TotalEnergies E&P North Sea UK Ltd

Culzean - Floating Offshore Wind Turbine Pilot Project

Appendix B: Major Accidents and Disasters

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CONTENTS

ACRONYMS AND ABBREVIATIONS

ACRONYM	DEFINITION
ALARP	As Low As Reasonably Practicable
BWM	Ballast Water Management
CAA	Civil Aviation Authority
CaP	Cable Plan
CBRA	Cable Burial Risk Assessment
CDM	Construction Design and Management
CEMP	Construction Environmental Management Plan
CMS	Construction Method Statement
CoCP	Code of Construction Practice
COLREGS	Compliance with the International Regulations for the Prevention of Collision at Sea
COMAH	Control of Major Accident Hazards
COSHH	Control of Substances Hazardous to Health
DGC	Defence Geographic Centre
DSLP	Development Specification and Layout Plan
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EMP	Environmental Management Plan
ERCoP	Emergency Response Cooperation Plan
FLO	Fisheries Liaison Officer
FSA	Formal Safety Assessment
HAZID	Hazard Identification
HSE	Health, Safety and Environment
IALA	International Association of Marine Aids
IEMA	Institute of Environmental Management and Assessment

ACRONYM	DEFINITION
IMO	International Maritime Organization
INNS	Invasive Non-Native Species
LMP	Lighting and Marking Plan
m	Metres
MARPOL	The International Convention for the Prevention of Pollution from Ships
MD-LOT	Marine Directorate – Licensing and Operations Team
MGN	Marine Guidance Note
MMMP	Marine Mammal Mitigation Plan
MoD	Ministry of Defence
NOTAM	Notice to Airmen
NRA	Navigational Risk Assessment
NRR	National Risk Register
NSRA	National Security Risk Assessment
NSP	Navigational Safety Plan
NtMs	Notice to Mariners
OEMP	Operational Environmental Management Plan
PDE	Project Design Envelope
PEMP	Project Environmental Monitoring Programme
PLL	Potential Loss of Life
RAMS	Risk Assessment and Method Statement
SAR	Search and Rescue
SOLAS	Safety of Life at Sea
SOPEP	Ship Oil Pollution Emergency Plan
TEPNSUK	TotalEnergies Exploration and Production North Sea UK Limited
UK	United Kingdom

ACRONYM	DEFINITION
UKHO	UK Hydrographic Office
UXO	Unexploded Ordnance
VMC	Visual Meteorological Conditions
VMP	Vessel Management Plan
WTG	Wind Turbine Generator

1 INTRODUCTION

This appendix assesses the risk of major accidents and/or disasters associated with the Culzean Floating Offshore Wind Turbine Pilot Project (the 'Project'), during construction, operation and maintenance, and decommissioning.

This appendix has been produced in accordance the Institute of Environmental Management and Assessment (IEMA) (2020) guidance: Major Accidents and Disasters in Environmental Impact Assessment (EIA): A Primer.

Major accidents and/or disasters assessed can either be internal i.e., those caused by the Project, or, external i.e., those not caused by the project but those which have the potential to interact with the Project to cause a major accident and/ or disaster.

In order to define the risks assessed, IEMA (2020) guidance defines major accidents and disasters as:

- Major accidents: *"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., fatalities or injury from blade failure) may be the same and therefore many mitigation measures will apply to both deliberate and accidental events"*; and
- Disasters: *"may be 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."*

2 LEGISLATION, POLICY AND GUIDANCE

In addition to those described in Chapter 2: Legislation and Policy of this EIA Report (EIAR), the following key relevant legislation, strategy and guidance relating to the assessment of Major Accidents and/or Disasters was used in the preparation of this appendix:

Schedule 1 of the EIA Regulations (as defined in Chapter 2: Legislation and Policy)[1] require the EIA to consider matters relevant to whether or not an Annex II project is likely to have significant effects on the environment, including:

"The characteristics of the project, having regard, in particular, to— the risk of accidents, having regard in particular to substances or technologies used."

Other relevant legislation and policy include:

- Legislation:
  - Health and Safety at Work etc. Act 1974 - The Health and Safety at Work Act is the primary legislation covering workplace health and safety in the UK. The Act aims to ensure, in so far as is reasonably practicable, that persons at work are not exposed to risks to their health and safety;
  - The Management of Health and Safety at Work Regulations 1999 - These regulations reinforce the Health and Safety Act 1974. They make explicit what employers are required to do to manage health and safety. The regulations place a set of duties on employers and employees to maintain a safe and healthy workplace;
  - The Construction (Design and Management) (CDM) 2015 Regulations - The CDM Regulations are the main set of regulations for managing the health, safety and welfare of construction projects. The Regulations place specific duties on clients, designers, contractors and workers, so that health and safety is considered throughout the life of a construction project from its inception to its subsequent final demolition and removal;
  - The Control of Major Accident Hazards (COMAH) Regulations 2015 – The COMAH Regulations are intended to prevent industrial major accidents and to limit their consequences to people and the environment. The Regulations lay down rules for the prevention of major accidents which might result from certain industrial activities sites involving the production, use or storage of dangerous substances at or above certain thresholds, and the limitations of their consequences; and
  - The Control of Substances Hazardous to Health (COSHH) Regulations 2002 - Chemicals and other hazardous substances at work result in ill health, the COSHH Regulations require employers to control exposure to hazardous substances to prevent ill health.
- Policy:
  - Scottish National Marine Plan (2015):
    - Prepared in accordance with the United Kingdom (UK) Marine Policy Statement, 2010, which outlines the framework for marine plans for the UK marine environment.

[1] *As defined in chapter 2: Legislation and Policy, the 'EIA Regulations' encompass The Marine Works (Environmental Impact Assessment) Regulations 2007.*

- Guidance:
  - IEMA (2020): Major Accidents and Disasters in EIA: A Primer; and
  - International Maritime Organization (IMO) (2018): Revised Guidelines for Formal Safety Assessment (FSA) for use in the IMO Rule-Making Process.

In addition to the above legislation, policy and guidance, the 2023 National Risk Register (NRR) (HM Government, 2023) is the external version of the National Security Risk Assessment (NSRA), which is the government's assessment of the most serious risks facing the UK. The document assesses the likelihood for the identified risks to occur. Relevant risks within this register which are applicable to the Project are incorporated into the assessment presented within this Appendix.

3 SCOPING AND CONSULTATION

Scoping and consultation has been ongoing throughout the EIA process and has played an important part in ensuring the scopes of the baseline characterisation and impact assessment are appropriate with respect to the Project and the requirements of the regulators and their advisors.

The Scoping Opinion received for the Project provided advice from Scottish Ministers (via the Marine Directorate – Licensing and Operations Team (MD-LOT)) for the consideration of major accidents and/ or disasters within the EIAR, as detailed in Table 3-1.

Table 3-1 Scoping Opinion responses from Scottish Minister relevant to consideration of major accidents and/ or disasters

SCOPING OPINION REFERENCE	COMMENT	RESPONSE
3.4.1	The EIA Report must include a description and assessment of the likely significant effects 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', as noted within section 5.6.2 of the Scoping Report, to better understand the likelihood of an occurrence and the Proposed Development 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 potential to cause an accident or disaster.	As described in the IEMA (2020) 'Major Accidents and Disasters in EIA: A Primer guidance', major accidents refer to low likelihood high consequence events that threaten immediate or delayed serious environmental effects to human health, welfare and/or the environment and requires the use of resources beyond those of the client or its appointed representatives (i.e., contractors) to manage. In line with IEMA Guidance on Major Accidents and Disasters in EIA, this Appendix provides a summary of the likelihood of an occurrence and the Project susceptibility and vulnerability to potential major accidents and hazards as well as the potential of the Project to cause an accident or disaster. The Project has been designed to operate within the marine environment and relevant extreme environmental conditions (e.g., storm events) for the lifetime of the Project have been considered in the Project design. The Project will not include any large inventories of hazardous material that could be released in the event of a natural disaster. Risk reduction will continue to be refined during detailed engineering design, to ensure that a hierarchy of controls are in place through the various management plans and method statements.
3.4.2	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.	
3.4.3	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.	

4 ASSESSMENT METHODOLOGY

The assessment of the Project's vulnerability to major accidents and/or disasters has followed the methodology set out in the IEMA (2020) guidance. The assessment of major accidents and/or disasters involves three key steps:

1. Screening (section 4.1);
2. Scoping (section 4.2); and
3. Assessment (section 6).

4.1 Screening

A screening exercise is undertaken to identify if the Project has a vulnerability to major accidents and/or disasters and to consider whether a development could lead to a significant effect on receptors. Both internal and external risks (as defined in Section 1) are considered at a high-level only, without the need for evidence at this stage.

Based on the above criteria, it has been assessed that the Project is potentially vulnerable to major accidents and/or disasters, and this vulnerability requires further assessment within this appendix.

4.2 Scoping

The scoping stage considers the potential vulnerability of a project to major accidents and/or disasters in further detail by considering the development location, type, context, existing and future constraints and likely receptors.

The IEMA (2020) guidance states that the scope of the assessment should focus on low likelihood and high consequence hazards for the following reasons:

- Low likelihood, low consequence hazards are addressed in receptor assessments within the EIAR, where relevant (e.g., leaks and spills at construction sites); and
- High likelihood, high consequence hazards should already be designed-out by the developer.

In line with the above, a list of potential internal or external hazards and receptors is collated, based on existing sources of hazard/ risk assessments (e.g., Hazard Identification (HAZID) workshops, CDM Risk Register etc.). Hazards can then be scoped in and out through the following key considerations:

- Major accidents and/or disasters can be scoped out for the following reasons:
  - There is no source-pathway-receptor linkage of a hazard that could trigger a major accident and/or disaster or potential for the development to lead to a significant environmental effect; and
  - All possible major accidents and/or disasters are adequately covered elsewhere or covered by existing embedded mitigation measures or compliance with legislation and best practice.

The scoping process is highlighted in Figure 4-1 and Section 6 outlines the internal and external hazards scoped in and out for the assessment of major accidents and/or disasters.

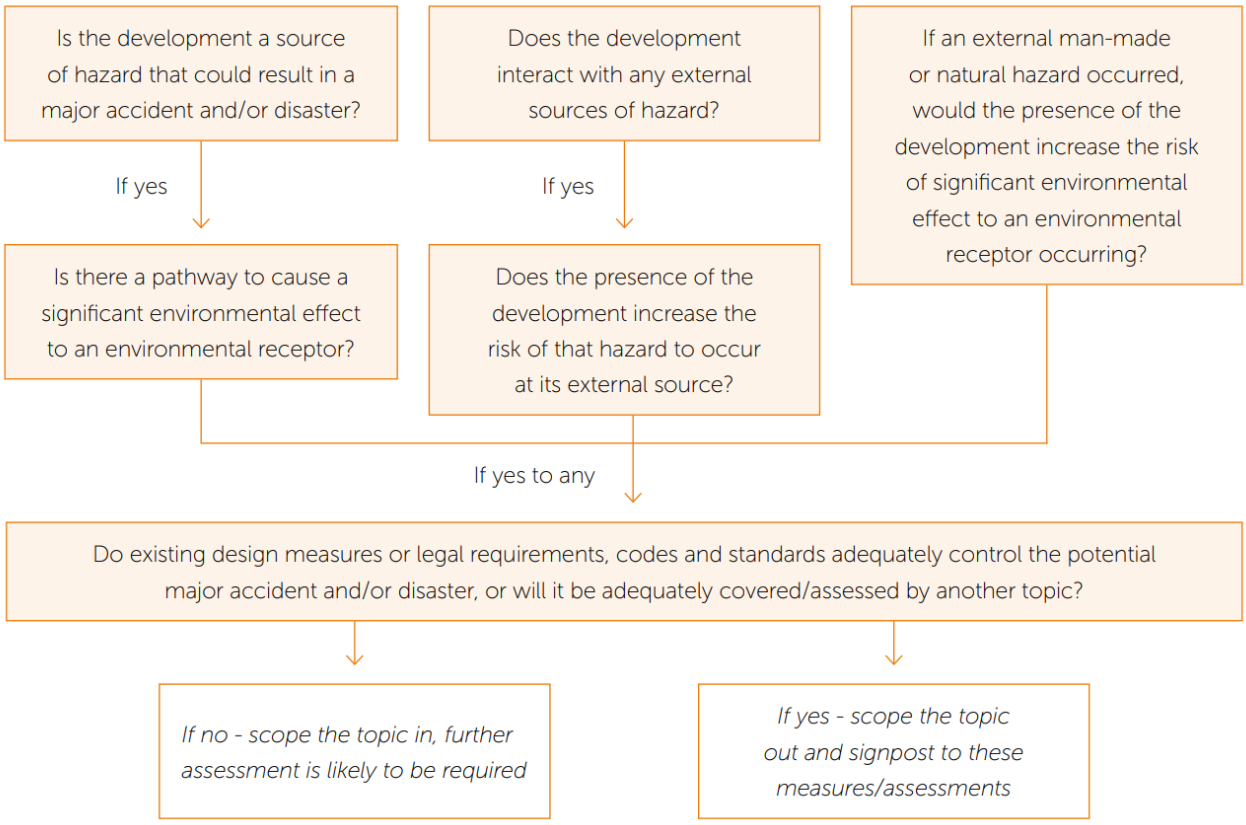

Figure 4-1 Scoping decision flow chart (IEMA, 2020)

The assessment stage involves the following key steps:

- Identify hazards (based on the worst case grouped risk event[2]);
- Assess hazards through assigning a likelihood and consequence to determine resultant risks;
- Identify secondary mitigation measures for unacceptable risks; and
- if, a residual risk still occurs with additional mitigation, further assessment and additional mitigation will be necessary to eliminate or reduce the risk to acceptable levels.

[2] *Risk events are unplanned events with the potential to result in a major accident and/or disaster and these are the subject of the risk assessment. A grouped risk event is a combined term that represents all sources and pathways that could lead to a major accident and/or disaster on a particular receptor.*

The assessment methodology is informed by the FSA process (IMO, 2018), which aims to ensure risks are reduced to As Low As Reasonably Practicable (ALARP). As such the methodology differs slightly from that presented in chapter 6: EIA methodology.

4.2.1 Likelihood

The likelihood of the reasonable worst-case consequence occurring relates both to the likelihood of the grouped risk event and the likelihood of the receptor being affected, and in both instances, embedded mitigation is taken into account. The likelihood criteria are set out in Table 4-1 and are based on FSA criteria (IMO, 2018).

Table 4-1 Likelihood criteria

LIKELIHOOD	DEFINITION
Negligible	Less than 1 occurrence per 10,000 years.
Extremely unlikely	1 occurrence per 100 to 10,000 years.
Remote	1 occurrence per 10 to 100 years.
Reasonably probable	1 occurrence per 1 to 10 years.
Frequent	Yearly occurrence.

4.2.2 Consequence

The reasonable worst case consequence is identified for each grouped risk event, using professional judgement. The worst case consequence is then assessed against the criteria set out in Table 4-2 to understand the potential for the consequence to constitute a major accident and/or disaster. The criteria for assigning consequence have been informed by FSA criteria (IMO, 2018) and are provided separately for each group of receptors: people and human health, material assets, and environment.

Table 4-2 Consequence criteria

SEVERITY OF CONSEQUENCE	DEFINITION
Negligible	**All receptors:** No perceptible effect
Minor	**Population and human health:** Minor injury or very short term health concerns. **Material assets:** Minor damage. **Environment:** Local (on site) assistance required.

SEVERITY OF CONSEQUENCE	DEFINITION
Moderate	**People and human health:** Multiple minor injuries or injuries resulting in medium health concerns (e.g., multiple days off work). **Material assets:** Damage to a level that is not critical to operations. **Environment:** Limited external assistance required.
Serious	**Population and human health:** Single fatality or injury resulting in permanent disability. **Material assets:** Damage to a level that results in a critical impact on operations. **Environment:** Regional assistance required.
Major	**Population and human health:** Multiple fatalities or injuries resulting in permanent disability. **Material assets:** Total loss of asset. **Environment:** National assistance required.

4.2.3 Risk Ranking

The tolerability matrix used to determine the significance of effects from the frequency of occurrence and the severity of consequences is presented in Table 4-3. The risks are ranked as low (broadly acceptable), intermediate (tolerable with mitigation) and high (unacceptable). Low and intermediate risks are considered to be managed to an acceptable level. High risks are considered to be unacceptable.

Table 4-3 Tolerability matrix

CONSEQUENCE	MAJOR	Tolerable with mitigation	Tolerable with mitigation	Unacceptable	Unacceptable	Unacceptable
	SERIOUS	Broadly acceptable	Tolerable with mitigation	Tolerable with mitigation	Unacceptable	Unacceptable
	MODERATE	Broadly acceptable	Broadly acceptable	Tolerable with mitigation	Tolerable with mitigation	Unacceptable
	MINOR	Broadly acceptable	Broadly acceptable	Broadly acceptable	Tolerable with mitigation	Tolerable with mitigation
	NEGLIGIBLE	Broadly acceptable	Broadly acceptable	Broadly acceptable	Broadly acceptable	Tolerable with mitigation
		NEGLIGIBLE	EXTREMELY UNLIKELY	REMOTE	REASONABLY PROBABLE	FREQUENT
		LIKELIHOOD				

5 BASELINE CHARACTERISATION

Relevant aspects of the EIAR have considered the risk of major accidents and disasters, alongside the associated risks to the environment and society. The following chapters include details on the baseline characterisation used to inform this supporting study:

- Chapter 4: Project Description;
- Chapter 12: Commercial Fisheries;
- Chapter 13: Shipping and Navigation;
- Chapter 14: Aviation and Radar;
- Chapter 15: Marine Archaeology; and
- Chapter 16: Other Sea Users.

Each of the topic-specific assessment chapters present the future baseline for that topic taking into account, for example, climate change or changes in use of the marine environment (e.g., changes in fishing practices, vessel use and developments). Nonetheless, certain climate factors have been captured within this assessment to ensure all relevant hazards and associated risks are considered.

6 HAZARD ASSESSMENT

6.1 Embedded Mitigation and management plans

As part of the Project design process, a number of designed-in measures and management plans have been proposed to reduce the potential for impacts from Major Accidents and/or Disasters (Table 6-1). As there is a commitment to implement these measures, they are considered inherently part of the design of the Project and have therefore been considered in the assessment presented below.

Table 6-1Embedded Mitigation and Management Plans

EMBEDDED MITIGATION AND MANAGEMENT PLANS	DESCRIPTION
MITIGATION	
Minimum air gap	Minimum air gap from mean sea level will be equal to or greater than the minimum 22 metres (m) required to comply with Search and Rescue (SAR) requirements. This is to reduce potential risks to ornithological receptors.
Micro-siting of WTG and associated offshore infrastructure including cable route	The final Project layout will be presented within the Cable Plan (CaP) and Development Specification and Layout Plan (DSLP) and conditions of the marine licence. The final placement of anchors and export cable will be informed through micro siting based on available site survey data to ensure avoidance of sensitive habitats, archaeological and other structures where possible. Where this is not possible, the route will take the shortest distance possible through the sensitive areas to reduce environmental effects.
Reducing localised habitat loss	Best practice will be followed to ensure that potential habitat loss is minimised throughout the proposed works (e.g. Micro-siting and minimising the benthic footprint of the Project). The amount of rock used to protect the offshore export cable or as scour protection will be kept to a minimum where possible.
Removal of marine growth	The substructure will be designed to accommodate marine growth; however, to manage weight / drag-induced fatigue, growth levels will be inspected regularly, and subsequent removal of this growth will be undertaken using water jetting tools if substantial accumulation is in evidence.
Removal of debris from floating lines and cables	Mooring lines and the floating cable will be inspected with a risk-based frequency during the operational life cycle of the Project, starting at a higher frequency and likely declining after several years, based on evidence gathered during inspections. Any inspected or detected debris on the floating lines and cable will be recovered based on a risk assessment which considers impact on environment, risk to asset integrity and cost of intervention.
Application of scour protection	The Project Design Envelope (PDE) includes the installation of scour protection around the anchors. This will therefore negate the introduction of scour during the Project operation stage. The potential scale and requirement for scour protection will be informed by ongoing inspection surveys and the selected anchor solution.

EMBEDDED MITIGATION AND MANAGEMENT PLANS	DESCRIPTION
MITIGATION	
Charting requirements	Prior to construction, the position and final height of the Wind Turbine Generator (WTG) will be provided to the UK Hydrographic Office (UKHO), Ministry of Defence (MoD), and Defence Geographic Centre (DGC) for aviation and nautical charting purposes. The height will be charted on aeronautical charts and reported to the DGC, which maintains the UK's database of tall structures (digital vertical obstruction file) at least ten weeks prior to construction. The Project infrastructure, including the cable, mooring lines, anchoring points, as well as the WTG and floating substructure, will be plotted and provided to other sea users to be uploaded on their charts.
Promulgation of information as per marine licence requirements and standard industry practice.	As per required marine licence conditions, the details of the Project's activities will be promulgated in advance of, and during, construction via channels such as notices to mariners and kingfisher bulletins to ensure shipping and navigation users are informed about ongoing and upcoming works.
Fisheries Liaison Officer (FLO)	A TotalEnergies Exploration and Production North Sea UK Limited (TEPNSUK) FLO will be appointed to establish effective communications surrounding the Project with local fishermen and other sea users. The FLO will distribute information on the safe operations of fishing activities at the site and will be a contact for fishermen and other sea users during the lifetime of the Project.
Target depth of lowering	Static cables will be trenched and buried to a minimum target depth of 0.6 m. Where this cannot be achieved, remedial cable protection will be applied. The cable burial target depth will be informed by a Cable Burial Risk Assessment (CBRA) and implemented through the CaP produced post-consent.
Nacelle, tower, and rotor design	The nacelle, tower, and rotor are designed and constructed to contain leaks thereby reducing the risk of spillage into the marine environment.
Marine Guidance Note (MGN) 654 compliance	The Project will comply with MGN 654 and its annexes as per its marine licence conditions to ensure that impacts on navigational safety and emergency response are considered, assessed, and mitigated where necessary. This includes post-consent completion of the search and rescue checklist which includes the completion of an Emergency Response Cooperation Plan (ERCoP).
Any temporary obstacles associated with wind farms which are of more than 91.4 m in height are to be alerted to aircrews through the Notice to Airmen (NOTAM) system.	Consultation with the Civil Aviation Authority (CAA) will be required to ensure that temporary obstacles of more than 91.4 m are identified to aircrews by NOTAM. Notification of temporary obstacles will be a condition of the marine licence. Measures will be adopted to ensure that the potential risk of aircraft collision with construction, operation and maintenance, and decommissioning infrastructure is minimised.
Post-consent application for safety zones	The floating WTG is being treated as a supplementary unit under the Health, Safety and Environment (HSE) Offshore Installations and Pipeline Works (Management and Administration) Regulations 1995 and as such, TEPNSUK are applying for a 500 m safety exclusion zone centred around the WTG. In addition, a 500-m advisory safety zone will also be requested around project vessels (e.g. During cable-laying).

EMBEDDED MITIGATION AND MANAGEMENT PLANS	DESCRIPTION
MITIGATION	
Adherence with the International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 (Ballast Water Management (BWM) convention)	Ballast water discharges from vessels will be managed under the BWM Convention which aims to prevent the spread of harmful aquatic organisms from one region to another, by establishing standards and procedures for the management and control of ships' ballast water and sediments. Measures will be adopted to ensure that the risk of invasive non-native species introduction during construction, operation and maintenance, and decommissioning is minimised.
Procedures for dropped objects and claim processes for loss / damage to fishing gear / vessels.	Protocols and procedures for dropped objects will be adhered to in order to minimise the risk to navigation from large, dropped objects associated with the Project.
International Regulations for the Prevention of Collision at Sea (ColRegs) and the International Regulations for the Safety of Life at Sea (SOLAS).	All vessels will comply with the provisions of the ColRegs and the SOLAS, including the display of appropriate lights and shapes such as when vessels are restricted in their ability to manoeuvre.
Adherence to the International Convention for the Prevention of Pollution from Ships (MARPOL)	All vessels will operate in adherence with MARPOL requirements. Accordance with this will help to ensure that the potential for release of pollutants is minimised during operations.
Review and Revise Helicopter Landing Certificates for the Culzean platform and Ailsa FSO facility.	Revision of Helicopter Landing Certificates will ensure that low-visibility procedures into the Culzean and Ailsa helicopter platforms continue to be carried out safely, or, if needed, be restricted to Visual Meteorological Conditions (VMC) only.
MANAGEMENT PLANS	
Environmental Management Plan (EMP)	The EMP will provide the over-arching framework for on-site environmental management during the phases of development as follows: • All construction as required to be undertaken before the commissioning of the Project • The operational lifespan of the Project from Commissioning until the cessation of electricity generation (environmental management during decommissioning is addressed by the Decommissioning Programme). The EMP will be in accordance with the Application insofar as it relates to environmental management measures. The EMP will set out the roles, responsibilities and chain of command in respect of environmental management for the protection of environmental interests during the construction and operation of the Project. It will address (but not be limited to) the following overarching requirements for environmental management during construction: • Mitigation measures as identified in the Application, pre-consent and pre-construction monitoring or data collection

EMBEDDED MITIGATION AND MANAGEMENT PLANS	DESCRIPTION
MITIGATION	
	• A pollution prevention and control method statement, including contingency plans; • Management measures to prevent the introduction of Invasive Non-Native Species (INNS); • A site waste management plan (dealing with all aspects of waste produced during the construction period), including details of contingency planning in the event of accidental release of materials which could cause harm to the environment. Wherever possible the waste hierarchy of reduce, reuse and recycle will be referred to; and • The reporting mechanisms that will be used to provide the Scottish Ministers and relevant stakeholders with regular updates on construction activity, including any environmental issues that have been encountered and how these have been addressed. The EMP will be regularly reviewed by the Company at intervals agreed by the Scottish Ministers and will be updated based on current information on construction methods and operations. The EMP will be informed, so far as is reasonably practicable, by the baseline monitoring or data collection undertaken as part of the Application and the Project Environmental Monitoring Programme (PEMP) to ensure that all construction and operation activities are carried out in a manner that minimises their impact on the environment, and that mitigation measures contained in the Application, or as otherwise agreed are fully implemented.
Project Environmental Monitoring Programme (PEMP)	A PEMP will be developed to provide further evidence to support these conclusions of the EIA and to provide information on the environmental research initiatives for the Project to allow information to be obtained for future offshore wind farm developments.
Construction Method Statement (CMS)	A CMS will be developed in accordance with the EMP and detail how project activities and plans identified within the EMP will be carried out, whilst also highlighting any possible dangers / risks associated with specific Project activities. The CMS will include the Code of Construction Practice (CoCP) which will set out the approach to how construction activities will be managed and controlled in order to deliver the commitments and mitigation arising from Project.
ERCoP	An ERCoP will be in place for the Project. The ERCoP will detail the key roles and responsibilities and protocols to be established in the event of an emergency during the lifetime of Project related activities.
CaP and CBRA	A CaP will be provided for the Project which will detail the location, duration / route and cable laying techniques of export cable and detail the methods for cable surveys during its operational life. This will be supported by survey results from the geotechnical, geophysical, and benthic surveys. The CaP will also detail the electromagnetic fields of the cables deployed.

EMBEDDED MITIGATION AND MANAGEMENT PLANS	DESCRIPTION
MITIGATION	
	A CBRA will also be undertaken and included within the CaP which will detail cable specifications, cable installation, cable protection, target burial depths / depth of lowering and any hazards the cable will present during the lifetime of the cable.
Vessel Management Plan (VMP)	A VMP will be prepared for the Project which will detail the number, type and specification of vessels utilised during construction and operation. This will also detail how vessel management is coordinated and the ports and transit corridors proposed.
Navigational Safety Plan (NSP)	A NSP will be developed for the Project which will detail all navigational safety measures, construction exclusion zones if required, notices to mariners and radio navigation warnings, anchoring areas, lighting and marking requirements and buoyage during all phases of the project.
Lighting and Marking Plan (LMP)	A LMP will be developed for the Project. This will provide that the Project site be lit and marked in accordance with the current CAA and MoD aviation lighting policy and guidance. The LMP will also detail the navigational lighting requirements detailed in International Association of Marine Aids (IALA) R139 and G1162.
Decommissioning Programme	A Decommissioning Programme will be provided pre-construction to address the principal decommissioning measures for the Project, this will be written in accordance with applicable guidance and detail the management, environmental management, and schedule for decommissioning.

6.2 Hazard Identification

For the purpose of this baseline, hazards are defined as something with the potential to cause harm, that could result in a major accident and/or disaster occurring. A risk is the likelihood of an impact occurring, combined with the effect or consequence(s) of the impact on a receptor if it does occur.

In line with the Scoping Stage (as described in section 4.2) a number of internal and external hazards have been collated through review of the EIAR receptor assessments, internal risk registers such as the Project Hazard HAZID workshop, CDM Risk Register and the NRR (HM Government, 2023). The following sections present those hazards which have been scoped in to, and out of, the assessment.

6.2.1 Hazards Requiring Assessment

The hazards identified as requiring consideration within the assessment of major accidents and/or disasters are listed in Table 6-2.

Table 6-2 Hazards scoped into the assessment

HAZARD	SOURCE[3]		RECEPTOR(S)	JUSTIFICATION
	INTERNAL	EXTERNAL		
External interference – cable snagging	×	✓	Population and human health / material asset	There is a risk of a third-party vessel snagging or damaging the offshore export cable. As described in chapter 12: Commercial Fisheries, snagging of fishing gear on Project infrastructure may result in potential injury, fatalities, damage to assets and/or vessels.
External interference – third-party vessel or aviation collision and allision	×	✓	Population and human health / material asset	It is possible that third-party vessel or aviation collision could impact on the Project or Project vessels, either on site or in transit to site. The presence of Project vessels and infrastructure may increase encounters and collision risk for third-party vessels and aviation receptors in the area. This risk could result in potential injury, fatalities, damage to assets and/or vessels. Chapter 13: Shipping and Navigation includes information on potential third-party vessel collisions and allisions with Project infrastructure or vessels and chapter 14: Aviation and Radar outlines the potential impact of the Project to aviation receptors, including on low-flying aircrafts.
Transport accidents –vessel or aviation collision	✓	×	Population and human health / material asset	There is the potential for accidents to occur on transiting Project vessels or helicopters transporting equipment or personnel which could lead to fatalities or injury to Project personnel or third-parties, and damage to Project and/or third-party infrastructure and vessels. Chapter 13: Shipping and Navigation includes information on potential third-party vessel collisions with Project vessels.
Climate hazards[4]	×	✓	Population and human health/ material asset.	It is possible for the Project to be vulnerable to climate hazards. For example, extreme weather events (e.g., lighting strikes, high winds and storm surges) could increase the likelihood of a major accident and/or disaster for transiting Project or third-party vessels, Project personnel, or result in a loss of structural integrity of the Project infrastructure. This could pose a health and safety risk to people, and damage Project and/or third party infrastructure and vessels.

[3] Internal source refers to the potential for the Project to cause a major accident and/or disaster and external source refers to the potential for the Project to interact with an external hazard to increase the risk of a major accident and/or disaster

[4] Any potential welfare effects on works due to ambient weather conditions will be managed by existing health and safety protocols and this hazard is not considered further within this supporting study.

HAZARD	SOURCE[3]		RECEPTOR(S)	JUSTIFICATION
	INTERNAL	EXTERNAL		
Electrical / system or process failures	✓	✓	Population and human health / material asset.	There is a risk of an unexpected electrical and/or process or system failure resulting in a major accident or disaster, for example, through the malfunction of equipment (e.g., loss of blade at sea, breaking of a mooring line resulting in loss of station etc.), or through a fire or explosion (as a result of an electrical fault and the presence of combustibles or explosion hazards). If a major accident and/or disaster were to arise from an electrical or system failure, this could pose a health and safety risk to Project personnel and third parties and potentially damage Project and/or third-party infrastructure and vessels.
External industrial hazards (i.e., major accidents at a nearby development)	×	✓	Population and human health/ material asset.	Due to the proximity of the Project to the Culzean platforms to the Project location, there is a risk of a major accident at the platforms which could result in compromising the integrity of the Project infrastructure and Project personnel in the vicinity of the platforms.
Ground hazards – Unexploded Ordnance (UXO)	×	✓	Population and human health / environment / material asset	As discussed in Chapter 4: Project Description, no UXO were detected during Project site-specific surveys with a magnetometer. Nonetheless, UXO have been identified previously in the area and one detonation occurred following Culzean platform pre-construction surveys in 2017. Therefore, there is the potential for UXO to be unintentionally encountered, which would pose a health and safety risk to people, and potential damage to Project and/or third party infrastructure and vessels. Additionally, accidental UXO detonation could pose a risk of injury, mortality or disturbance to marine ecology receptors.

6.2.2 Hazards Scoped Out of the Assessment

The hazards scoped out of the assessment, and the justification for this, are listed in Table 6-3. Generally, it is considered that the risks associated with the development of WTGs are well understood and adequately managed through existing processes and risk assessments, such as the CDM Regulations and best practice. All elements of risk will be assessed once the Project Design Envelope has been further refined, and the appointed CDM engineer will ensure that all Project design choices comply with the requirements under the CDM Regulations. Other hazards scoped out for further assessment are adequately covered by existing embedded mitigation measures and management plans outlined in section 6.1.

Table 6-3 Hazards scoped out of the assessment

HAZARD	SOURCE		RECEPTOR(S)	JUSTIFICATION
	INTERNAL	EXTERNAL		
Marine pollution	✓	×	Population and human health / environment	There is the potential for the Project to result in marine pollution events through the accidental release of hazardous substances contained within the WTG and vessels. The risk and impact of accidental releases of hazardous substances will be reduced given the scale of the Project and through the implementation of the EMP, including measures for compliance with international requirements of MARPOL, as well as best practice for works in the marine environment (e.g., preparation of Ship Oil Pollution Emergency Plan (SOPEP)). In this manner, accidental release of potential contaminants from construction vessels will be strictly controlled and procedures will be in place to minimise the impact of any accidental release if it occurs. Therefore, possible major accidents and/or disasters are adequately covered by existing embedded mitigation measures and compliance with legislation and best practice. The Project is not considered to be vulnerable to pollution and contamination and this hazard has not been assessed further.
Natural disasters	×	✓	Population and human health / material asset.	Natural disasters (such as earthquakes) are identified within the NRR (HM Government, 2023). Nonetheless, although earthquakes in the UK are moderately frequent, they are extremely unlikely to be of a magnitude that would result in large amounts of damage that would constitute a major accident and or disaster for the Project. Other natural disasters such as volcanic eruptions or severe space weather (e.g. solar flares) are not a credible risk for the Project due to a lack of pathway to result in a major accident and or disaster. As such the vulnerability of the Project is extremely low for this hazard and as such this hazard is not considered further.
Workplace accidents	✓	×	Population and human health / material asset.	Potential workplace accidents (e.g., falling from height) will be managed through existing health and safety protocols. Therefore, possible major accidents and/or disasters are adequately covered by existing health and safety measures and compliance with legislation and best practice. This hazard has not been assessed further.

HAZARD	SOURCE		RECEPTOR(S)	JUSTIFICATION
	INTERNAL	EXTERNAL		
Malicious maritime incident and cyber security attacks	✖	✓	Population and human health / economics	The Project will not be publicly accessible without specialist vehicles and equipment to enable malicious attacks. Additionally, in terms of cyber security risks, network segmentation will be implemented where practical and systems will be monitored, and software kept up to date in compliance with industry best practice, guidelines and procedures. As such, there is no source-pathway-receptor linkage that could trigger a major accident and/or disaster. Other potential attacks on a regional, national or international scale are considered to be adequately controlled through existing protocols, legislation, policy and strategy. Therefore, this hazard has not been assessed further.
Pandemics or outbreak of disease	✖	✓	Population and human health	The Project will not cause the outbreak of diseases given the nature of the development. Should another pandemic arise, Project personnel will comply with the relevant government guidance and risk assessments to ensure that no significant consequence to Project personnel. As such the Project is not vulnerable and this hazard is not assessed further.

7 RISK ASSESSMENT

A risk assessment has been undertaken for the Project across all stages to assess if any of the hazards identified would result in significant risk on receptors with the embedded mitigation and management plans in place, see Table 7-1 below. All risk events are assessed as being **broadly acceptable** or **tolerable with (embedded) mitigation** as outlined in Table 7-1. Therefore, with the implementation of embedded mitigation measures, all risks are at an acceptable level and no secondary mitigation or further residual assessment is necessary.

Table 7-1 Assessment of vulnerability of the Project to major accidents and/or hazards

RISK EVENT	SOURCE AND/OR PATHWAY	RECEPTOR(S)	SOURCE DOCUMENT / CHAPTER	CONSEQUENCE	LIKELIHOOD	SIGNIFICANCE OF RISK	FURTHER ASSESSMENT REQUIRED
External hazards							
External interference – cable snagging	Fishing vessels snagging on Project export cable.	Population and human health – crew on board fishing vessels	Chapter 12: Commercial Fisheries	**Serious -** Multiple serious injuries and/or fatality.	**Extremely Unlikely**- There is a low utilisation of the Project area by trawl fisheries which are more susceptible to snagging risks. As such, any potential interaction between fishing gear and the subsea infrastructure is expected to be very infrequent. The risk of snagging is reduced with the implementation of embedded mitigation measures that ensure effective liaison with all fishers through a FLO including the promulgation of information on the presence of statutory and advisory safety zones and unburied or unprotected areas of cable or wet stored cables.	Tolerable with (embedded) mitigation	No
		Material assets – commercial fishing vessels and equipment		**Serious -** Severe damage to fishing equipment and/or vessel to a level that is critical on operations.		Tolerable with (embedded) mitigation	No
		Material assets – Project infrastructure		**Serious -** Damage to Project cables resulting in cable fault that is crucial to operations.		Tolerable with (embedded) mitigation	No
External interference – third-party vessel or aviation collision	Third-party vessels or aircraft collide or allide with Project infrastructure or vessels. Increased third-party to third-party vessel collision because of the presence of Project infrastructure and/or vessels.	Population and human health – Project workforce, mariners and aircraft crew	Chapter 13: Shipping and Navigation Chapter 14: Aviation and Radar Appendix I: Navigational Risk Assessment (NRA)	**Serious -** Multiple minor injuries or injuries resulting in medium health concerns (e.g., multiple days off work). As a worst case, Potential Loss of Life (PLL) could occur.	**Extremely Unlikely -** As discussed in chapter 13: Shipping and Navigation, the existing and future levels of vessel-to-vessel collision and marine incidents within the Project area are predicted to be low. Historically, there has been one instance of a third-party vessel colliding with a project vessel associated with a UK offshore wind development, resulting in moderate vessel damage but no harm to persons. The risk of remote powered or drifting allision between third-party vessels and Project structures is remote with the implementation of embedded mitigation measures. Collision risk between third-party vessels and the Project structures and Project vessels is anticipated to be extremely unlikely and managed with embedded mitigation measures such as through the use of safety zones around vessels, Notice to Mariners (NtMs) and Project infrastructure and vessels utilising AIS and adhering to COLREGs and SOLAS. The risk of a third party aviation collision is also anticipated to be low with the implementation of embedded mitigation measures, such as aviation lighting and charting and issue of NOTAM as required.	Tolerable with (embedded) mitigation	No
		Material assets – third-party vessels and aircraft		**Moderate -** Damage to a single third-party vessel and/or aircraft that is not critical to operations.		Broadly acceptable	No
		Material assets – Project infrastructure and vessels		**Moderate -** a collision event could occur resulting in vessel or aircraft damage, pollution, and the foundering or drifting of the WTG / floater to a level that is not critical to operations.		Broadly acceptable	No

RISK EVENT	SOURCE AND/OR PATHWAY	RECEPTOR(S)	SOURCE DOCUMENT / CHAPTER	CONSEQUENCE	LIKELIHOOD	SIGNIFICANCE OF RISK	FURTHER ASSESSMENT REQUIRED
Electrical / system failures	Unexpected electrical or system failure results in loss of structural integrity (e.g., loss of blade at sea or loss of station) and/or a fire or explosion.	Material assets – Third party infrastructure	Appendix I: Navigational Risk Assessment (NRA)	**Moderate-** Damage to a single third party vessel to a level that is not critical to operations.	**Extremely unlikely -** Offshore WTGs and associated infrastructure have a very good safety record with a very low failure rate. Fire detection and control systems will be in place to prevent the escalation of fires in the unlikely event of an occurrence. Appropriate battery housing will be utilised, and flammable liquids will be stored in secure cabinets in accordance COSHH Regulations, to limit the likelihood of any ignition potential. The electrical equipment will be designed in accordance with internationally recognised design standards and maintained in accordance with best practices. Fault detection systems will be in place and built into the design e.g., use of non-corrosive materials. Additionally, regular inspections of the infrastructure (both remote and in person) will be undertaken to ensure systems and controls are working and adhered to. Such measures also include compliance with the MCA's Regulatory Expectations on Mooring for Floating Wind and Marine Devices (MCA and HSE, 2017). With these measures in place the likelihood of a system failure, loss of station, explosion or fire is extremely unlikely.	**Broadly acceptable**	No
Climate hazards	Extreme weather events (lightning strikes, high winds and storm surges) results in loss of structural integrity at the Project and/or fires and explosions.	Population and human health – Project workforce and mariners	Future baselines as presented within the EIAR topic specific chapters.	**Serious-** Multiple serious injuries and/or fatality e.g. due to crew member overboard a vessel.	**Remote –** The Project will be designed in line with best practice in order to withstand climate hazards (e.g., lighting, high winds and storm surges). Such measures include lighting rods installed on structures, remote shut down of the turbine if wind speeds exceed manufacture specifications, and no on site personnel during adverse weather conditions. Furthermore, Project workers are unlikely to be on-site for any significant length of time and daily weather and sea state forecasts will be studied to ensure it is safe for activities to commence.	**Tolerable with (embedded) mitigation**	No
		Material assets – third-party vessels		**Serious -** Damage or loss of single third-party vessel that is critical to operations.		**Tolerable with (embedded) mitigation**	No
		Material assets – Project infrastructure, vessels and aircraft		**Serious -** Severe damage to Project infrastructure, or loss or damage to a single Project vessel and/or helicopter that is critical to operations.		**Tolerable with (embedded) mitigation**	No
External industrial hazards (i.e., major accidents at a nearby development)	A major accident at the Culzean Platforms e.g., through well blow out.	Population and human health – Project workforce and mariners	Project and Culzean Platform Risk Registers	**Serious –** An accident at the Culzean platforms could lead to serious injuries and/or fatality of Project workforce in the vicinity of the Project.	**Extremely unlikely –** The oil and gas industry is heavily regulated in terms of health and safety. The potential for well blow out or other high consequence events are managed by existing protocols on board the Culzean Platforms and key legislation. Existing mitigation ensures a hierarchy of control is implemented and as such for the event to happen it would mean complete failure of all control measures which is extremely unlikely to occur.	**Tolerable with (embedded) mitigation**	No
		Material assets – Project infrastructure		**Serious -** Severe damage to Project infrastructure that is critical to operations.		**Tolerable with (embedded) mitigation**	No

RISK EVENT	SOURCE AND/OR PATHWAY	RECEPTOR(S)	SOURCE DOCUMENT / CHAPTER	CONSEQUENCE	LIKELIHOOD	SIGNIFICANCE OF RISK	FURTHER ASSESSMENT REQUIRED
Ground hazards – UXO	Accidental detonation of UXO.	Population and human health – Project workforce and mariners	Chapter 4: Project Description	**Serious -** Multiple serious injuries and/or fatality.	**Extremely unlikely** -The Project has conducted pre-construction geophysical and geotechnical surveys which have not identified the presence of UXOs within the Project area. Pre-lay surveys will be undertaken to re-establish the ground conditions ahead of construction. Standard best practice measures and control measures will be implemented to reduce the potential for an accidental detonation of UXO. However, if further mitigation such as clearance or detonation is required, this would be subject to separate assessment and applications.	Tolerable with (embedded) mitigation	No
		Material assets – third-party vessels and infrastructure		**Serious -** Severe damage to nearby assets (e.g., Culzean Platforms) that is critical to operations.		Tolerable with (embedded) mitigation	No
		Material assets – Project infrastructure		**Serious -** Severe damage to Project infrastructure that is critical to operations.		Tolerable with (embedded) mitigation	No
		Environment – marine species		**Moderate -** Injury or disturbance to marine species - limited external assistance required.		Broadly acceptable	No
Internal hazards							
Transport accidents – vessel or aviation collision	Project vessels collide with third-party structures or vessels because of equipment failure or human error.	Population and human health – Project workforce and mariners	Chapter 13: Shipping and Navigation Chapter 14: Aviation and Radar Appendix I: Navigational Risk Assessment (NRA)	**Serious -** Multiple minor injuries or injuries resulting in medium health concerns (e.g., multiple days off work). As a worst case, PLL could occur.	**Extremely unlikely -** As discussed in chapter 15: Shipping and Navigation, collision modelling undertaken estimates the collision frequency to be one in 102,000 years for base case traffic levels, representing a 1.7% change compared to the pre WTG scenario. The change is similar when applying future case traffic levels. Additionally, through adherence to embedded mitigation such as promulgation of information through NtMs, safety zones, adherence to COLREGS and SOLAS, charting and lighting, the likelihood of a project vessel collision with a third party vessel or infrastructure is considered to be extremely unlikely. There will be no helicopters deployed for the Project and as such no potential for internal collision risk of helicopters with infrastructure.	Tolerable with (embedded) mitigation	No
		Material assets - third-party vessels or infrastructure		**Moderate -** Damage to a single third-party vessel or infrastructure that is not critical to operations.		Broadly acceptable	No
		Material assets – Project vessels and infrastructure		**Moderate -** a collision event could occur during towage operations, resulting in vessel damage, pollution, and the foundering or drifting of the WTG / floater to a level that is not critical to operations.		Broadly acceptable	No

RISK EVENT	SOURCE AND/OR PATHWAY	RECEPTOR(S)	SOURCE DOCUMENT / CHAPTER	CONSEQUENCE	LIKELIHOOD	SIGNIFICANCE OF RISK	FURTHER ASSESSMENT REQUIRED
Electrical / system failures	Unexpected electrical or system failure results in loss of structural integrity (e.g., loss of blade at sea or loss of station) and/or a fire or explosion.	Population and human health – Project workforce and mariners	Project Risk Registers Appendix I: Navigational Risk Assessment (NRA)	**Serious -** Multiple severe injuries and/or fatality.	**Extremely unlikely -** Offshore WTGs and associated infrastructure have a very good safety record with a very low failure rate. Fire detection and control systems will be in place to prevent the escalation of fires in the unlikely event of an occurrence. Appropriate battery housing will be utilised, and flammable liquids will be stored in secure cabinets in accordance COSHH Regulations, to limit the likelihood of any ignition potential. The electrical equipment will be designed in accordance with internationally recognised design standards and maintained in accordance with best practices. Fault detection systems will be in place and built into the design e.g., use of non-corrosive materials. Additionally, regular inspections of the infrastructure (both remote and in person) will be undertaken to ensure systems and controls are working and adhered to. Such measures also include compliance with the MCA's Regulatory Expectations on Mooring for Floating Wind and Marine Devices (MCA and HSE, 2017). With these measures in place the likelihood of a system failure, loss of station, explosion or fire is extremely unlikely.	Tolerable with (embedded) mitigation	No
		Material assets – Project infrastructure		**Serious -** Damage or loss of station of Project infrastructure to a level that would be critical to operations.		Tolerable with (embedded) mitigation	No
		Material assets – Project vessels		**Moderate-** Damage to a single project vessel to a level that is not critical to operations.		Broadly Acceptable	No

8 CONCLUSIONS

This appendix presents an assessment of the potential major accidents and/or disasters relevant to the Project, throughout all stages of development.

Overall, there were no risks identified for the Project that could result in a major accident and/or disaster with the embedded mitigation and management plans in place. The Project will be a notifiable project for the purposes of the CDM Regulations, and the Project will require compliance with these Regulations in the design of the Project and throughout the construction process, through conditions of contract.

In EIA terms, the risks identified for the Project result in no significant effects on receptors, owing in principle to the scale and design of the Project, which will be built in line with the identified embedded mitigations and management plans to safeguard, in so far as practicable, against these risks. As such, in line with the expectations of the IEMA Guidance, there is no need for a Residual Risk Assessment.

If a Marine Licence is granted for the Project, risk reduction will continue to be refined during detailed engineering design, to ensure that a hierarchy of controls are in place through the various management plans. In line with this, the Project will require all contractors and subcontractors to complete adequate Risk Assessments and Method Statements (RAMS) to manage risks to an acceptable level. Review of all RAMs will be captured within the relevant consent plans including the EMP and internal Project procedures. Furthermore, in the very unlikely event of an incident occurring a ERCoP will be in place to set out procedures in an emergency situation.

9 REFERENCES

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