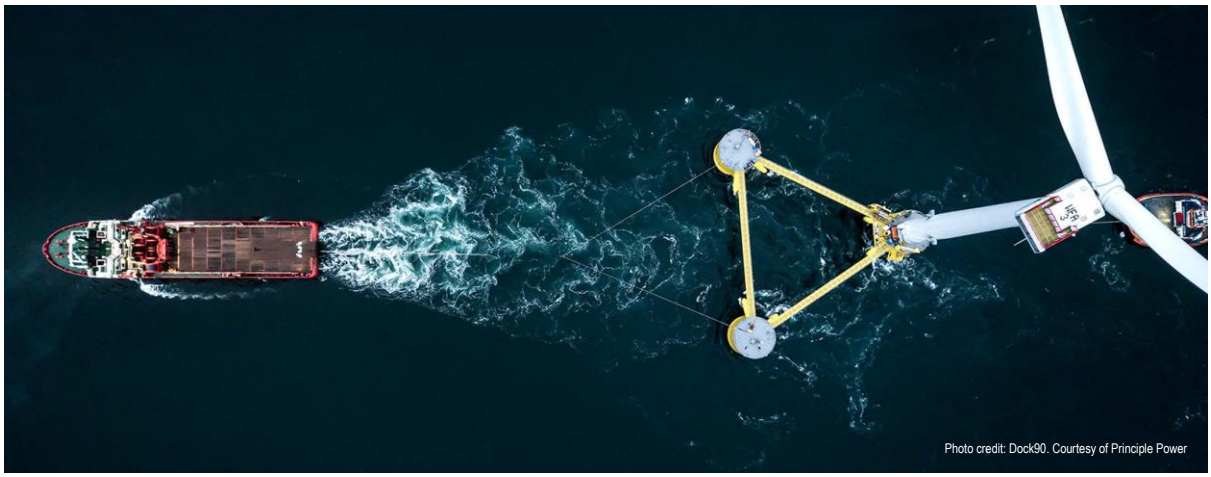


# Project Erebus Environmental Statement
# Chapter 28: Climate Change, Major Accidents and Disasters

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# Acronyms

| Term | Definition |
|---|---|
| ALARP | As Low As Reasonably Practicable |
| CEMP | Construction Environmental Management Plan |
| CoCP | Code of Construction Practice |
| EIA | Environmental Impact Assessment |
| EU | European Union |
| GPP | Guidance for Pollution Prevention |
| IEMA | Institute of Environmental Management and Assessment |
| IMO | International Maritime Organisation |
| MARPOL | International Convention for the Prevention of Pollution from Ships |
| MCA | Maritime and Coastguard Agency |
| MHPA | Milford Haven Port Authority |
| NRW | Natural Resources Wales |
| OEMP | Operational Environmental Management Plan |
| SOPEP | Shipboard Oil Pollution Emergency Plan |
| THLS | Trinity House Lighthouse Service |
| WFD | Water Framework Directive |
| WTG | Wind Turbine Generator |

# Chapter 28 Climate Change, Major Accidents and Disasters

## 28.1 Introduction

28.1.1.1 This chapter presents the assessment of major accidents and disasters associated with the Project as defined in Chapter 4: Proposed Development Description.

28.1.1.2 The topic of major accidents and disasters was introduced into the Environmental Impact Assessment (EIA) process as a result of EU Directive 2014/52/EU, which amended Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (the EIA Directive). Under Annex VI, paragraph 8 of the EIA Directive, EIA reports must now include:

*"A description of the expected significant adverse effects of the project on the environment deriving from the vulnerability of the project to risks of major accidents and/or disasters which are relevant to the project concerned."*

28.1.1.3 As per the European Commission (2017) guidance on the preparation of EIA Reports, two key considerations stem from this requirement:

- The project's potential to cause accidents and/or disasters (e.g. major hydrocarbon spill), here the EIA Directive specifically refers to considerations for human health, cultural heritage and the environment.
- The vulnerability of the project to potential disaster/accident. This covers both natural (e.g. earthquakes) and man-made disasters (e.g. technological hazards) that could *"significantly impede the Project's activities and objectives and which might have adverse effects"*

28.1.1.4 This chapter draws upon the individual assessments within relevant EIA topic chapters that have the potential to result in major accidents and/or be affected by disasters.

28.1.1.5 This chapter has been prepared by MarineSpace and ITPE Energised Environments Limited trading as ITPEnergised). The Chapter has been authored by Lara Lawrie (MSc) of MarineSpace who has over 12 years' experience in infrastructure planning, specialising in terrestrial and marine consenting and EIA and Gemma Tait (MSc) of ITPE, who has over 11 years of experience in EIA.

## 28.2 Legislation, Policy and Guidelines

28.2.1.1 The following legislation, planning policy and guidance documents have been considered in the preparation of this chapter.

### *28.2.2 Legislation*

*EIA Regulations*

28.2.2.1 The consideration of major accidents and disasters in EIA was introduced by the amendment to the EIA Directive detailed in Section 28.1. As outlined in previous chapters, the applicable UK regulations implementing the EIA Directive for the Project are the Electricity Works (Environmental Impact Assessment) (England and Wales) Regulations 2017 (hereinafter referred to as Electricity Works EIA Regulations); and the Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended) (hereinafter referred to as the Marine Works EIA Regulations).

28.2.2.2 The requirement for EIA reports to include *"A description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and disasters that are relevant to the development"* is detailed under Schedule 4, paragraph 8(1) of the Electricity Works EIA Regulations. Very similar requirements are details under Schedule 3, paragraph 9 of the Marine Works EIA Regulations.

*Pollution prevention*

28.2.2.3 All project vessels will comply with the International Maritime Organisation (IMO) International Convention for the Prevention of Pollution from Ships (MARPOL) standards.

28.2.2.4 Regulation 37 of MARPOL Annex I requires that all ships of 400 gross tonnage and above carry an approved Shipboard Oil Pollution Emergency Plan (SOPEP). SOPEPs should be prepared in line with the relevant IMO guidelines, including Resolution MEPC.54(32) (IMO, 1992) as amended by Resolution MEPC.86(44) (IMO, 2000).

28.2.2.5 The Water Resources (Control of Pollution) (Oil Storage) (Wales) Regulations 2016 are applicable to onshore projects where oil storage containers have a capacity ≥200 litres. These Regulations have been made under the Water Resources Act 1991, they outline measures to ensure oil is stored and handled properly. For example, contains must have sufficient strength and structural integrity to ensure leaks are unlikely during ordinary use.

*Control of Major Accident Hazards*

28.2.2.6 The Seveso III Directive (2012/18/EU) has been implemented in the EU to limit risks related to the storage and handling of hazardous chemicals. The directive has been implemented in the UK by the Control of Major Accident Hazards (COMAH) Regulations 2015. The latter regulations will remain in force in the UK after Brexit. The aim of Seveso III/COMAH Regulations is to both prevent major accidents involving dangerous substances in the workplace and to limit the consequences of such accidents to people and the environment. There are legally binding requirements on all establishments affected by the regulation. COMAH also aims to mitigate the effects of major accidents involving dangerous substances which can cause serious damage/harm to people and/or the environment. COMAH treats risks to the environment as seriously as those to people.

### *28.2.3 Policy*

28.2.3.1 The following planning policies have been reviewed and taken into account as part of this assessment:

*Marine Policy Statement*

28.2.3.2 The UK Marine Policy Statement (MPS), adopted by all UK administrations in March 2011, provides the policy framework for the preparation of marine plans and establishes how decisions affecting the marine area should be made in order to enable sustainable development. The MPS sets out a vision of having "*clean, healthy, safe, productive and biologically diverse oceans and seas*" by supporting the development of Marine Plans.

28.2.3.3 One of the overarching themes of the MPS is the role low carbon energy generation, including offshore renewables, has as mitigation against climate change and in reducing the UK's dependence on fossil fuels.

28.2.3.4 All public authorities, including devolved administrations such as the Welsh Government and Local Planning Authorities, are to take into account the MPS and relevant Marine Plans when making decisions in regard to the marine area. This ensures that marine resources are used in a sustainable way, in line with the high-level marine objectives.

*Welsh National Marine Plan*

28.2.3.5 The Welsh Government published and adopted the first WNMP in November 2019 (Welsh Government, 2019c). Since adoption, the WNMP must be adhered to and relevant public authorities, such as Local Planning Authorities and PEDW must consider it when making decisions regarding the Welsh marine area. The WNMP covers Welsh inshore and offshore waters and seeks to ensure marine resources are used in a sustainable way in line with the high-level marine objectives over its 20- year lifespan. The WNMP sets out policies to achieve this, including both general and sector specific policies.

28.2.3.6 Welsh Government has committed to developing an environmental evidence base for the Welsh marine area, which in turn will help inform marine planning into the future.

28.2.3.7 The first WNMP identifies that Strategic Resource Areas (SRA) should be developed for certain sector activities, such as aggregates and aquaculture. The WNMP states that "SRAs are a tool to improve the management of marine activities, space and resources, helping to support the management of sector-sector interactions". It is understood that SRAs will be developed and implemented through Marine Planning Notices to support the WNMP (Welsh Government, 2020b) which could include floating offshore wind.

28.2.3.8 The following two policies from the WNMP were of particular relevance to this assessment:

- SOC_10: Minimising climate change

This Policy states that:

*"Proposals should demonstrate how they, in order of preference:*

*a. Avoid the emission of greenhouse gases; and/or*

*b. Minimise them where they cannot be avoided; and/or*

*c. Mitigate them where they cannot be minimised*

*Where significant emission of greenhouse gases cannot be avoided, minimised or mitigated, proposals for regulated activities must present a clear and convincing case for proceeding."*

- SOC_11: Resilience to climate change

This Policy states that:

*"Proposals should demonstrate that they have considered the impacts of climate change and have incorporated appropriate adaptation measures, taking into account Climate Change Risk Assessments for Wales.*

*Proposals that contribute to climate change adaptation and/or mitigation are encouraged."*

### *28.2.4 Guidance*

28.2.4.1 The assessment has been taken of the following best practice guidelines / guidance:

- EU Guidance on the preparation of the Environmental Impact Assessment Report (European Commission, 2017);
- Institute of Environmental Management and Assessment (IEMA) Major Accidents and Disasters in EIA: A Primer (IEMA, 2020);
- European Commission (EC) Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy (the Water Framework Directive), which has been transposed into UK law by the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017;
- The International Convention for the Prevention of Marine Pollution by Ships (MARPOL Convention) 73/78; International Cable Protection Committee (ICPC) recommendations, October 2017;
- European Subsea Cables Association (ESCA) recommendations;
- Convention on the International Regulations for Preventing Collisions at Sea 1972;
- Relevant Pollution Prevention Guidelines (PPGs) and Guidance for Pollution Prevention (GPPs), particularly:
    - GPP 1: a general guide to preventing pollution
    - GGP 5: works and maintenance near water
    - GPP 6: working at construction and demolition sites
    - GPP 21: pollution incident response planning
    - GGP 22: dealing with spills
    - GPP 26: safe storage – drums and intermediate bulk containers
    - A full list of PPGs and GPPs is provided by NetRegs (2021).
- NRW's (2014) Environmental Management Toolkit General Version Industry Guidance
- Regulatory Expectations for Emergency Response Arrangements for the Offshore Renewable Energy Industry (MCA & HSE, 2019)

## 28.3 Consultation and Scoping

### *28.3.1 Scoping*

28.3.1.1 According to the IEMA (2020) primer, major accidents and disasters assessments should cover *"the assessment of potentially significant adverse effects of a development on the environment deriving from its vulnerability to risks of relevant major accidents and/or disasters"*.

28.3.1.2 The EIA Scoping Report (MarineSpace, 2019) (Volume 3, Technical Appendix 2.1: EIA Scoping Report) stated:

*The 2017 amendments to the EIA Regulations require that the EIA considers the vulnerability of the proposed Project to climate change, natural disasters and major accidents. This assessment will be included within the EIA; either incorporated into topic chapters, or in a separate section. The scope of this assessment will be informed by NRW's advice on the nature and scope of natural disasters and major accidents it would advise are relevant the Project.*

28.3.1.3 The Scoping Opinion, received from NRW in January 2020 (Volume 3, Technical Appendix 2.2: EIA Scoping Opinion) did not identify any specific natural disasters or major accidents considered relevant to the Project but clarified that the Environmental Statement (ES) should including "*A description of the expected significant adverse effects of the project on the environment resulting from the vulnerability of the project to risks of major accidents or disasters*" (NRW, 2020).

28.3.1.4 The Project has been designed to adequately future proof it against events such as flooding and increased sea levels as a result of climate change. In addition, the Project area is not prone to natural disasters such as earthquakes and landslides. As such the Project's vulnerability to accidents and disasters was scoped out of the assessment.

28.3.1.5 The focus of the assessment is, therefore, on the Project's potential to cause a major accident that would result in significant adverse effects on the environment.

28.3.1.6 The IEMA primer (IEMA, 2020) provides the following definitions which are relevant to the assessment:

- "Major accident is an event (for instance, train derailment or major road traffic accident) that threatens 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"
- "A disaster is a man-made/external hazard (such as an act of terrorism) or a natural hazard (such as an earthquake) with the potential to cause an event or situation that meets the definition of a major accident."
- "In general, major accidents and/or disasters should be considered as part of an assessment where the development has the potential to cause the loss of life, permanent injury and/or temporary or permanent destruction of an environmental receptor which cannot be restored through minor clean-up and restoration."

### *28.3.2 Consultation*

28.3.2.1 Details of consultation in relation to major accidents and disasters is provided in Table 28.1.

**Table 28.1 – Major Accidents and Disasters Consultation**

| Consultee | Response | Applicant Action |
|---|---|---|
| Maritime and Coastguard Agency (MCA) | **Comments received during Preliminary Consultation Meeting held on 20 January 2021**<br>Request to see reference to mooring guidance developed between HSE and MCA and third-party verification of mooring arrangements as per Risk Control 17: Inspection/Monitoring Regime. | Comments on mitigation measures have been incorporated into Chapter 16: Shipping and Navigation |
| Trinity House Lighthouse Service (THLS) | **Comments received during the Preliminary Consultation Meeting on 20 January 2021**<br>When reviewing preliminary risk control mitigation THLS raised point around the inspection and monitoring in the event of incidents in the vicinity of the array area. | Comments on mitigation measures have been incorporated into Chapter 16: Shipping and Navigation |
| Milford Haven Port Authority (MHPA) | **Comments received during the Hazard Workshop held on 22 April 2021**<br>Requested that collision risk between large and small vessels be considered by area, in order to capture area-specific risks. | Area-specific collision risk between large and small vessels has been considered within Chapter 16: Shipping and Navigation |
| Natural Resources Wales (NRW) | **Comments relating to shipping and navigation assessment included in the Scoping Opinion**<br>The following impacts must be scoped into the ES:<br>• The risk to drifting recreational craft in adverse weather or tidal conditions; | Chapter 16: Shipping and Navigation and supporting Technical Appendix 16.1: Navigational Risk Assessment have considered the impacts and proposed mitigations outlined in the scoping opinion. |

| Consultee | Response | Applicant Action |
|---|---|---|
| | An assessment of the impact of, and emergency response to, a semi-submersible floating platform/WTG breaking free of its moorings, along with appropriate risk mitigation measures (e.g. AIS/GPS monitoring of offshore structures). | |
| South Hook Liquefied Natural Gas (SHLNG) | **Comments received via MHPA email dated 09 April 2021**<br>The Terminal would be looking for re-assurances on:<br>During construction, operation or decommissioning phases there will be no adverse impact on LNG vessels for SHLNG.<br>Location of the array and cable route will not significantly limit approach to Port of Milford Haven/SHLNG.<br>Ongoing maintenance of the new facility - there will be a robust plan in place that will limit risk of any unplanned disruption to shipping routes. | Effects on tankers and large commercial vessels are considered in Chapter 16: Shipping and Navigation |
| Mainline Pipeline – Fisher German (managing consortium for the pipeline) | **Comments received via email dated 15th June 2021**<br>In order to cross the oil pipeline at Wallaston Cross, a method statement and crossing agreement has been requested by the managing consortium for the pipeline. Follow up meeting on 16th November 2021. | Ongoing discussion on preferred methodology for onshore export cable crossing of the pipeline, finalisation to be expected at detail design phase. |

## 28.4 Assessment Methodology and Significance Criteria

28.4.1.1 This chapter draws upon the individual topic assessments of major accidents and disasters to determine potential impacts of the Project, overall. Please refer to the following chapters for individual assessment methodologies and baseline conditions:

- Chapter 7: Marine Water and Sediment Quality
- Chapter 16: Shipping and Navigation
- Chapter 19: Onshore Geology, Hydrogeology and Hydrology
- Chapter 20: Terrestrial and Coastal Ecology and Onshore Ornithology.

### *28.4.2 Standard Mitigation*

28.4.2.1 A range of standard mitigation measures has already been applied to the Project as part of the over-arching site selection and iterative design process (see below and Chapter 3: Site Selection and Alternatives). These have been introduced in order to minimise potential impacts of the Project on any affected receptors.

28.4.2.2 Standard mitigation measures which the Project has already implemented, or is committed to in the future, in order to minimise potential impacts on major accidents and disasters are listed below. Further details can be found under the individual topic chapter identified in Section 28.4.1.1.

- Construction Environmental Management Plan (CEMP) will be in place which will include a pollution prevention plan and a pollution incidence response plan;
- Operational Environmental Management Plan (OEMP) will be in place which will include a pollution prevention plan and a pollution incidence response plan;
- Construction practices will comply with a Code of Construction Practice (CoCP) to ensure appropriate GPPs and good practice guidelines are followed;
- Engagement with the Ministry of Defence (MoD) and Milford Haven Port Authority (MHPA) prior to any construction, maintenance or decommissioning works.
- Promulgation of Information and warnings through Notices to Mariners or other appropriate Marine Safety Information (MSI) dissemination methods. Rolling and regular updates during construction phases.
- Continuous watch by multi-channel VHF, including Digital Selective Calling (DSC).
- Vessel Traffic Monitoring (and data collection to MGN654 standard) - Continuous monitoring by radar, AIS, closed circuit television (CCTV) or other agreed means (to minimum of MGN654 standard) during construction and immediate period (3 months) post construction, whilst traffic habituates, to MCA approval.
- Application and use of safety zones of up to 500 m from platform edge (at sea level) during construction/major maintenance and decommissioning phases. Safety zones shall be of appropriate configuration, extent and application, to specified vessels of identified primary risk of sub-sea equipment to fishing and snagging hazard. Safety Zones will not apply to any part of the offshore export cable and/or array cables.
- An advisory safe passing distance of up to 1,000 m around work areas (cable landfall proximity) during construction and decommissioning phases, and up to 1,000m advisory safe distances around cable installation/removal or maintenance vessels [where feasible and in agreement with MHPA where within MHPA port limits].
- Suitable Aids to Navigation (AtoN) lighting and marking the Project site shall be deployed, complying with International Association of Lighthouse Authorities (IALA) Recommendations O-139 (IALA, 2013 and due to be updated prior to construction), to be finalised and approved in consultation with MCA and THLS through an AtoN Management Plan.
- Fog horns to alert vessels to the position of structures when visibility is poor. Note planned update to O-139 to include painting reference from waterline (not Highest Astronomical Tide (HAT)).

- AIS transponders to be placed on periphery corner semi-submersible floating platform /WTGs
- Buoys deployed around construction work in array area in line with THLS requirements and may include a combination of cardinal and/or safe water marks. To be finalised and approved in consultation with MCA and THLS through an AtoN Management Plan.
- Emergency Response Co-Operation Plan with agreement of MCA. Including: semi-submersible floating platform /WTGs partial/complete breakout response and recovery plan, and interface with MHPA and UK National Contingency Plan re: marine pollution. Measures will be adopted to ensure that the potential for release of pollutants from construction and operation and maintenance activities is minimised, which will include planning for accidental spills and responding to all potential contaminant releases.
- Provision of guard vessel in vicinity of array area to monitor 3rd party vessel traffic and intervene with warnings as necessary. Presence during construction phase and consider immediate period (3 months) post construction whilst traffic habituates, with MCA approval prior to release.
- Location monitoring device (GPS based) providing warning on breach of semi-submersible floating platform position near/beyond excursion limits and position tracking in event of partial/full breakout. Device should be integrated with AIS transponders;
- Cable burial risk assessment to be undertaken pre-construction, including consideration of under keel clearance. Where possible, subsea cables will be either fully buried (where ground conditions permit and burial tool performance allows), partially buried (buried but not to target depth) with rock protection, or surface laid with rock protection (note that that the sections of the array cables that leave the semi-submersible floating platform will remain within the water column throughout the operational phase of the project).
- No more than 5% reduction in water depth (referenced to Chart Datum) will occur at any point on the cable route without prior written approval from the Licensing Authority.
- The Applicant will ensure that all project related vessels meet both IMO conventions for safe operation, as well as health, safety and environment requirements, where applicable. This shall include the following good practice:
- Project associated vessels will comply with International Maritime Regulations;
- All vessels, regardless of size, will be required to carry AIS equipment on board;
- All vessels engaged in activities will comply with relevant regulations for their size and class of operation and will be assessed on whether they are “fit for purpose” for activities they are required to carry out;
- All marine operations will be governed by operational limits, tidal conditions, weather conditions and vessel traffic information.
- Minimum under keel clearance to be maintained around turbines to ensure they do not impact on vessels transiting within the array area.
- Charting of array area structures (semi-submersible floating platform and subsea mooring/array cable equipment inc. anchor spread patterns) clearly on appropriately scaled nautical charts and electronic charts in line with United Kingdom Hydrogaphic Office (UKHO) standard and using wind farm symbology.

- Charting of offshore export cable and landfall infrastructure clearly on appropriately scaled nautical charts and electronic charts in line with UKHO standard in line with UKHO standard and using standard symbology.
- Array layout plan to be agreed with MCA and THLS prior to construction and maintain two lines of orientation unless justified and agreed with the MCA.
- Project Vessel Marine Operations Plan, Traffic Co-ordination Plan and Promulgation of Information: Contractor/Vessel Operators to develop Marine Operations Plan (MOP) and, for all activities inside MHPA port limits (and recommended within 5 nautical miles (nm) of MHPA port limits), this shall include comprehensive passage plan in pre-approved format for review and authorisation by MHPA. Pre-deployment meeting shall be held with MHPA, MHPA Pilots and Contractor/Vessel Operator to review MOP, co-ordinate operations, identify and reduce operational disturbance and mitigate risks to navigational safety.
- Fisheries Liaison Plan providing detailed Project information to fishermen, such as site and offshore export cable corridor location and position of any offshore export cable protection for upload into fish plotters
- Compliance from all vessels associated with the proposed project with international maritime regulations, as adopted by the relevant flag state (e.g. International Convention for the Prevention of Collision at Sea (COLREGS) (IMO, 1972) and International Convention for the Safety of Life at Sea (SOLAS (IMO, 1974)
- A submersible floating platform/WTG tow-out passage plan risk assessment and method statement (RAMS) should be undertaken by the Contractor, covering the period between quayside departure and completion of the mooring connection being made. This should consider aspects including risks to project vessels, risks to 3rd party vessels (and consequential collision, contact or grounding risks) through reduced manoeuvrability; and breakout of the device under tow.
- A pre-installation (post-consent) geophysical survey will also be carried out and include a magnetometer survey, designed to identify any potential UXO targets in the vicinity of the planned cable route. If a UXO target is identified the intention would be to route around the UXO and avoid interacting with it. If it is not possible to route around the UXO a more detailed assessment of the specific target would be undertaken (potentially via ROV) to determine UXO risk and only if no alternative existed, would the Project undertake UXO clearance via deflagration (low-order).
- MHPA Waterway Management during period when offshore export cable construction activity is within MHPA limits and approaches (within circa 5 nm), Applicant will liaise with MHPA and ensure MHPA integrated risk based approach is considered for works within MHPA waters.
- Consideration will be given to introduction of specific routes/measures and protocols for construction works and specific vessels (e.g. regular 'larger' vessels [Irish Ferries], Recreational and Fishing community together with the Castlemartin ranges) using East Channel during defined periods when cable associated works are present in channel.
- Consideration will be given to navigation lines (and port approaches), relationship of vessel usage of West/East channel and limit state conditions (restricted visibility. limiting metocean conditions). See also Risk Control ID 15.

- All work practices and vessels will adhere to the requirements of the International Convention for the Prevention of Pollution from Ships (MARPOL)73/78; specifically Annex 1 Regulations for the prevention of pollution by oil concerning machine waters, bilge waters and deck drainage and Annex IV Regulations for the prevention of pollution by sewage from ships concerning black and grey waters
- Wind turbine design will include appropriate provisions, e.g. self-contained bunds, to retain any spilled fluids and prevent discharges to the environment;
- Where grout is required, care would be taken at all times to avoid excess use or discharged into the marine environment
- Onshore cable construction works will avoid impact through engineering techniques (e.g. trenchless techniques at sensitive points) where sensitive habitats and receptors are present;

### *28.4.3 Assessment for Residual Effect Significance*

28.4.3.1 The impact assessments and conclusions on significance of effect presented in Section 28.5 assume that these standard mitigation measures listed above have been successfully implemented. Where significant environmental impacts remain even after these standard measures have been factored in, then project-specific mitigation measures are detailed and the residual significance of effect presented.

## 28.5 Potential Environmental Effects

28.5.1.1 Table 28.2 presents the key parameters from the project design envelope, as presented in Chapter 4: Proposed Development Description, that have been used to inform each major accident and disaster assessment presented in the relevant topic chapters.

**Table 28.2 - Project Design Envelope Parameters Relevant to Major Accidents and Disasters**

| Potential Pathway Change / Impact | Realistic Worst Case Scenario | Justification |
|---|---|---|
| **Construction** | | |
| Increased risk of vessel collisions | • Maximum overall offshore construction duration = 8 months;<br>• During construction phase, temporary 500 m safety zones will be imposed around all major construction vessels;<br>Vessel movements:<br>• Up to 6 vessels at any time;<br>• Floater – 1 unit delivered every 2 weeks; | This presents the maximum number of vessels and maximum duration during the construction phase |

| Potential Pathway Change / Impact | Realistic Worst Case Scenario | Justification |
|---|---|---|
| | • Floater duration of tow out – up to 15 hr per Floater (if Milford Haven) 70 hr per Floater (if Belfast) | |
| Risk of contaminants entering the marine environment | Construction Vessels:<br>• Up to 4 vessels at any time<br><br><u>HDD / Drilling fluid release (at landfall)</u><br>• Number of HDD exit/release events: 2<br>• Maximum volume of drilling fluid in one HDD conduit: 1,200 $m^3$.<br>• Maximum concentration of bentonite in drilling fluid: 80,000 mg/l. | This presents the maximum number of vessels and/or sources of pollution |
| Interaction with Unexploded Ordnance (UXO) | • Maximum overall offshore construction duration = 8 months;<br>Offshore export cable:<br>• Length: 49 km;<br>• Boulder clearance:<br>• Sandwave levelling:<br>• Cable installation<br>Array area:<br>• Array area: 43.5 $km^2$;<br>• Sandwave levelling (array cables, moorings, and anchors);<br>• Cable array installation: | This presents the greatest extent of potential interaction with the seabed |
| Semi-submersible floating platform towing failure | Floater – 1 unit delivered every 2 weeks;<br><br>Floater duration of tow out – up to 15 hr per Floater (if Milford Haven), 70 hr per Floater (if Belfast) | Maximum number of platforms under tow for the maximum duration. |

| Potential Pathway Change / Impact | Realistic Worst Case Scenario | Justification |
|---|---|---|
| Accidental events during cable crossing could lead to pollution of watercourses, habitats and environmentally sensitive areas | Notable obstacles found along the onshore export cable site boundary are: major roads, watercourses, trees and hedgerows, existing major utilities and environmentally sensitive areas. | Number of crossings unknown at this stage, assumed all obstacles will be crossed to represent the worst case |
| **Operation and Maintenance** | | |
| Increased risk of vessel collisions | • Estimated cable repair during lifespan: 5 x export, 5 x array;<br>• Maintenance work:<br>  ○ Mooring and sub-structure inspections: 10;<br>  ○ Minor offshore maintenance: 7;<br>  ○ Mooring line replacement: 2 in 25 yrs;<br>  ○ Hull repairs: 2 small and 2 majors in 25 yrs (3 events requiring towing back to port);<br>• Vessel movements per year for O&M<br>  ○ 2 CTV vessels per day: 730 trips per year;<br>Maintenance vessels: variable, up to 15 visits | This presents the maximum number of vessels and maximum duration |
| Risk of contaminants entering the marine environment | <u>Vessel presence</u><br>Vessel presence for O&M activities will not exceed 2 x 12h periods per year<br><u>Cable Repair</u><br>• Maximum number of events (export cable): 5<br>• Maximum length (export cable): 1 km<br>• Maximum number of events (array): 5 | This presents the maximum number of vessels and/or sources of pollution |

| Potential Pathway Change / Impact | Realistic Worst Case Scenario | Justification |
|---|---|---|
| | • Maximum length (array): 6 km | |
| Failure of semi-submersible floating platform mooring system | • Minimum number of mooring lines: 20<br>• Minimum number of drag embedment anchors / driven piles: 20<br>• Maximum dimensions of drilled pile section: 2.5 m diameter, 55 m length<br>• Total minimum number of mooring clumps: 480 (10 WTGs, 15 clumps per line) | Minimum parameters for the mooring configuration |
| Failure of Wind Turbine Generators (WTGs) | • Up to 10 semi-submersible floating platform. One WTG per platform | Maximum number of platforms |
| Risk of changes to the meteorological conditions as a result of climate change impacting temperature, precipitation, floods, changes to wind patterns | • Increases in temperate can impact air density and wind patterns<br>• Glacier melting and flooding creates an increased risk to equipment<br>• Changes to wind speed | The impacts on the development as result of climate change and weather conditions can ultimately affect the equipment and increase or decrease the predicted generation. |
| **Decommissioning** | | |
| Increased risk of vessel collisions | Similar to the parameters set out for construction | |
| Risk of contaminants entering the marine environment | Similar to the parameters set out for construction | |
| Semi-submersible floating platform towing failure | Similar to the parameters set out for construction | |

### *28.5.2 Construction*

*Increased risk of vessel collisions*

28.5.2.1 During construction there will be up to 6 additional vessels present at one time, operating under a temporary 500m safety zone. The impacts of additional construction vessels on commercial fisheries, shipping and navigation, and other users have been assessed in Chapter 15, 16 and 18 respectively. A Navigational Risk Assessment (NRA) (Volume 3, Technical Appendix 16.1: Navigational Risk Assessment) was also undertaken in support of Chapter 16: Shipping and Navigation.

28.5.2.2 The NRA and subsequent impact assessment undertaken in Chapter 16: Shipping and Navigation identified that the risk of vessel collisions could increase as a result of the construction of an OWF in an otherwise navigable area displacing vessels from the array area and/or offshore export cable corridor (the latter only during cable laying/removal activities), constraining shipping routes and resulting in pinch points or areas of high density. The risk of collision can also be heightened due to the presence of additional project-related vessel movements during construction.

28.5.2.3 However, the array area is well clear of the major shipping routes and although some offsetting of shipping, including loitering vessels is inevitable due to the presence of OWF construction vessels and partially or fully constructed semi-submersible floating platform/WTGs during the construction phase, there is significant sea room to support this and, therefore, the increased risk of collision is considered to be negligible.

28.5.2.4 Standard mitigation and the additional mitigation identified in Chapter 16: Shipping and Navigation will ensure any impacts are below the defining threshold of major accidents and disasters, as per the IEMA (2020) primer:

*"In general, major accidents and/or disasters should be considered as part of an assessment where the development has the potential to cause the loss of life, permanent injury and/or temporary or permanent destruction of an environmental receptor which cannot be restored through minor clean-up and restoration"*

28.5.2.5 Specifically, the appropriate mitigation is in place to ensure that impacts to human receptors do not result in the loss of life.

*Risk of contaminants entering the marine environment*

28.5.2.6 Impacts on water quality from drilling and changes to water quality through sediment suspension are assessed in Chapter 7: Marine Sediment and Water Quality. The accidental release of fluids into the environment from construction vessels is also assessed but it is recognised that the risk of contaminants entering the marine environment could result in a major disaster.

28.5.2.7 However, it is considered that standard mitigation will ensure the risk of such an event occurring is as low as reasonably practicable (ALARP) and that appropriate response measures are in place in the event a spill does occur. The risk or contaminants entering the marine environment as a result of a collision is assessed within Volume 3, Technical Appendix 16.1: Navigational Risk Assessment.

28.5.2.8 Standard mitigation would ensure any impacts are below the defining threshold of major accidents and disasters, as per the IEMA (2020) primer:

*"In general, major accidents and/or disasters should be considered as part of an assessment where the development has the potential to cause the loss of life, permanent injury and/or temporary or permanent destruction of an environmental receptor which cannot be restored through minor clean-up and restoration"*

28.5.2.9 Specifically, the appropriate mitigation is in place to ensure that impacts to ecological receptors can be restored through minor clean-up and restoration.

*Interaction with Unexploded Ordnance*

28.5.2.10 The potential interaction with Unexploded Ordnance (UXO) through intrusive seabed works could cause loss of life and/or damage to ecological receptors.

28.5.2.11 A UXO Threat and Risk Assessment (6 Alpha, 2020) was commissioned in support of Project specific geotechnical surveys undertaken in May 2021. The assessment was based on UXO defined geospatial threat source positions, and the anticipated level of contamination from background UXO threats situated upon and within 5 km of the array area and offshore export cable corridor. The report concluded that, generally, the likelihood of encountering UXO is higher nearer to shore along the offshore export cable, with the likelihood reducing further offshore, towards the array area.

28.5.2.12 The Project is seeking consent for one Unexploded Ordnance (UXO) detonation via deflagration (low-order). This is presented as the realistic worst case scenario throughout the Environmental Statement and has formed the basis of the impact assessment undertaken. The potential impacts on ecological receptors have been assessed in Chapter 10: Fish and Shellfish and Chapter 12: Marine Mammals.

28.5.2.13 With respect to potential interaction with UXO resulting in injury or loss of life the UXO Threat and Risk Assessment identified that if standard mitigation were applied this would ensure the risk of such an event occurring is as low as reasonably practicable (ALARP).

28.5.2.14 The proposed mitigation constitutes a pre-installation (post-consent) geophysical survey, including magnetometer survey, designed to identify any potential UXO targets in the vicinity of the planned offshore export cable corridor. If a UXO target is identified the intention would be to route around the UXO and avoid interacting with it. The offshore export cable corridor has sufficient width, built in, to allow this occur. However, if it is not possible to route around the UXO a more detailed assessment of the specific target would be undertaken (potentially via ROV) to determine UXO risk and only if no alternative existed, would the Project undertake UXO clearance via deflagration (low-order). This is considered the realistic worst case.

28.5.2.15 If the survey identifies more than one UXO target requiring clearance, the Project will engage with the Regulators and apply for a variation to allow additional UXO clearance via deflagration (low-order).

28.5.2.16 The proposed mitigation set out above and would ensure any impacts are below the defining threshold of major accidents and disasters, as per the IEMA (2020) primer:

*"In general, major accidents and/or disasters should be considered as part of an assessment where the development has the potential to cause the loss of life, permanent injury and/or temporary or permanent destruction of an environmental receptor which cannot be restored through minor clean-up and restoration"*

28.5.2.17 Specifically, the appropriate mitigation is in place to ensure that impacts to human receptors do not result in loss of life.

*Semi-submersible floating platform towing failure*

28.5.2.18 Failure of the towing vessel or hook up lines between the towing vessel and semi-submersible floating platform may result in a major accident while the semi-submersible floating platform is being towed to the array area. It is anticipated that transit of the semi-submersible floating platform to the array area would be undertaken by one dynamic positioning vessel, accompanied by one escort vessel. The furthest mobilisation port to the array area would be Belfast, approximately 210 nm or 70 hours transit time.

28.5.2.19 Impacts associated with collision risk have been considered in Chapter 16: Shipping and Navigation and mitigation is proposed via the requirement for a semi-submersible floating platform/WTG tow-out passage plan risk assessment and method statement (RAMS). This would be undertaken by the Contractor, covering the period between quayside departure and completion of the mooring connection being made. This will consider aspects including:

- Risks to Project vessels;
- Risks to 3rd party vessels (and consequential collision, contact or grounding risks) through reduced manoeuvrability; and
- Breakout of the device under tow.

28.5.2.20 Standard mitigation and the additional mitigation identified in Chapter 16: Shipping and Navigation will ensure any impacts are below the defining threshold of major accidents and disasters, as per the IEMA (2020) primer:

*"In general, major accidents and/or disasters should be considered as part of an assessment where the development has the potential to cause the loss of life, permanent injury and/or temporary or permanent destruction of an environmental receptor which cannot be restored through minor clean-up and restoration"*

28.5.2.21 Specifically, the appropriate mitigation is in place to ensure that impacts to human receptors do not result in the loss of life.

*Terrestrial ecology*

28.5.2.22 Due to the nature of the Project, there will be no storage of the dangerous substances included within schedule 1; Dangerous substances, part 1: Categories of Dangerous Substances of the Control of Major Accident Hazards Regulations (UK Gov, 2015). Therefore, it is considered that there is no risk of major accidents involving dangerous substances which can cause serious damage/harm to people and/or the environment.

28.5.2.23 Specifically, the appropriate mitigation described in Chapter 20 Terrestrial and Coastal ecology and Onshore Ornithology is in place to ensure that impacts to watercourses, ecology receptors and sensitive habitats can be restored through minor clean-up and restoration.

*Onshore Geology, Hydrogeology and Hydrology*

28.5.2.24 Due to the nature of the Project, there will be no storage of the dangerous substances included within schedule 1; Dangerous substances, part 1: Categories of Dangerous Substances of the Control of Major Accident Hazards Regulations (UK Gov, 2015). Therefore, it is considered that there is no risk of major accidents involving dangerous substances which can cause serious damage/harm to people and/or the environment.

28.5.2.25 Specifically, the appropriate mitigation described in Chapter 19 Onshore Geology, Hydrogeology and Hydrology is in place to ensure that impacts to watercourses, groundwater and soil can be restored through minor clean-up and restoration.

### *28.5.3 Operational Phase*

*Increased risk of vessel collisions*

28.5.3.1 During the O&M phase of the Project there will be up to two Crew Transfer Vessel (CTV) movements per day, a total of 730 per year with up to 15 maintenance visits. The impacts of additional construction vessels on commercial fisheries, shipping and navigation, and other users have been assessed in Chapter 15, 16 and 18 respectively. As discussed in Section 28.5.2.1; Volume 3, Technical Appendix 16.1: Navigation Risk Assessment and Chapter 16: Shipping and Navigation the risk of vessel collisions could increase as a result of displaced vessels from the array area constraining shipping routes and resulting in pinch points or areas of high density. The risk of collision may also be heightened due to vessel movements during O&M.

28.5.3.2 However, the array area is well clear of the major shipping routes and although some offsetting of shipping, including loitering vessels, is inevitable due to the presence of the array and O&M vessels there is significant sea room to support this and, therefore, the increased risk of collision is considered to be negligible.

28.5.3.3 An assessment of the risks associated with passing ships colliding with the semi-submersible floating platform was also undertaken during the pre-FEED scope of works. Notwithstanding the outputs of Volume 3, Technical Appendix 16.1: Navigation Risk Assessment the hull design of the semi-submersible floating platform has been designed to withstand an impact resulting in one compartment being completely flooded.

28.5.3.4 Standard mitigation and the additional mitigation identified in Chapter 16: Shipping and Navigation will ensure any impacts are below the defining threshold of major accidents and disasters, as per the IEMA (2020) primer:

*"In general, major accidents and/or disasters should be considered as part of an assessment where the development has the potential to cause the loss of life, permanent injury and/or temporary or permanent destruction of an environmental receptor which cannot be restored through minor clean-up and restoration"*

28.5.3.5 Specifically, the appropriate mitigation is in place to ensure that impacts to human receptors do not result in the loss of life.

*Risk of contaminants entering the marine environment*

28.5.3.6 Pollution incidents could result in contaminants entering the marine environment. Impacts associated with the accidental release of fluids into the environment from O&M vessels are assessed in Chapter 7: Marine Sediment and Water Quality and Chapter 16: Shipping and Navigation.

28.5.3.7 Standard mitigation will ensure the risk of such an event occurring is as low as reasonably practicable (ALARP) and that appropriate response measures are in place in the event a spill does occur.

28.5.3.8 This would ensure any impacts are below the defining threshold of major accidents and disasters, as per the IEMA (2020) primer:

*"In general, major accidents and/or disasters should be considered as part of an assessment where the development has the potential to cause the loss of life, permanent injury and/or temporary or permanent destruction of an environmental receptor which cannot be restored through minor clean-up and restoration"*

28.5.3.9 Specifically, the appropriate mitigation is in place to ensure that impacts to ecological receptors can be restored through minor clean-up and restoration.

*Failure of semi-submersible floating platform Mooring System*

28.5.3.10 The loss of holding capacity of the anchors, leading to potential drag and excessive motions of the platform has been assessed as part of the pre-FEED scope of works and in Chapter 16: Shipping and Navigation.

28.5.3.11 The mooring systems are designed to resist extreme conditions such as a 50 year return period event (i.e. significant wave height of 12.5m, wind speed of 56 knots (1hr based) and current velocity of 2.2 knots).

28.5.3.12 Each semi-submersible floating platform will have up to five mooring lines (the two prevailing lines will have a double mooring line). The mooring line will comprise mooring rope (minimum 250 mm diameter) attached to mooring chain (minimum 130 mm diameter) with a minimum number of 15 mooring clumps per chain (minimum 12 tons per clump) anchored via drag embedment anchors, suction piles or percussive/driven piles.

28.5.3.13 Furthermore, it is proposed that each structure (semi-submersible floating platform and WTG) will undergo a fatigue assessment based on the excessive motions of the platform, with the inclusion of strain gauges and load monitoring at critical interface zones. An integrated WTG and hull controller system will be fitted and digital twin / calibration and floater behaviour validation undertaken. There will also be frequent checks to monitor structural degradation.

28.5.3.14 Consideration has been given to the potential for excessive corrosion to affect the mooring system resulting in a failure of the mooring line. This has been reflected in the mooring design which factors in corrosion allowance, incorporates cathodic protection for mooring connectors and requires preventative inspections of mooring lines during the O&M phase of the Project.

28.5.3.15 Each semi-submersible floating platform will also be fitted with GPS based location monitoring device which would provide a warning if there is a breach in position of the semi-submersible floating platform near to or beyond its excursion limits. Position tracking would be available in the event of partial/full breakout.

28.5.3.16 Furthermore, were the semi-submersible floating platform/WTG to breakout, they will remain marked and visible to other navigating vessels, enabling them to identify and avoid the hazard.

28.5.3.17 The additional design mitigation would ensure any impacts are below the defining threshold of major accidents and disasters, as per the IEMA (2020) primer:

*"In general, major accidents and/or disasters should be considered as part of an assessment where the development has the potential to cause the loss of life, permanent injury and/or temporary or permanent destruction of an environmental receptor which cannot be restored through minor clean-up and restoration"*

28.5.3.18 Specifically, the appropriate mitigation is in place to ensure that impacts to human receptors do not result in the loss of life.

*Failure of Wind Turbine Generators (WTGs)*

28.5.3.19 Although the Project will only be the fourth operational FLOW farm, fixed Offshore Wind Farms (OWFs) have been operational since 1991 and during this time offshore WTGs have maintained an excellent safety record with a very low failure rate. Furthermore, the Project is 35 km offshore, away from populated areas and any failure, whether blades failing, or fires associated with faulty electrical equipment is unlikely to result in injury or death.

28.5.3.20 A review of the potential risks associated with excessive corrosion on the hull and turbine structures has been undertaken. This identified that the design followed best industry practices and applied corrosion protection philosophy, with corrosion allowance. Preventative inspections would be undertaken during the O&M phase and for those areas difficult to inspect or repair increased fatigue safety factors would be incorporated. Anode system design philosophy would also be applied covering the entire platform life.

28.5.3.21 The risk from fire in the semi-submersible floating platform and WTG will be assessed, by competent people during the design and operational phases, in accordance with recognised standards. Appropriate fire prevention measures and emergency response measures will be installed, and procedures will be in place if anyone should be on the semi-submersible floating platform or inside the WTG at the time.

28.5.3.22 The additional design mitigation would ensure any impacts are below the defining threshold of major accidents and disasters, as per the IEMA (2020) primer:

*"In general, major accidents and/or disasters should be considered as part of an assessment where the development has the potential to cause the loss of life, permanent injury and/or temporary or permanent destruction of an environmental receptor which cannot be restored through minor clean-up and restoration"*

28.5.3.23 Specifically, the appropriate mitigation is in place to ensure that impacts to human receptors do not result in the loss of life.

*Risk of Climate Change*

28.5.3.24 Climate change has the potential to impact the Project by changes to the climatic conditions and increased natural disaster risk eg. storms, floods and sea level rise affecting equipment.

28.5.3.25 The level of energy generation is dependent on the climatic conditions which can increase or decrease wind speeds, both having positive and negative effects on the development. An increase wind speed increases energy generation however if the wind speed become too high this can result in turbine shutdown becoming more frequent and potential damage to equipment. A decrease in wind speed will impact the predicted generation of the Project. Additionally, studies have been undertaken predicting an increase in wave height between 5-8% in the north-east Atlantic Sea by the end of the 21st century. However, the Project has a lifespan of approximately 25 years and whilst it is difficult to predict the level of change to climate conditions the direct impact on the Project is expected to be marginal.

28.5.3.26 The Project has the potential to reduce carbon emissions, contribute to national and international targets and lessen the impacts of climate change. The Project has a generating capacity of up to 100 MW and it would be expected to generate around 325 GWh per year. The average electricity consumption per household in the UK quoted by RenewableUK is 3,578 kWh (RenewableUK, 2020) meaning the Proposed Development would generate enough power to supply approximately 93,217 homes.

### *28.5.4 Decommissioning*

*Increased risk of vessel collisions*

28.5.4.1 Potential impacts during decommissioning would be similar to those identified during construction.

*Risk of contaminants entering the marine environment*

28.5.4.2 Potential impacts during decommissioning would be similar to those identified during construction.

*Interaction with Unexploded Ordnance*

28.5.4.3 Potential impacts during decommissioning would be similar to those identified during construction.

*Semi-submersible floating platform towing failure*

28.5.4.4 Potential impacts during decommissioning would be similar to those identified during construction.

*Terrestrial ecology*

28.5.4.5 Potential impacts during decommissioning would be similar to those identified during construction.

*Onshore Geology, Hydrogeology and Hydrology*

28.5.4.6 Potential impacts during decommissioning would be similar to those identified during construction.

## 28.6 References

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