazard than any other development	N/A
Serious and organised crime – prosperity	No		N/A
Serious and organised crime – commodities	No		N/A
Serious and organised crime – vulnerabilities	No		N/A
<b>Environmental Hazards</b>			
Coastal flooding	No	The construction works would occur within the marine environment and would not impact on coastal flooding	N/A
Coastal erosion	No	Horizontal Directional Drilling (HDD) will be used to install cables in the coastal zone and there will be no alteration to the potential for coastal erosion, or changes to the potential consequences from coast erosion events.	N/A
River flooding	No	The construction works would occur within the marine environment and would not impact on rivers	N/A
Surface water flooding	No	The construction works would occur within the marine environment and would not impact on flood defences or flood risk	N/A

Hazard	Relevant for Shortlist	Justification	Receptors
Storms	No	Damage to infrastructure from severe weather is unlikely to result in hazards with significant risk. In cases where infrastructure is damaged and turbine blades are lost to sea, this is considered unlikely to cause injury.	N/A
Low temperatures	No	The project design will consider the effect of low temperatures; however, an event would have minimal interaction with the Project	N/A
Heatwaves	No	The project design will consider the effect of high temperatures; however, such events are considered unlikely and would have minimal interaction with the Project.	N/A
Droughts	No	Event would have negligible consequence on the Project	N/A
Severe space weather	No	The Project is no more vulnerable to this type of hazard than any other development	N/A
Poor air quality	No	Event would have negligible consequence on the Project	N/A
Earthquakes / seismic activity	No	The Project site is not in a geologically active area and is not considered vulnerable to earthquakes.	N/A
Environmental disasters overseas	No	Event would have negligible consequence on the Project	N/A
Wildfires	No	There would be no impact of wildfires on the Project.	N/A
<b>Human and Animal Health</b>			
Pandemics	No	The Project is no more vulnerable to this type of hazard than any other development	N/A
High consequence infectious disease outbreaks	No		N/A
Antimicrobial resistance	No		N/A
Animal diseases	No		N/A
<b>Major Accidents</b>			
Widespread electricity failures	No	Event would have negligible consequence on the Project	N/A
Major transport accidents	No	Event would have negligible consequence on the Project	N/A
System failures	No	Event would have negligible consequence on the Project	N/A
Commercial failures	No	Event would have negligible consequence on the Project	N/A
Systematic financial crisis	No	Event would have negligible consequence on the Project	N/A
Industrial accidents – nuclear	No	Event would have negligible consequence on the Project	N/A
Major fires	Yes	Event may lead to serious damage to the environment through harmful emissions to air and sea and create a localised fire hazard, however the location away from populated areas limits the scale of impact.	Population and human health, biodiversity, air quality and climate, material assets and land

Hazard	Relevant for Shortlist	Justification	Receptors
<b>Societal Risks</b>			
Industrial action	No	The Project is no more vulnerable to this type of hazard than any other development	N/A
Widespread public disorder	No	The Project is no more vulnerable to this type of hazard than any other development	N/A
<b>Project Specific Hazards</b>			
Exposed cables leading to vessel snagging	Yes	Event could lead to immediate and likely irreparable damage to the marine environment, with likely transboundary impacts	Population and human health, biodiversity, material assets
Seabed conditions affecting foundations	No	Pre-construction survey will ensure that seabed conditions are suitable for foundations / anchors. The Applicant has committed to avoid pockmarks.	N/A
Vessel interactions (e.g. collision, allision)	Yes	Event could lead to immediate and likely irreparable damage to the marine environment, with likely transboundary impacts	Population and human health, biodiversity, material assets
Aviation collision	Yes	Risk of loss of life and damage to Project infrastructure and other marine users.	Population and human health, biodiversity, material assets
Accidental spills of hazardous material	Yes	The impacts would relate to the scale of the spill and the type of hazardous material. Only large scale spills with the potential to cause considerable damage to the environment is scoped in for further assessment	Population and human health, biodiversity, material assets and land
Disturbance of UXO in Project area	Yes	Risk of loss of life and damage to infrastructure	Population and human health, biodiversity, material assets
Floating Wind Turbine Generator (WTG) breaking free during tow or from moorings	Yes	Risk of loss of life and damage to Project infrastructure and other marine users.	Population and human health, biodiversity, material assets
Workplace accident (on vessel, within Wind Farm)	Yes	Risk of loss of life and damage to Project infrastructure and other marine users.	Population and human health, biodiversity, material assets and land

## 5.2 Stage 2

25. Hazards from the longlist in **Table 5.1** considered for further assessment are:

- Major Accidents:
  - Fires
- Project Specific Hazards:
  - Exposed cables leading to vessel snagging;
  - Vessel collision;
  - Aviation collision;
  - Accidental spills of hazardous material;
  - Disturbance of UXO in Offshore Development Area;
  - WTG breaking free during tow or from moorings; and
  - Workplace accident

### 5.3 Stage 3

26. This stage requires definition of the potential impacts that may occur from the risks and classification of the likelihood that the events may occur. Mitigation measures for each hazard are considered. Several of the hazards identified are already covered in previous chapters of this EIA, details of which are provided in the following sections.

#### 5.3.1 Fires

27. This hazard would likely only be limited to the Windfarm Site. The risk of substation fires is low; however, substation fires can impact the supply of electricity and create a localised fire hazard. The highest appropriate levels of fire protection and resilience will be specified for the substation to minimise fire risks ALARP. The small quantities of lubricants, fuel and cleaning equipment required within the project will be stored in suitable facilities designed to the relevant regulations and policy design guidance. **Emergency Response** and **Cooperation Plans** (ERCoP) will be developed following discussions with the Maritime Coastguard Agency, including risk assessments and designated evacuation plans for workers on board in unlikely event of fire breaking out. Given the Project's offshore location limiting access to the public, and preventing fires from spreading, including mitigation the risk of the consequences meeting the threshold for the applicable receptors is considered to be ALARP.

#### 5.3.2 Exposed Cables Leading to Vessel Snagging

28. This hazard is relevant to the Offshore Development Area, including Windfarm Site, Buzzard Export and the Landfall Export Corridors. The impacts, mitigation and evaluation of the residual risk resulting from this hazard are discussed in the **Offshore EIA Report** in **Chapter 14: Shipping and Navigation**.
29. A **Cable plan** (CaP) will be developed to set out the installation methods, which will set out environmental and navigational issues. The Project will use cabling burial techniques, where possible, for both the inter-array and export cables. This will enable a reduction in the potential for interactions between other marine users and the deployed cabling infrastructure associated with the Project. This is particularly important to enable the continuation of fishing activities in the locations where the cabling infrastructure has been buried. The Project will seek cable crossing agreements with other existing cable operators where a cable crossing is required. The Project will comply with all cabling industry standards in locations where the Project cabling infrastructure will be buried. Cable protection will be monitored as per cable suppliers' recommendations, and in agreement with power purchase customers. Further information on the intended pre-construction campaigns is outlined in the **Offshore EIA Report** in **Chapter 5 Project Description** of the **Offshore EIA Report**. The risk of this hazard occurring is considered to be ALARP.

#### 5.3.3 Vessel Collision

30. This hazard is relevant to the Windfarm Site, the Buzzard Export and the Landfall Export Corridors. The impacts, mitigation and evaluation of the residual risk is discussed in the **Offshore EIA Report** in **Chapter 14: Shipping and Navigation** and **Chapter 17: Infrastructure and Other Marine Users** which also discusses the risk that the increased vessel movement to and from the site may pose to navigational safety during construction and operational phases, and further detail is provided in the **Navigational Risk Assessment (Appendix 14.1)**.
31. Site selection process implemented by the Project avoided significant interactions with existing marine infrastructure in the Offshore Development Area. This has been undertaken through a combination of consultation, desk-based research and offshore surveys. This will reduce the potential of the Project's infrastructure interfering with existing marine infrastructure. A further

detailed analysis of this site selection process has been provided in **Chapter 4: Site Selection and Assessment of Alternatives** of the **Offshore EIA Report**.

32. **Table 5.2** lists the mitigation measures embedded into the Project design to reduce Navigational Risk.

*Table 5.2 Embedded mitigation measures for Navigational Risk*

Mitigation Measure	Description
Application for Safety Zones	<p>Application to Marine Scotland for safety zones around structures as per relevant legislation (Energy Act 2004 and Electricity Regulations 2007). The application will include 500m safety zones around structures where construction or major maintenance is ongoing, and 50m pre-commissioning safety zones around partially completed or completed structures prior to commissioning of the Project.</p> <p>The Applicant will consider relevant operations required for and risks associated with a floating project to determine what will be applied for post consent including which activities may require safety zones and which vessels will trigger their use. Consultation will be undertaken with MCA, NLB and MS-LOT as part of this process to agree what mitigation are necessary for a large scale floating project.</p>
Cable burial risk assessment	Implementation and monitoring of cable protection. This will include cable burial or external protection where adequate burial depth as identified via risk assessment is not feasible.
Design Specification and Layout Plan (DLSP)	The layout of structures will be agreed with MCA and NLB as part of the DSLP process. This will include consideration of Search and Rescue (SAR) and surface navigation.
Display on charts	Appropriate marking of Project infrastructure on appropriate UK Hydrographic Office (UKHO) Admiralty Charts.
Guard vessels	Use of guard vessel(s) where necessary as identified by risk assessment.
Lighting and Marking Plan	Lighting and Marking Plan setting out how the Project will be lit and marked in agreement with NLB and in line with IALA Guidance G1162/R139 (IALA, 2021). This will include agreement on any construction buoyage requirements.
Marine Coordination	Marine coordination and communication for the purposes of managing project vessel movements.
Marine Pollution Contingency Plan	Implementation of a Marine Pollution Contingency Plan.
MCA & Health and Safety Executive (HSE) Regulatory Expectations Compliance	Compliance with the Regulatory Expectations on Moorings for Floating Wind and Marine Devices, in particular independent Third Party Verification (TPV) and monitoring / tracking.
MGN 654 Compliance	Compliance with MGN 654 and its annexes including SAR annex 5 (MCA, 2021) and completion of a SAR checklist.
Minimum blade clearance	Minimum blade clearance of 22 m above MSL (in line with RYA policy (RYA, 2019) and MGN 654 (MCA, 2021)).
Navigational Safety Plan	Implementation of a Navigational Safety Plan setting out the navigational safety measures that will be in place during the construction and operational phases.
Project vessel compliance with international marine regulations	Compliance of all project vessels with international marine regulations as adopted by the Flag State, notably COLREGs (IMO, 1972/77) and SOLAS (IMO, 1974).
Promulgation of information	Promulgation of information via all usual means (e.g., Kingfisher bulletins, Notifications to Mariners).
Vessel Management Plan	Implementation of a Vessel Management Plan to ensure Project vessel movements are managed to minimise disruption to third party vessels.



33. In terms of shipping and navigation risks, the **Navigational Risk Assessment (Appendix 14.1)** includes consideration of the potential allision, collision and re-routeing both for the Project alone and cumulatively, with all effects either tolerable or broadly acceptable

#### 5.3.4 Aviation collision

34. Helicopter access is not being considered for the Project. Therefore, any risk to aviation would be to third-parties.
35. Mitigation to avoid impacts upon aviation receptors is discussed in **Chapter 16: Aviation and Radar**. This mitigation incorporates:
- Mitigation for construction (including towing of turbines and lighting of construction plant);
  - Compliance with requirements for SAR;
  - Aviation obstacle lighting; and
  - Helicopter Main Route mitigations.
36. With the agreement and implementation of suitable mitigation the risk is considered ALARP.

#### 5.3.5 Accidental Spills of Hazardous Material

37. During construction and decommissioning the use of fuels will be required, and some chemicals may be required on board vessels involved in the marine installation of HDD works, as discussed in **Chapter 5: Project Description**. Accidental spill of these substances has the potential to occur in the Windfarm Site, Buzzard Export and the Landfall Export Corridors. Impacts from spills associated with the land-based HDD works will be covered in the Onshore EIA Report.
38. The Applicant will commit to undertaking construction works in adherence will all relevant best practice guidance and legislation and will prepare all necessary plans in advance of construction activities. As such, the impact of pollution due to leaks and spills from other vessels or other plant equipment was scoped out of the assessment, as agreed by MS-LOT in the **Scoping Opinion (Appendix 1.1 of the Offshore EIA Report)**, as discussed in **Chapter 8: Marine Sediment and Water Quality**. Where there is the potential for an accidental spill or leak, the focus will be on control measures that would be employed to reduce accidental releases to the environment. To ensure these are captured and implemented, a separate outline **Construction Environmental Management Plan (CEMP)** will be developed prior to construction. The CEMP will include measures for planning for accidental spills, address all potential contaminant releases and include key emergency contact details. A **Marine Pollution Contingency Plan** will set out for approval, the management measures to be implemented during construction, operation and decommissioning to mitigate the risks of accidental spills of hazardous materials. Measures to reduced instances of spills, remedial action and response measures to be used in the event of a spill or collision, and detail measures for refuelling at sea. This plan will also align with relevant Plan(s) for Buzzard. These measures will prevent a release of hazardous material of a scale large enough to meet the thresholds set out in **Table 4.1** for the affected receptors and the risk is considered ALARP.

#### 5.3.6 Disturbance of UXO in Project Area

39. This hazard, along with the impacts, mitigation and evaluation of the residual risk is discussed in the **Offshore EIA Report** and in the **Appendix 5.3: Unexploded Ordnance Threat and Risk Assessment**. Further detail on disturbance of UXO and underwater noise and impacts and mitigation is also included in **Chapter 10: Fish and Shellfish Ecology** and **Chapter 11: Marine Mammal Ecology**.

40. The following embedded mitigation measures have been included to reduce the risk of disturbance of unexploded ordnance (UXO):

- Pre-construction surveys will be implemented by the Project in order to identify any potential hazards within the array site and export cable corridor. These will include geophysical surveys to identify seabed hazards such as discarded fishing gear or unidentified objects and magnetometer surveys to identify for the presence of UXO devices. Further information on the intended pre-construction campaigns is outlined in the **Offshore EIA Report** in **Chapter 5: Project Description, Appendix 5.3: Unexploded Ordnance Threat and Risk Assessment** and **Appendix 5.4: Unexploded Ordnance Risk Mitigation Strategy**.

41. The following strategies are presented in the Unexploded Ordnance Risk Mitigation Strategy:

- Avoidance - a strategy of potential unexploded ordnance (pUXO) detection and avoidance is proposed as the most cost effective and efficient method of reducing UXO risks to ALARP. By surveying for and avoiding direct or indirect contact with any pUXO (the source of the risk) and by moving any intrusive activity away from such prospective hazards (where practicable), such risks are avoided.
- Removal of risk receptors - an alternative option is to remove the receptor element (of the source-pathway-receptor model), by moving certain sensitive and vulnerable receptors (typically the crews of offshore vessels), to a safe distance from the point of the intrusive activity and thus the pUXO hazard, so that it will diminish sufficiently the prospective blast, fragmentation (the former and latter are through air effects) and/or shock wave (a through water effect) consequences, in order to reduce UXO risks to ALARP.
- Removal of Threat Sources - Where pUXO cannot be avoided, another alternative option, is to verify pUXO by investigation and where it is confirmed unexploded ordnance (cUXO), to remove it (effectively removing the source element of the source-pathway-receptor model), either by moving it to a position where it can do no harm (but only when it is safe to do so and wherever permit licencing and consent condition allow such actions), and/or by destroying it or otherwise rendering it safe.
- In high and medium risk zones geophysical UXO survey is recommended prior to the commencement operations that are planned within the boundaries of the Study Area, in order to provide the basis for a strategy of pUXO avoidance, or for its identification and removal.
- Surface detection for threat spectrum UXO should consist of either Side Scan Sonar, Multi Beam Echo Sounder and/or Work Class Remotely Operated Vehicle camera search (subject to visibility and resolution, especially in areas where shallow water operations are planned), over the area of proposed operations and prior to their commencement.
- Sub-surface detection for threat spectrum UXO should also be undertaken ahead of seabed intrusive operations should consist of magnetometer/gradiometer survey over the area of the proposed operations.
- Any vessels involved in intrusive works should be equipped with UXO specific **Emergency Response** plans, so that in the event of an unplanned UXO discovery the vessel Master and/or the offshore superintendent/party chief (or similar) are informed in advance about what safety actions must be taken.

42. With the mitigation in place the risk of a major accident occurring due to this hazard is determined to be ALARP.

### 5.3.7 WTG breaking free of moorings or issues during tows

43. The MCA require under their Regulatory Expectations on Moorings for Floating Wind and Marine Devices (MCA & HSE, 2017) that developers arrange TPV of the mooring systems by an independent and competent person / body. The Regulatory Expectations state that TPV is a “continuous activity”, and that any modifications to a system or if new information becomes available with regard to its reliability, additional TPV would be required.
44. On this basis, a WTG breaking free of its moorings is considered likely to represent a low frequency event, noting that for a total loss of station, all moorings would be required to fail (based on current envelope there will be between three and six depending on the design chosen).
45. The Regulatory Expectations also require the provision of continuous monitoring either by Global Positioning System (GPS) or other suitable means, the Applicant will put such a system in place, with each WTG continuously monitored, and with capability of being tracked via Automatic Identification Systems (AIS) in the event of a loss of station as detailed in MGN 654. Each WTG will also have an alarm system in place, whereby an alert will be provided to the Marine Coordination Centre in the event that any floating substructure leaves a pre-defined ringfenced alarm zone. This means in the unlikely event that a floating substructure suffers total loss of station and drifts outside of its alarm zone, the Applicant would be made aware, and would be able to track its position and make the necessary emergency arrangements. The Navigational Risk Assessment concludes therefore this this impact would be broadly acceptable.
46. Any issues during tows of WTGs to and from the Windfarm Site (either during construction or O&M) (vessel breakdowns etc) would be mitigated by existing procedures relating to shipping and navigation listed in **Table 5.2**, the most relevant being Navigational Safety Plan; Project vessel compliance with international marine regulation; Promulgation of information and the Vessel Management Plan.
47. The aim is to design out the scenario where an emergency tow is required by following appropriate design codes and draw on experience gained by the oil and gas industry. The number of mooring lines per floating substructure allows for some failure (in relation to metocean conditions or vessel allision, for example) whilst maintaining integrity of the mooring system. The materials for each mooring line are selected to ensure stability and wear resistance, whilst the attachment points are designed for fatigue.
48. During construction, all aspects of the mooring system and the attachment points will be subject to thorough scrutiny. As the floating substructures are classed as ships, there will be compliance with flag state rules and a class surveyor will be present throughout. Third party verification (TPV) of the mooring systems will be undertaken by an independent and competent body to ensure they meet the required standards. Once at the wind farm site, a programme of inspection of the floating substructures and mooring systems will be in place on a pre-determined cycle.
49. Each unit will have a GPS system which sets off an alarm if movement starts goes beyond a pre-set limit, for example from a ship allision. It should be noted that this limit is less than what would be expected from a mooring failure and would trigger a response to check the moorings. The alerts will be provided to the Marine Coordination Centre.
50. The floating substructures will probably have mooring bollards that could take tow lines. However, onboard access would be required to attach tow lines, which may be challenging in adverse weather conditions. In such an event, warning mechanisms will be used to give adequate notification to ensure the safety of other sea users until weather conditions are suitable for a towing connection to be made. The procedures for emergency situations will all be detailed in an Emergency Response Cooperation Plan (ERCoP) that will be approved by the MCA and the Northern Lighthouse Board.

51. When the units are under tow to or from the wind farm site there will be emergency tow bridles in place, in addition to the tow lines. The bridles float on the surface with a buoy at the free end, but these are not permanent features as the floating lines can be degraded by UV and marine growth and potentially fail at the critical moment.

### 5.3.8 Workplace accidents

52. Other workplace accidents which could lead to major accidents will be avoided by means of training of personnel and ensuring that all personnel have all required qualifications, that qualifications are maintained, and that regular project specific information (e.g. toolbox talks) is promulgated to staff. All equipment, plant and vessels will be fit for purpose and maintained as required. In addition to training, all necessary requirements for dealing with accidents (first aid equipment, firefighting equipment) would be in place to deal with workplace accidents/incidents.
53. With all of the above in place the risk is considered ALARP.

## 5.4 Stage 4

54. At this stage, the mitigation measures are evaluated to ensure that risks from the hazards are sufficient to reduce risks ALARP.
55. Mitigation measures are embedded into the construction, operation, maintenance and decommissioning phases of the Project, and, alongside use of industry safety standards, will act to minimise the impacts on the relevant receptors identified during stage 3. With a commitment to the highest health and safety standards in design and working practices enacted, none of the anticipated construction works or operational procedures is expected to pose an appreciable risk of major accidents or disasters.

## 6 Summary

56. Consideration of the LSE for potential major accidents and disasters has been carried out following available guidance and legislation. The residual risk for hazards scoped in for further assessment are considered to be ALARP. A summary of the results of the assessment is provided in **Table 6.1**.

Table 6.1 Summary of Potential Hazards Relating to the Project

Hazard	Receptors	EIA Chapter(s) / Document Addressing this Risk	Embedded Mitigation	Risk of Major Accident or Disaster After Mitigation
<b>Major Accidents</b>				
Major Fires	Population and human health, biodiversity	N/A PEMP and ERCP will be developed	Development of a PEMP will outline safety measures to reduce the risk of a major accident or disaster resulting from substation fires.  ERCPs will be developed following discussions with the Maritime Coastguard Agency, including risk assessments and designated evacuation plans for workers on board in unlikely event of fire breaking out.	Risk is ALARP

Hazard	Receptors	EIA Chapter(s) / Document Addressing this Risk	Embedded Mitigation	Risk of Major Accident or Disaster After Mitigation
<b>Project Specific Risks</b>				
Exposed cables leading to vessel snagging	Population and human health, biodiversity, material assets	<b>Chapter 14: Shipping and Navigation.</b>  CaP will be developed	CaP will be developed to set out the installation methods, which will set out environmental and navigational issues. Cabling burial techniques, where possible, and the Project will comply with all cabling industry standards in locations where cabling infrastructure will be buried.	Risk is ALARP
Vessel collision	Population and human health, biodiversity, material assets	<b>Chapter 14: Shipping and Navigation.</b>  <b>Appendix 14.1 Navigational Risk Assessment</b>  <b>Chapter 17: Infrastructure and Other Marine Users.</b>	Embedded mitigation detailed in Table 5.2 Application for Safety Zones <ul style="list-style-type: none"> <li>• Cable burial risk assessment</li> <li>• DLSP</li> <li>• Display on charts</li> <li>• Guard vessels</li> <li>• Lighting and Marking Plan</li> <li>• Marine Coordination</li> <li>• Marine Pollution Contingency Plan</li> <li>• MCA &amp; HSE Regulatory Expectations Compliance</li> <li>• MGN 654 Compliance</li> <li>• Minimum blade clearance</li> <li>• Navigational Safety Plan</li> <li>• Project vessel compliance with international marine regulations</li> <li>• Promulgation of information</li> <li>• Vessel Management Plan</li> </ul>	Risk is ALARP
Aviation Collision	Population and human health, biodiversity, material assets	<b>Chapter 16: Aviation and Radar</b>	<ul style="list-style-type: none"> <li>• Mitigation for construction (including towing of turbines and lighting of construction plant);</li> <li>• Compliance with requirements for Search and Rescue;</li> <li>• Aviation obstacle lighting; and</li> <li>• Helicopter Main Route mitigations.</li> </ul>	Risk is ALARP
Accidental spills of hazardous material	Population and human health, biodiversity, material assets and land	PEMP and Marine Pollution Contingency Plan (MPCP) will be developed	<p>A PEMP will be produced and followed to cover the construction, O&amp;M phase of the Project. This will include planning for accidental spills, address all potential contaminant releases and include key emergency contact details.</p> <p>MPCP will set the management measures to be implemented during construction, operation and decommissioning to mitigate the risks of accidental spills of hazardous materials. Measures to reduced instances of spills, remedial action and response measures to be used in the event</p>	Risk is ALARP

Hazard	Receptors	EIA Chapter(s) / Document Addressing this Risk	Embedded Mitigation	Risk of Major Accident or Disaster After Mitigation
			of a spill or collision, and detail measures for refuelling at sea.	
Disturbance of UXO in Project Area	Population and human health, biodiversity, material assets	<b>Appendix 5.3: Unexploded Ordnance Threat and Risk Assessment</b>	<ul style="list-style-type: none"> <li>Implementation of UXO clearance campaign prior to construction.</li> <li>Detonation, relocation, or retrieval of UXO, or implementation of safety zones</li> <li>UXO surveys during operation for activities that may interact with the seabed.</li> </ul> <p>A Risk Mitigation Strategy has been developed as part of the UXO Risk Assessment. This includes mitigation strategies to avoid pUXOs in the first instance, removing risk receptors or threat sources if required.</p>	Risk is ALARP
Floating WTG breaking free of moorings	Population and human health, biodiversity, material assets	<b>Appendix 14.1 Navigational Risk Assessment</b>	<ul style="list-style-type: none"> <li>TPV of the mooring systems</li> <li>GPS monitoring</li> </ul>	Risk is ALARP
Workplace Accidents	Population and human health	<b>N/A</b>	<ul style="list-style-type: none"> <li>Qualified staff</li> <li>Appropriate and maintained equipment, plant and vessels</li> <li>Provision of first aid and safety equipment</li> </ul>	Risk is ALARP

## 7 References

Department for Environmental Food and Rural Affairs (2011), Guidelines for Environmental Risk Assessment and Management Green Leaves III, Revised Departmental Guidance. Prepared by Defra and the Collaborative Centre of Excellence in Understanding and Managing Natural and Environmental Risks, Cranfield University.

Department for Environmental Food and Rural Affairs (2011). The UK Marine Policy Statement ('the MPS') [online]. Available at [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/69322/pb3654-marine-policy-statement-110316.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69322/pb3654-marine-policy-statement-110316.pdf). Accessed March 2022.

Department for Environment, Food and Rural Affairs and Met Office, 2021. UK Climate Projections: Headline Findings [online]. Available at <https://www.metoffice.gov.uk/research/approach/collaboration/ukcp>. Accessed March 2022.

Department of the Environment, Transport and the Regions (DETR) (1999) Guidance on the Interpretation of Major Accident to the Environment for the Purposes of the COMAH Regulations Available at: <https://www.sepa.org.uk/media/219153/detr-guidance-1999.pdf> Accessed November 2022

Genesis, 2016. Ettrick and Blackbird Decommissioning EIA, Prepared for: Nexen Petroleum U.K. Limited [online]. Available at [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/581530/Ettrick\\_and\\_Blackbird\\_EIA.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/581530/Ettrick_and_Blackbird_EIA.pdf). Accessed March 2022.

Hse.gov.uk. 2015. Construction - Construction (Design and Management) Regulations 2015 (CDM 2015). [online] Available at <https://www.hse.gov.uk/construction/cdm/2015/index.htm> Accessed March 2022.

Hse.gov.uk. 2015. The Control of Major Accident Hazards Regulations 2015 [online]. <https://www.hse.gov.uk/comah/index.htm>. Accessed March 2022.

Hse.gov.uk. 2015. The Offshore Installations (Offshore Safety Directive) (Safety Case etc) Regulations 2015. Guidance on Regulations [online]. Available at: <https://www.hse.gov.uk/pubns/books/l154.htm>

Institute of Environmental Management and Assessment (IEMA) (2020). Accidents and Major Accidents and Disasters in EIA: A Primer [online]. Available at: <https://www.iema.net/resources/blog/2020/09/23/iema-major-accidents-and-disasters-in-eia-primer>. Accessed February 2022.

IEMA, 2016. EIA Quality Mark Article: Assessing Risks of Major Accidents / Disasters in EIA.

IEMA, 2017. EIA Quality Mark Article: What is this MADness?,

IEMA, 2017. EIA Quality Mark Webinar: Major Accidents and Natural Disasters in EIA.

International Maritime Organization, 1978 Protocol of 1978 relating to the International Convention for the Prevention of Pollution from Ships (MARPOL).

<https://wwwcdn.imo.org/localresources/en/KnowledgeCentre/ConferencesMeetings/Documents/MARPOL%20Protocol%20of%201978.pdf>

The International Standards Organization's ISO 31000, 2009. Risk Management – principles and guidelines.

Legislation.gov.uk, 1973. Protection of Wrecks Act 1973 [online] Available at: <https://www.legislation.gov.uk/ukpga/1973/33>. Accessed March 2022.

Legislation.gov.uk, 2004. The Civil Contingencies Act 2004 (“the Act”) and the Civil Contingencies Act 2004 (Contingency Planning) (Scotland) Regulations 2005 (“the Regulations”).  
[https://www.legislation.gov.uk/ukxi/2005/2042/pdfs/ukxi\\_20052042\\_en.pdf](https://www.legislation.gov.uk/ukxi/2005/2042/pdfs/ukxi_20052042_en.pdf)

Legislation.gov.uk. 2018. Health and Safety at Work etc. Act 1974. [online] Available at:  
<https://www.legislation.gov.uk/ukpga/1974/37>. Accessed March 2022.

Legislation.gov.uk. 2007. The Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended). Available at <https://www.legislation.gov.uk/ukxi/2007/1518>. Accessed March 2022.

Legislation.gov.uk. 2017. The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended) (Scotland) Regulations 2017. [online] Available at:  
<https://www.legislation.gov.uk/ssi/2017/115/made>. Accessed March 2022.

Legislation.gov.uk. 1999. the Management of Health and Safety at Work Regulations 1990 [online] Available at: <https://www.legislation.gov.uk/ukxi/1999/3242/made>. Accessed March 2022.

Legislation.gov.uk. 2015. The Offshore Installations (Offshore Safety Directive) (Safety Case etc.) Regulations 2015 Statutory Instrument 2015 No. 398 [online] Available at:  
<https://www.legislation.gov.uk/ukxi/2015/398/contents/made>

MCA & HSE (2017). Regulatory Expectations on Moorings for Floating Wind And Marine Devices. Amendment 2. Southampton: MCA.

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/640962/Regulatory\\_expectations\\_on\\_mooring\\_devices\\_from\\_HSE\\_and\\_MCA.PDF](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/640962/Regulatory_expectations_on_mooring_devices_from_HSE_and_MCA.PDF)

Offshore Major Accident Regulator (OMAR) (2018). Memorandum of Understanding between The Offshore Petroleum Regulator for Environment and Decommissioning (OPRED) and The Health and Safety Executive





Royal HaskoningDHV is an independent, international engineering and project management consultancy with over 138 years of experience. Our professionals deliver services in the fields of aviation, buildings, energy, industry, infrastructure, maritime, mining, transport, urban and rural development and water.

Backed by expertise and experience of 6,000 colleagues across the world, we work for public and private clients in over 140 countries. We understand the local context and deliver appropriate local solutions.

We focus on delivering added value for our clients while at the same time addressing the challenges that societies are facing. These include the growing world population and the consequences for towns and cities; the demand for clean drinking water, water security and water safety; pressures on traffic and transport; resource availability and demand for energy and waste issues facing industry.

We aim to minimise our impact on the environment by leading by example in our projects, our own business operations and by the role we see in “giving back” to society. By showing leadership in sustainable development and innovation, together with our clients, we are working to become part of the solution to a more sustainable society now and into the future.

Our head office is in the Netherlands, other principal offices are in the United Kingdom, South Africa and Indonesia. We also have established offices in Thailand, India and the Americas; and we have a long standing presence in Africa and the Middle East.