

LLYR FLOATING OFFSHORE WIND PROJECT

Llŷr 1 Floating Offshore Wind Farm

Environmental Statement

**Volume 6: Appendix 30 Major Accidents and Disasters
(MA&D) Environment Risk Record**

August 2024

**Document Status**

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Approval for Issue

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Prepared for	Llŷr Floating Wind Limited
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Glossary of project terms

Term	Definition
The Applicant	The developer of the Project, Llŷr Floating Wind Limited.
Array	All wind turbine generators, inter array cables, mooring lines, floating sub-structures and supporting subsea infrastructure within the Array Area, as defined, when considered collectively, excluding the offshore export cable(s).
Array Area	The area within which the wind turbine generators, inter array cables, mooring lines, floating sub-structures and supporting subsea infrastructure will be located.
Floventis Energy	A joint venture company between Cierco Ltd and SBM Offshore Ltd of which Llŷr Floating Wind Limited is a wholly owned subsidiary.
Landfall	The location where the offshore export cable(s) from the Array Area, as defined, are brought onshore and connected to the onshore export cables (as defined) via the transition joint bays.
Llŷr 1	The proposed Project, for which the Applicant is applying for Section 36 and Marine Licence consents. Including all offshore and onshore infrastructure and activities, and all project phases.
Marine Licence	A licence required under the Marine and Coastal Access Act 2009 for marine works which is administered by Natural Resources Wales (NRW) Marine Licensing Team on behalf of the Welsh Ministers.
Offshore Development Area	The footprint of the offshore infrastructure and associated temporary works, comprised of the Array Area and the Offshore Export Cable Corridor, as defined, that forms the offshore boundary for the S36 Consent and Marine Licence application.
Offshore Export Cable	The cable(s) that transmit electricity produced by the WTGs to landfall.
Offshore Export Cable Corridor (OfECC)	The area within which the offshore export cable circuit(s) will be located, from the Array Area to the Landfall.
Onshore Development Area	The footprint of the onshore infrastructure and associated temporary works, comprised of the Onshore Export Cable Corridor and the Onshore Substation, as defined, and including new access routes and visibility splays, that forms the onshore boundary for the planning application.
Onshore Export Cable(s)	The cable(s) that transmit electricity from the landfall to the onshore substation.
Onshore Export Cable Corridor (OnECC)	The area within which the onshore export cable circuit(s) will be located.
proposed Project	All aspects of the Llŷr 1 development (i.e. the onshore and offshore components).
Onshore Substation	Located within the Onshore Development Area, converts high voltage generated electricity into low voltage electricity that can be used for the grid and domestic consumption.
Section 36 consent	Consent to construct and operate an offshore generating station, under Section 36 (S.36) of the Electricity Act 1989. This includes deemed planning permission for onshore works.



Probability Criteria

Probability	Category	Description of Frequency	Ranking
5	Probable	> 1 in 2 chance over 5 years	Very high
4	Possible	Greater than > 1 in 20 chance over 5 years	High
3	Unlikely	> 1 in 200 chance over 5 years	Medium
2	Rare	> 1 in 2,000 chance over 5 years	Low
1	Negligible	> 1 in 20,000 chance over 5 years	Very low

Impact Magnitude Criteria

Impact Magnitude Category	Impact Magnitude Description
4	Catastrophic
3	Severe
2	Moderate
1	Minor
0	Negligible



Level	Descriptor	Categories of Impact	Description of impact
0	Negligible	Health	<ul style="list-style-type: none"> Insignificant number of injuries or impact on health
		Social	<ul style="list-style-type: none"> Insignificant number of persons displaced and personal support required
		Economic	<ul style="list-style-type: none"> Insignificant disruption to community services, including transport services and infrastructure
		Environment	<ul style="list-style-type: none"> Insignificant impact on local economy Insignificant impact on environment
1	Minor	Health	<ul style="list-style-type: none"> Small number of people affected, no fatalities, and small number of minor injuries with first aid treatment
		Social	<ul style="list-style-type: none"> Minor damage to properties Minor displacement of a small number of people <24 hours and minor personal support required Minor localised disruption to community services or infrastructure
		Economic	<ul style="list-style-type: none"> Negligible impact on local economy and cost easily absorbed
		Environment	<ul style="list-style-type: none"> Minor impact on the environment with no lasting effects
2	Moderate	Health	<ul style="list-style-type: none"> Moderate number of fatalities with some casualties requiring hospitalisation and medical treatment and activation of MAJAX, the automated intelligent alert notification system, procedures in one or more hospitals
		Social	<ul style="list-style-type: none"> Damage that is confined to a specific location, or to a number of locations, but requires additional resources Localised displacement of >100 people for 1-3 days Localised disruption to infrastructure and community services
		Economic	<ul style="list-style-type: none"> Limited impact on local economy with some short-term loss of production, with possible additional clean-up costs
		Environment	<ul style="list-style-type: none"> Limited impact on environment with short-term or long-term effects
3	Severe	Health	<ul style="list-style-type: none"> Significant number of people in affected area impacted with multiple fatalities, multiple serious or extensive injuries, significant hospitalisation and activation of MAJAX procedures across a number of hospitals
		Social	<ul style="list-style-type: none"> Significant damage that requires support for local responders with external resources 100 to 500 people in danger and displaced for longer than 1 week. Local responders require external resources to deliver personal support Significant impact on, and possible breakdown of, delivery of some local community services
		Economic	<ul style="list-style-type: none"> Significant impact on local economy with medium-term loss of production Significant extra clean-up and recovery costs
		Environment	<ul style="list-style-type: none"> Significant impact on environment with medium-to long-term effects
4	Catastrophic	Health	<ul style="list-style-type: none"> Very large numbers of people in affected area(s) impacted with significant numbers of fatalities, large number of people requiring hospitalisation with serious injuries with longer-term effects
		Social	<ul style="list-style-type: none"> Extensive damage to properties and built up environment in affected area requiring major demolition General and widespread displacement of more than 500 people for prolonged duration and extensive personal support required Serious damage to infrastructure causing significant disruption to, or loss of, key services for prolonged period. Community unable to function without significant support
		Economic	<ul style="list-style-type: none"> Serious impact on local and regional economy with some long-term, potentially permanent, loss of production with some structural change Extensive clean-up and recovery costs.
		Environment	<ul style="list-style-type: none"> Serious long term impact on environment and/or permanent damage



Classification of Risk Criteria

Probability Category	5	0	5	10	15	20
	4	0	4	8	12	16
	3	0	3	6	9	12
	2	0	2	4	6	8
	1	0	1	2	3	4
		0	1	2	3	4
	Impact Magnitude Category					

Score (Impact Magnitude x Probability)	Level of risk
12 to 20	Critical
6 to 11	High
3 to 5	Medium
1 to 2	Low
0	None perceived

Environmental Risk Record

ID	Hazard	Hazard source and/ or pathway	Receptor	Reasonably foreseeable worst case consequence if event occurred (i.e. potential significant effect)	Maximum study area of potential impact	Pre-mitigation		Proposed mitigation	Post-mitigation			
						Degree of Harm	Impact Category		Description of Frequency	Likelihood Category	Risk Score	Level of Risk
Installation												
Vulnerability of the proposed development to natural disasters during installation												
11	Flooding from rivers, surface water, groundwater reservoirs and sewers	Periods of heavy or extreme rainfall resulting in the flooding of the Installation site and surrounding areas Proposed development affecting drainage pathways Not covered under this item: Release of contaminants into the environment, resulting in a major pollution incident due to run-off from the Installation site (see Risk ID I18); Disruption to utilities (Covered under risk IDs I20-23 and IDs I40-I43).	<u>Onshore</u> On site: - Installation personnel and equipment Off-site: - Properties - General public - Agricultural land and livestock - Sensitive environmental receptors - Biodiversity / ecological, heritage receptors	<u>Onshore</u> On site: - Damage to Installation equipment and risk of injury to Installation personnel due to flooding; Off-site: - Damage to and evacuation of affected properties, ecological sites and heritage assets due to flooding as a result of the proposed development; - Damage to crops.	Relevant catchment area modelled in the Flood Risk Assessment (FRA)	Catastrophic	4	Drainage Strategy: A pre-construction drainage plan will be developed and implemented to minimise water within the trench and ensure ongoing drainage of surrounding land. Where water enters the trenches during installation, this will be pumped via the appropriate means to remove sediment, before being discharged into local ditches or drains via temporary interceptor drains. A Detailed Drainage Management Strategy will be prepared post consent. Flood Risk Assessments and Flood risk emergency plan: Identifies the requirement to signing-up to Environment Agency (EA) advance flood warning systems, identification of access and emergency evacuation routes and/ or safe refugia for personnel in the event of a flood event. Outline Construction Environmental Management Plan (OCEMP): States an Emergency Response Plan will be developed by the Principal Contractor and will detail the procedures for responding to incidents and emergencies on site, and any reporting obligations. It also sets out the requirement for monitoring the weather forecast. Compliance with relevant Health and Safety Legislation as detailed in Table 30-1 of Volume 4, Chapter 30: Major Accidents and Disasters.	Negligible	1	4	Medium
			<u>Offshore</u> No relevant receptors	<u>Offshore</u> No relevant receptors		N/A	N/A	N/A	N/A	N/A	N/A	None perceived
12	Coastal flooding	Coastal flooding as a result of a storm event or tsunami or breach of flood defences resulting in the flooding of the Installation and surrounding areas. Not covered under this item: Release of contaminants into the environment, resulting in a major pollution incident due to run-off from the Installation site (see Risk ID I18 and I19); Disruption to utilities (Covered under risk IDs I20-23 and IDs I40-43).	<u>Onshore</u> On site: Installation personnel and equipment Off-site: Properties General public Agricultural land and livestock Sensitive environmental receptors - biodiversity / ecological, heritage receptors	<u>Onshore</u> On site: Collapse and subsidence of ground can lead to damage to equipment and death or injury; Off-site: Damage to property and risk of injury to general public; Physical damage to sensitive environmental receptors.	Relevant catchment area modelled in the Flood Risk Assessment (FRA)	Catastrophic	4	Onshore development design: A pre-construction drainage plan will be developed and implemented to minimise water within the trench and ensure ongoing drainage of surrounding land. Where water enters the trenches during installation, this will be pumped via the appropriate means to remove sediment, before being discharged into local ditches or drains via temporary interceptor drains. Flood Risk Assessments and Flood risk emergency plan: Identifies the requirement to signing-up to EA advance flood warning systems, identification of access and emergency evacuation routes and/ or safe refugia for personnel in the event of a flood event. OCEMP: States an Emergency Response Plan will be developed by the Principal Contractor and will detail the procedures for responding to incidents and emergencies on site, and any reporting obligations. It also sets out the requirement for monitoring the weather forecast. Compliance with relevant Health and Safety Legislation as detailed in Table 30-1 of Volume 4, Chapter 30: Major Accidents and Disasters.	Negligible	1	4	Medium
			<u>Offshore</u> No relevant receptors	<u>Offshore</u> No relevant receptors		N/A	N/A	N/A	N/A	N/A	N/A	None perceived
13	Storms and Gales	Strong winds resulting in the potential movement of debris across the Installation site.	<u>Onshore</u> On site: Installation personnel and equipment Utilities Off-site: Properties General public <u>Offshore</u>	<u>Onshore</u> On site: Damage to Installation equipment and risk of injury or death of Installation personnel; Off-site: Damage to property and risk of injury to general public	500m radius	Catastrophic	4	OCEMP: States an Emergency Response Plan will be developed by the Principal Contractor and will detail the procedures for responding to incidents and emergencies on site, and any reporting obligations. It also sets out the requirement for monitoring the weather forecast. Compliance with relevant Health and Safety Legislation as detailed in Table 30-1 of Volume 4, Chapter 30: Major Accidents and Disasters.	Negligible	1	4	Medium
			On-site: Installation personnel and equipment Utilities Off-site: Commercial and Recreational users	On-site: Damage to Installation equipment and risk of injury or death of Installation personnel. Off-site: Damage to offsite users and risk of injury		Catastrophic	4				4	
14	Drought	Prolonged periods of dry weather creating hard and dry surfaces across the Installation site. Potential creation of dust from Installation site due to dry weather Not covered under this item: Heat exhaustion of Installation personnel (considered under risk ID I5); Wildfires (considered under risk ID I12)	<u>Onshore</u> On site: Installation personnel and equipment Off-site: Properties General public Agricultural land Sensitive environmental receptors - biodiversity / ecological, heritage receptors	<u>Onshore</u> On site: Soiling of equipment; Off-site: Dust deposition on properties, agricultural land, and sensitive environmental sites.	500m radius	Negligible	0	The effects are unlikely to result in serious damage as defined for the purposes of the MA&D assessment.	N/A	N/A	N/A	None perceived
			<u>Offshore</u> On-site: Installation personnel and equipment Utilities Off-site: Commercial and Recreational users	<u>Offshore</u> On-site: Damage to Installation equipment and risk of injury or death of Installation personnel. Off-site: Damage to offsite users and risk of injury		Negligible	0		N/A	N/A	N/A	None perceived
15	Heatwave	Extreme heat impacting Installation workers	<u>Onshore</u> On site: Installation personnel	<u>Onshore</u> On site: Heat exhaustion of Installation personnel	Site only	Negligible	0	The effects are unlikely to result in serious damage as defined for the purposes of the MA&D assessment.	N/A	N/A	N/A	None perceived
			<u>Offshore</u> On-site: Installation personnel and equipment Utilities	<u>Offshore</u> On-site: Damage to Installation equipment and risk of injury or death of Installation personnel.		Negligible	0		N/A	N/A	N/A	None perceived

ID	Hazard	Hazard source and/ or pathway	Receptor	Reasonably foreseeable worst case consequence if event occurred (i.e. potential significant effect)	Maximum study area of potential impact	Pre-mitigation		Proposed mitigation	Post-mitigation			
						Degree of Harm	Impact Category		Description of Frequency	Likelihood Category	Risk Score	Level of Risk
16	Cold and snow	Extreme cold weather including snowfall impacting the Installation site Not covered under this item: Utilities freezing on-site - see disruption to utilities (Covered under risk IDs I20-23 and IDs I40-42). Icy surfaces resulting in traffic accidents involving Installation traffic (see Risk ID I36) Melting snow and ice washing pollutants and contaminants into surrounding areas (see Risk ID I18 and I19)	<u>Onshore</u> On site: Installation personnel and equipment	<u>Onshore</u> On site Risk to the health of Installation workers due to directly experiencing freezing temperatures and/ or being more vulnerable to other hazards as a consequence (for example being more prone to slips and falls on icy surfaces, reduced visibility and mobility/ dexterity due to precipitation and additional clothing, vehicles losing traction and/ or control of direction of travel, hidden hazards beneath snow, falling snow from roofs etc.). Failure of Installation machinery;	Site only	Moderate	2	OCEMP: States an Emergency Response Plan will be developed by the Principal Contractor and will detail the procedures for responding to incidents and emergencies on site, and any reporting obligations. It also sets out the requirement for monitoring the weather forecast. Compliance with relevant Health and Safety Legislation as detailed in Table 30-1 of Volume 4, Chapter 30: Major Accidents and Disasters .	Negligible	1	2	Low
			<u>Offshore</u> On site: Installation personnel and equipment	<u>Offshore</u> On site Risk to the health of Installation workers due to freezing temperatures; Failure of Installation machinery;		Moderate	2		Negligible	1	2	Low
17	Lightning and Electrical Storms	Working in proximity to tall equipment that may be more prone to being struck by lightning (e.g. cranes) <u>Not covered under this item:</u> Fire at a Project site (considered under risk IDs I14 and I15). Loss of electricity (considered under risk IDs I20) Loss of telecommunications (considered under risk IDs I23)	<u>Onshore</u> On site: Installation personnel and equipment	<u>Onshore</u> On site: Damage to Installation equipment (including loss of communications, data stores, telemetry systems or control/ maintenance/ safety mechanisms, each of which could have knock-on implications in terms of other consequences) and risk of injury or death of Installation personnel;	Site only	Moderate	2	OCEMP: States an Emergency Response Plan will be developed by the Principal Contractor and will detail the procedures for responding to incidents and emergencies on site, and any reporting obligations. It also sets out the requirement for monitoring the weather forecast. Compliance with relevant Health and Safety Legislation as detailed in Table 30-1 of Volume 4, Chapter 30: Major Accidents and Disasters .	Negligible	1	2	Medium
			<u>Offshore</u> On site: Installation personnel and equipment	<u>Offshore</u> On site: Damage to Installation equipment (including loss of communications, data stores, telemetry systems or control/ maintenance/ safety mechanisms, each of which could have knock-on implications in terms of other consequences) and risk of injury or death of Installation personnel;		Moderate	2		Negligible	1	2	Medium
18	Reduced visibility, e.g. due to volcanic ash, dust, sand or fog	Volcanic eruptions overseas can produce ash clouds which may reach the UK and impact on the Installation site. Reduced visibility at the Installation site due to weather. Not covered under this item: Traffic accidents involving Installation traffic due to adverse weather (see Risk ID I36)	<u>Onshore</u> On site: Installation personnel and equipment	<u>Onshore</u> On site: Deposition of ashes, sand on Installation areas and equipment Reduced visibility limiting Installation works.	Site only	Negligible	0	The effects are unlikely to result in serious damage as defined for the purposes of the MA&D assessment.	N/A	N/A	N/A	None perceived
			<u>Offshore</u> On site: Installation personnel and equipment	<u>Offshore</u> On site: Deposition of ashes, sand on Installation areas and equipment Reduced visibility limiting Installation works.		Negligible	0		N/A	N/A	N/A	Not significant
19	Ground instability hazards, e.g. landslides, ground collapse and sinkholes	Unstable ground conditions, landslides, sinkholes following heavy rainfall <u>Not covered under this item:</u> Structural collapse	<u>Onshore</u> On site: Installation personnel and equipment Off-site: Properties General Public Agricultural Land <u>Sensitive environmental receptors</u>	<u>Onshore</u> On site: Collapse and subsidence of ground can lead to damage to equipment and death or injury; Off-site: Damage to property and risk of injury to general public; Physical damage to sensitive environmental receptors.	500m	Severe	3	Ground Investigation: Will be carried out prior to construction across the Array Area and in the OFECC, to gather further information on debris, boulders, presence of seabed features and sediment depth, etc. Geotechnical design: Design of foundations and selection of materials inline with relevant standards, taking to account potential for ground movement or compaction. Compliance with relevant guidance and Legislation as detailed in Table 30-1 of Volume 4, Chapter 30: Major Accidents and Disasters .	Negligible	1	3	Medium
			<u>Offshore</u> On site: Installation personnel and equipment Off-site: Commercial and Recreational vessels Sensitive environmental receptors	<u>Offshore</u> On site: Collapse and subsidence of ground can lead to damage to equipment and death or injury; Off-site: Damage to property and risk of injury to general public; Physical damage to sensitive environmental receptors.		Severe	3		Negligible	1	3	Medium
110	Seismic hazards such as earthquakes or tremors	Earthquakes, tremors resulting in physical damage <u>Not covered under this item:</u> Structural collapse	<u>Onshore</u> On site: Installation personnel and equipment Off-site: Properties General Public Agricultural Land <u>Sensitive environmental receptors (ecological and heritage sites)</u>	<u>Onshore</u> On site: Collapse and subsidence of ground can lead to damage to equipment and death or injury; Off-site: Damage to property and risk of injury to general public; Physical damage to sensitive environmental receptors.	500m	Catastrophic	4	Ground Investigation: Geophysical and geotechnical surveys would be carried out prior to cable installation, to gather further information on route debris, boulders, presence of seabed features and sediment depth, etc. Geotechnical design: Design of foundations and selection of materials inline with relevant standards, taking to account potential for ground movement or compaction. Compliance with relevant guidance and Legislation as detailed in Table 30-1 of Volume 4, Chapter 30: Major Accidents and Disasters .	Negligible	1	4	Medium
			<u>Offshore</u> On site: Installation personnel and equipment Off-site: Commercial and Recreational vessels Sensitive environmental receptors	<u>Offshore</u> On site: Collapse and subsidence of ground can lead to damage to equipment and death or injury; Damage to Installation equipment (including loss of communications, data stores, telemetry systems or control/ maintenance/ safety mechanisms, each of which could have knock-on implications in terms of other consequences) and risk of injury or death of Installation personnel; and Damage to proposed Project Infrastructure Off-site: Physical damage to sensitive environmental receptors.		Catastrophic	4		Negligible	1	4	Medium
111	Space weather (e.g. geomagnetic storms, radiation storms and solar flares)	Increased radiation risk to human health Disruption to GPS and communications <u>Not covered under this item:</u> Loss of communication (covered under risk ID I23 and I43) Loss of electricity transmission network (covered under risk IDs I20 and I40)	<u>Onshore</u> On site: Installation workers	<u>Onshore</u> On-site Increase in exposure to radiation resulting in illness Disruption to GPS	Site only	Negligible	0	In line with Public Health England guidance, a significant space weather event may cause people on the ground to receive an unusual radiation dose, however it would be far too small to produce an observable health effect.	N/A	N/A	N/A	None perceived
			<u>Offshore</u> On site: Installation workers	<u>Offshore</u> On-site Increase in exposure to radiation resulting in illness Disruption to marine communications		Negligible	0		N/A	N/A	N/A	None perceived

ID	Hazard	Hazard source and/ or pathway	Receptor	Reasonably foreseeable worst case consequence if event occurred (i.e. potential significant effect)	Maximum study area of potential impact	Pre-mitigation		Proposed mitigation	Post-mitigation			
						Degree of Harm	Impact Category		Description of Frequency	Likelihood Category	Risk Score	Level of Risk
112	Wildfires	Wildfire spreading onto the Installation site Not covered under this item: Emergency response activities could result in impacts on sensitive receptors off-site (covered under risk ID 124)	<u>Onshore</u> On site: Installation personnel and equipment Off-site: Properties General Public Agricultural Land Sensitive environmental receptors (ecological and heritage sites)	<u>Onshore</u> On site: Damage to Installation equipment and risk of injury or death of Installation personnel; Off site: Fire spreading from site to a neighbouring site resulting in damage to property and risk of injury or death to the general public; Physical damage to sensitive environmental receptors; Indirect effects on human health, property, heritage assets and wildlife due to smoke and ash deposition.	500m	Severe	4	OCEMP - Sets out requirements for fire prevention and control, within the 'Construction Site and Housekeeping' controls.	Negligible	1	4	Medium
			<u>Offshore</u> On site: Installation personnel and equipment Off-site: Commercial and recreational vessels and users Sensitive environmental receptors	<u>Offshore</u> On site: Damage to Installation equipment and risk of injury or death of Installation personnel; Off site: Physical damage to sensitive environmental receptors; Indirect effects on human health, property, heritage assets and wildlife due to smoke and ash deposition.		Severe	4		Negligible	1	4	Medium
113	Extreme humidity condition (high and low)	Periods of high and low humidity impacting the Installation site	<u>Onshore</u> On site: Installation personnel and equipment	<u>Onshore</u> On site: Risk of illness for Installation personnel and failure of equipment.	Site only	Negligible	0	The effects are unlikely to result in serious damage as defined for the purposes of the MA&D assessment.	N/A	N/A	N/A	None perceived
			<u>Offshore</u> On site: Installation personnel and equipment	<u>Offshore</u> On site: Risk of illness for Installation personnel and failure of equipment.		Negligible	0		N/A	N/A	N/A	None perceived
Vulnerability of the installation of the proposed development to major accidents from on-site sources and the potential major accidents resulting from installation works and operation of temporary associated developments												
114	Fire and/or explosion at the development site	Cutting or drilling into unidentified utilities; Release of ground gas as a result of Installation activities; Fire/ explosion at a neighbouring site leading to a domino effect; Unexploded Ordnance (UXO); Storage and handling of fuel or other flammable and combustible material; Electrical faults and faulty wiring; Hot work operations (e.g. welding, smouldering, grinding etc.); Smoking; Portable heaters; Temporary lighting and lamps; Not covered under this item: Emergency response activities could result in impacts on sensitive receptors off-site (covered under risk ID 124)	<u>Onshore</u> On site: Installation personnel and equipment Off-site: Properties General Public Agricultural Land Sensitive environmental receptors (ecological and heritage sites)	<u>Onshore</u> On site: Damage to Installation equipment and risk of injury or death of Installation personnel; Off site: Fire spreading from site to a neighbouring site resulting in damage to property and risk of injury or death to the general public; Physical damage to sensitive environmental receptors; Indirect effects on human health, property, heritage assets and wildlife due to smoke and ash deposition.	500m	Catastrophic	4	Design: Unexploded Ordnance (UXO) survey along the cable route (onshore and offshore) and turbine locations. These surveys will be used to identify potential obstructions relating to maritime UXO. The likely number of UXO and detection methods will be confirmed in a UXO survey prior to start of the seabed structures installation.	Negligible	1	4	Medium
			<u>Offshore</u> On site: Installation personnel and equipment Off-site: Commercial and recreational vessels and users Sensitive environmental receptors	<u>Offshore</u> On site: Damage to Installation equipment and risk of injury or death of Installation personnel; Off site: Physical damage to sensitive environmental receptors; Indirect effects on human health, property, heritage assets and wildlife due to smoke and ash deposition.		Catastrophic	4		Negligible	1	4	Medium
116	Unexploded Ordnance in the marine environment	Disturbance of unidentified UXO during the installation of marine infrastructure	<u>Onshore</u> No relevant receptors	<u>Onshore</u> No relevant receptors	3.5km of offshore works area	N/A	N/A	Design: Unexploded Ordnance (UXO) survey along the cable route (onshore and offshore) and turbine locations. These surveys will be used to identify potential obstructions relating to maritime UXO. The likely number of UXO and detection methods will be confirmed in a UXO survey prior to start of the seabed structures installation.	N/A	N/A	N/A	None perceived
			<u>Offshore</u> On site: Installation personnel and equipment Sensitive environmental receptors - marine environment receptors Off-site: Sensitive environmental receptors - marine ecology	<u>Offshore</u> On site: Death or injury of Installation personnel. Mortality and potential mortal injury of fish species and marine mammals Off-site: Mortality and potential mortal injury of fish species and marine mammals		Catastrophic	4		Negligible	1	4	Medium
117	Ground instability - collapse of deep excavations and stockpiles	Collapse of slopes during deep excavations and stockpiling	<u>Onshore</u> On site: Installation personnel and equipment Off-site: Properties General Public Agricultural Land Sensitive environmental receptors (ecological and heritage sites)	<u>Onshore</u> On site: Collapse and subsidence of ground that can lead to damage to equipment and death or injury of Installation personnel. Off-site: Damage to property, agricultural land, heritage assets and risk of injury or death to the general public; Physical damage to sensitive environmental sites.	500m	Moderate	3	Compliance with relevant Health and Safety Legislation as detailed in Table 30-1 of Volume 4, Chapter 30: Major Accidents and Disasters .	Negligible	1	3	Medium
			<u>Offshore</u> On site: Installation personnel and equipment Off-site: Commercial and recreational vessels and users Sensitive environmental receptors	<u>Offshore</u> On site: Damage to Installation equipment and risk of injury or death of Installation personnel; Off site: Physical damage to sensitive environmental receptors;		Moderate	3		Negligible	1	3	Medium

ID	Hazard	Hazard source and/ or pathway	Receptor	Reasonably foreseeable worst case consequence if event occurred (i.e. potential significant effect)	Maximum study area of potential impact	Pre-mitigation		Proposed mitigation	Post-mitigation			
						Degree of Harm	Impact Category		Description of Frequency	Likelihood Category	Risk Score	Level of Risk
118	Major leaks and spillages at the development site resulting in contamination or release of hazardous substances	Handling and storage of hazardous substances, i.e. chemicals and fuels; Loss of containment; Contaminated run-off from site; Creation of new drainage pathways to sensitive receptors; Pollution of the marine environment; Loss of/damage to equipment.	<u>Onshore</u> On site: Installation personnel and equipment Off-site: Properties General public Agricultural land Sensitive environmental receptors (ecological and heritage sites, groundwater, surface water and marine receptors)	<u>Onshore</u> On site: Risk of contact with hazardous substances to Installation personnel Off-site: Risk of contact with hazardous substances by general public; Contamination of sensitive environmental receptors and agricultural land.	5km	Severe	3	OCEMP: Appropriate measures to mitigate leaks and spills are included with in the OCEMP. The OCEMP also notes that a Pollution Prevention Management Plan, Water Management Plan and Water Quality and Pollution Management Plan would be prepared post consent. PEMP: is proposed to ensure that the potential for any contaminant release is strictly controlled. All proposed Project vessels shall comply with the International Regulations for Preventing Collisions at Sea (IMO, 1972) and regulations relating to International Convention for the Prevention of Pollution from Ships (the MARPOL Convention 73/78) (IMO,2021) with the aim of preventing and minimising pollution from ships. All vessels shall have a contingency plan for marine oil pollution (Shipboard Oil Pollution Emergency Plan).	Negligible	1	3	Medium
		Handling and storage of hazardous substances, i.e. chemicals and fuels; Loss of containment; Contamination of marine environment; Accidental events during cable crossing; Semi-submersible floating platform towing failure; Pollution of the marine environment; Loss of/damage to equipment..	<u>Offshore</u> On site: Installation personnel and equipment Off-site: Marine environment Sensitive environmental receptors	<u>Offshore</u> On site: Risk of contact with hazardous substances to Installation personnel Off-site: Risk of contact with hazardous substances by general public; Contamination of sensitive environmental receptors and marine environment		Severe	3		Negligible	1	3	Medium
120	Loss or failure of electricity transmission	Unidentified utilities impacted by excavation, piling, cutting and drilling works. Damage to electricity transmission network from meteorological conditions or due to flooding impacting the proposed development. <u>Not covered within this item:</u> Disruption of utilities can lead to an interruption of communications (covered under risk ID 123 and 143) and services which may increase other MA&D risks;	<u>Onshore</u> On site: Installation equipment and activity Off-site: Properties served by such utilities	<u>Onshore</u> On site: Failure of equipment reliant on mains power. Disruption to Installation activity. Limited ability for an emergency response plan to be implemented, if reliant on mains power, and delay to emergency response. Limited ability to implement and effective safety, security and environmental management systems Off-site: Disruption to properties Limited ability for an emergency response plan to be implemented, if reliant on mains power, and delay to emergency response.	500m	Minor	1	OCEMP - States an Emergency Response Plan will be developed by the Principal Contractor and will detail the procedures for responding to incidents and emergencies on site, and any reporting obligations. Utilities connections would be protected at all times during the construction works. Inspection pits for buried utilities would be performed and clearances clearly demarcated on site. Critical services may require back up power supply or batteries.	Negligible	1	1	Low
			<u>Offshore</u> On site: Installation equipment and activity Off-site: Commercial and Recreational vessel users	<u>Offshore</u> <u>On site:</u> Failure of equipment reliant on mains power. Disruption to Installation activity. Limited ability for an emergency response plan to be implemented, if reliant on mains power, and delay to emergency response. <u>Off-site</u> Disruption to other vessels and users Limited ability for an emergency response plan to be implemented, if reliant on mains power, and delay to emergency response.		Minor	1		Negligible	1	1	Low
121	Loss or failure of gas supply	Unidentified utilities impacted by excavation, piling, cutting and drilling works. Damage to gas supply network from meteorological conditions.	<u>Onshore</u> On site: Installation equipment and activity Off-site: Properties served by such utilities	<u>Onshore</u> On site: Failure of equipment reliant on mains power. Disruption to Installation activity. Limited ability for an emergency response plan to be implemented, if reliant on mains power, and delay to emergency response. Limited ability to implement and effective safety, security and environmental management systems Off-site: Disruption to properties Limited ability for an emergency response plan to be implemented, if reliant on mains power, and delay to emergency response.	500m	Negligible	0	The loss of gas supply is unlikely to result in serious damage as defined for the purposes of this assessment.	N/A	N/A	N/A	None perceived
			<u>Offshore</u> On site: Installation equipment and activity Off-site: Commercial and Recreational vessel users	<u>Offshore</u> <u>On site:</u> Failure of equipment reliant on mains power. Disruption to Installation activity. Limited ability for an emergency response plan to be implemented, if reliant on mains power, and delay to emergency response. Limited ability to implement and effective safety, security and environmental management systems. <u>Off-site</u> Disruption to other vessels and users Limited ability for an emergency response plan to be implemented, if reliant on mains power, and delay to emergency response.		Negligible	0		N/A	N/A	N/A	None perceived
122	Loss or failure of water supply	Unidentified utilities impacted by excavation, piling, cutting and drilling works.	<u>Onshore</u> On site: Installation equipment and activity Off-site: Properties served by such utilities	<u>Onshore</u> On site: Failure of equipment reliant on mains power. Disruption to Installation activity. Limited ability for an emergency response plan to be implemented, if reliant on mains power, and delay to emergency response. Limited ability to implement and effective safety, security and environmental management systems Off-site: Disruption to properties Limited ability for an emergency response plan to be implemented, if reliant on mains power, and delay to emergency response.	<50m	Severe	3	OCEMP - States an Emergency Response Plan will be developed by the Principal Contractor and will detail the procedures for responding to incidents and emergencies on site, and any reporting obligations. Utilities connections would be protected at all times during the construction works	Negligible	1	3	Medium

ID	Hazard	Hazard source and/ or pathway	Receptor	Reasonably foreseeable worst case consequence if event occurred (i.e. potential significant effect)	Maximum study area of potential impact	Pre-mitigation		Proposed mitigation	Post-mitigation			
						Degree of Harm	Impact Category		Description of Frequency	Likelihood Category	Risk Score	Level of Risk
121	Loss of failure of water supply	Damage to water supply network from meteorological conditions.	<u>Offshore</u> On site: Installation equipment and activity Off-site: Commercial and Recreational vessel users	<u>Offshore</u> Failure of equipment reliant on mains power. Disruption to Installation activity. Limited ability for an emergency response plan to be implemented, if reliant on mains power, and delay to emergency response. Limited ability to implement and effective safety, security and environmental management systems. <u>Off-site</u> Disruption to other vessels and users Limited ability for an emergency response plan to be implemented, if reliant on mains power and delay to emergency response.	500m	Severe	3	Utilities connections would be protected at all times during the construction works.	Negligible	1	3	Medium
								An ERCoP would be prepared post consent.				
123	Loss or failure of telecommunications	Unidentified utilities impacted by excavation, piling, cutting and drilling works.	<u>Onshore</u> On site: Installation equipment and activity Off-site: Properties served by such utilities	On site: Failure of equipment reliant on mains power. Disruption to Installation activity. Limited ability for an emergency response plan to be implemented, if reliant on mains power, and delay to emergency response. Limited ability to implement and effective safety, security and environmental management systems Off-site Disruption to properties Limited ability for an emergency response plan to be implemented, if reliant on mains power and delay to emergency response.	500m	Catastrophic	4	The ERCoP should consider the procedure to be followed in the event of the loss of communications.	Negligible	1	4	Medium
		Damage to electricity transmission or telecommunications networks from meteorological conditions.	<u>Offshore</u> On site: Installation equipment and activity Off-site: Commercial and Recreational vessel users	<u>Offshore</u> On site: Failure of equipment reliant on mains power. Disruption to Installation activity. Limited ability for an emergency response plan to be implemented, if reliant on mains power, and delay to emergency response. Limited ability to implement and effective safety, security and environmental management systems. <u>Off-site</u> Disruption to other vessels and users Limited ability for an emergency response plan to be implemented, if reliant on mains power and delay to emergency response.		Catastrophic	4		Negligible	1	4	Medium
124	Emergency response activities implemented by the Project impacting on sensitive receptors	Retardant residues from fire fighting activities draining into environmentally sensitive areas and/ or controlled waters.	<u>Onshore</u> On site: Sensitive environmental receptors (surface water, groundwater, marine receptors) Off site: Agricultural land Sensitive environmental receptors (surface water, groundwater, marine)	<u>Onshore</u> On site: Contamination and pollution of identified sensitive environmental receptors Off-site: Contamination and pollution of identified sensitive environmental receptors	500m	Minor	1	OCEMP: States an Emergency Response Plan will be developed by the Principal Contractor and will detail the procedures for responding to incidents and emergencies on site, and any reporting obligations. An ERCoP would be prepared post consent.	Negligible	1	1	Low
			<u>Offshore</u> On site: Sensitive environmental receptors (surface water, groundwater, marine receptors) Off site: Sensitive environmental receptors (surface water, groundwater, marine)	<u>Offshore</u> On site: Contamination and pollution of identified sensitive environmental receptors Off-site: Contamination and pollution of identified sensitive environmental receptors		Minor	1		Negligible	1	1	Low
125	Absent or deficient safety and environmental management systems (e.g. inadequate planning, resource provision, procedures)	Increased risk of MA&D hazards described within this register.	<u>Onshore</u> On site: Installation personnel and equipment Off-site: General public Agricultural land Sensitive environmental receptors (ecological and heritage sites, groundwater, surface water and marine receptors)	As described within this register for all hazards relevant to the installation phase.	5km	Catastrophic	4	The installation contractor(s) would be required to have an Environmental Management System. An ERCoP would be prepared post consent. Compliance with relevant Legislation as detailed in Table 30-1 of Volume 4, Chapter 30: Major Accidents and Disasters .	Negligible	1	4	Medium
			<u>Offshore</u> On site: Installation personnel and equipment Off-site: Residential and commercial vessels and users Sensitive environmental receptors (ecological and heritage sites, groundwater, surface water and marine receptors)			Catastrophic	4		Negligible	1	4	Medium
126	Marine Navigation	Risk of collision, disruption to activities and vessel grounding;	<u>Onshore</u> On-site: Loss of life or injury Collapse and subsidence of ground Off-site: Death/injury to shipping personnel Physical damage to sensitive environmental receptors.	An assessment of the marine navigation risks is presented in Volume 2 , Chapter 24. The assessment concludes that the all marine navigation risks are considered not significant.				Measures relating to the management of Shipping and Navigation risks are described in full detailed within Table 25-13 of Volume 3 Chapter 25 and are not repeated within this chapter. In summary these include: •The application of safety zones; •Cable burial risk assessment; •Carting of infrastructure; •Compliance with MGN 654 (Including the ERCoP); •Compliance with floating foundation guidance; •Fishing Liaison (including a Fisheries Liaison and Co-existence Plan); •Guard Vessels; •Lighting and Marking (including a Lighting and Marking Management Plan); •Marine coordination for project vessels; •Pollution planning; •Project vessel compliance with international marine regulations; •Promulgation of information; and •A Marine Pollution Contingency Plan (MPCP).	Broadly Acceptable to Tolerable with Mitigation, Not significant			
		Displacement of anchorages during Installation impacting shipping industries;	<u>Offshore</u> On-site/ off-site Installation personnel and equipment Commercial and fishing vessels Sensitive environmental receptors in the marine environment									
			<u>Onshore</u> No relevant receptors	<u>Onshore</u> No relevant receptors		N/A	0	N/A	N/A	N/A	N/A	None perceived

ID	Hazard	Hazard source and/ or pathway	Receptor	Reasonably foreseeable worst case consequence if event occurred (i.e. potential significant effect)	Maximum study area of potential impact	Pre-mitigation		Proposed mitigation	Post-mitigation			
						Degree of Harm	Impact Category		Description of Frequency	Likelihood Category	Risk Score	Level of Risk
i27	Ground instability from subsea drilling/anchor installation	Unstable ground conditions under sea	<u>Offshore</u> On site: Installation personnel and equipment Off-site: Marine environment <u>Sensitive environmental receptors</u>	<u>Offshore</u> On site: Collapse and subsidence of ground can lead to damage to equipment and death or injury; Off-site: <u>Physical damage to sensitive environmental receptors</u>	5km	Severe	3	Ground investigation: Additional ground investigation to confirm undersea ground conditions and ground related risks. Geotechnical design: design of earthworks and foundations and selection of materials in accordance with relevant standards, taking into account potential for ground movement and compaction, in order to minimise risk associated with drilling and anchor installation.	Negligible	1	3	Medium
i28	Bird Collision Risk	Risk of collision of birds with wind turbines	<u>Onshore</u> <u>No relevant receptors</u>	<u>Onshore</u> <u>No relevant receptors</u>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	None perceived
			<u>Offshore</u> On site: Installation personnel and equipment Sensitive environmental receptors - birds Off-site: <u>Sensitive environmental receptors - birds</u>	<u>Offshore</u> On site: Mortality and potential mortal injury of bird species. Off-site: Mortality and potential mortal injury of bird species	Site only	Negligible	0	N/A	N/A	N/A	N/A	None perceived
i29	Collision of marine mammals with project vessels/cables	Risk of collision of equipment with marine mammals	<u>Onshore</u> <u>No relevant receptors</u>	<u>Onshore</u> <u>No relevant receptors</u>	5km	N/A	N/A	N/A	N/A	N/A	N/A	None perceived
			<u>Offshore</u> On site: Installation personnel and equipment Sensitive environmental receptors - marine environment receptors Off-site: <u>Sensitive environmental receptors - marine ecology</u>	<u>Offshore</u> On site: Death or injury of Installation personnel. Mortality and potential mortal injury of fish species and marine mammals Off-site: Mortality and potential mortal injury of fish species and marine mammals		Severe	3	Vessels and cables should avoid areas where there are likely to be large amounts of marine mammals e.g. feeding grounds, as part of their route. Vessel operators should be aware of the risk of marine mammal collision, with speed limits in place. Further details as provide in the Marine Mammal Mitigation Plan (MMMP).	Rare	2	6	High
i30	Installation within the marine environment	Handling and storage of hazardous substances, i.e. chemicals and fuels; Loss of containment; Contaminated run-off from site;	<u>Onshore</u> No relevant receptors	<u>Onshore</u> No relevant receptors	5km	N/A	N/A	N/A	N/A	N/A	N/A	None perceived
			<u>Offshore</u> On-site/ Off-site: Sensitive environmental receptors in the marine environment	<u>Offshore</u> Off-site: Risk of contact with hazardous substances by general public; Contamination of marine environment		Catastrophic	4	OCEMP: Appropriate measures to mitigate leaks and spills are included with in the OCEMP. An ERCOP, Marine Pollution Contingency Plan and Shipboard Oil Pollution Emergency Plans will also be prepared post consent to provide details of proposed mitigation measures.	Negligible	1	4	Medium
i31	Absent or deficient security provision (e.g. inadequate planning, resource provision, procedures)	Increased risk of vandalism/ crime/ terrorism	<u>Onshore</u> On site: Installation personnel and equipment Off-site: General public	<u>Onshore</u> On site: Death or risk of injury to Installation personnel; Damage to Installation equipment Off-site: <u>Risk of long term injury of death of members of the public</u>	500m	Catastrophic	4	OCEMP: On-site security provision. Compliance with relevant Legislation as detailed in Table 30-1 of Volume 4, Chapter 30: Major Accidents and Disasters .	Negligible	1	4	Medium
			<u>Offshore</u> On site: Installation personnel and equipment Off-site: Commercial and recreational vessels and users	<u>Offshore</u> On site: Death or risk of injury to Installation personnel; Damage to Installation equipment Off-site: <u>Risk of long term injury of death of members of the public</u>		Catastrophic	4		Negligible	1	4	Medium
Vulnerability of the installation of the main development site and associated developments, and operation of temporary associated developments to major accidents from off-site sources												
i32	Fire at a neighbouring site	Fire at a neighbouring site impacting on the Installation of the proposed development or the operation of temporary associated developments Not covered under this item: Potential to result in fire on site (covered under risk ID I14) Impeded access to site, limiting the ability to implement emergency response activities (covered under risk ID I51).	<u>Onshore</u> On site: Installation personnel and equipment	<u>Onshore</u> On-site: Indirect effects on human health and equipment due to smoke and ash deposition.	Site only	Negligible	0	The effects are unlikely to result in serious damage as defined for the purposes of the MA&D assessment.	N/A	N/A	N/A	None perceived
			<u>Offshore</u> On site: Installation personnel and equipment	<u>Offshore</u> On-site: Indirect effects on human health and equipment due to smoke and ash deposition.		Negligible	0		N/A	N/A	N/A	None perceived
i33	Explosion and structural collapse at neighbouring sites	Explosion and structural collapse at a neighbouring site impacting on the Installation of the proposed development or the operation of temporary associated developments Not covered under this item: Impeded access to the main development site, limiting the ability to implement emergency response activities (covered under risk ID I51);	<u>Onshore</u> On site: Installation personnel and equipment	<u>Onshore</u> On site: Falling debris or collapse of infrastructure within the neighbouring area resulting in damage to Installation equipment and risk of injury of Installation personnel	Site only	Severe	3	OCEMP - States an Emergency Response Plan will be developed by the Principal Contractor and will detail the procedures for responding to incidents and emergencies on site, and any reporting obligations.	Negligible	1	3	Medium
			<u>Offshore</u> On site: Installation personnel and equipment	<u>Offshore</u> On site: Falling debris or collapse of infrastructure within the neighbouring area resulting in damage to Installation equipment and risk of injury of Installation personnel		Severe	3		Negligible	1	3	Medium
i34	Contamination or release of hazardous substances by off-site sources	Contamination or release of hazardous substances from off-site sources impacting on the Installation of the main development site and associated development or the operation of temporary associated development.	<u>Onshore</u> On site: Installation personnel and equipment	<u>Onshore</u> On site: Risk of contact with hazardous substances to Installation personnel	Site only	Negligible	0	The effects are unlikely to result in serious damage as defined for the purposes of the MA&D assessment.	N/A	N/A	N/A	None perceived
			<u>Offshore</u> On site: Installation personnel and equipment	<u>Offshore</u> On site: Risk of contact with hazardous substances to Installation personnel		Negligible	0		N/A	N/A	N/A	None perceived
i35	Vandalism/crime/terrorism leading to increased risk to the safety of	Criminal damage/ vandalism; Theft; Terrorist acts	<u>Onshore</u> On site: Installation personnel and equipment Off-site: General public	<u>Onshore</u> On site: Death or risk of injury to Installation personnel; Damage to Installation equipment Off-site: <u>Risk of injury or death to the general public</u>	500m	Catastrophic	4	OCEMP: On-site security provision	Negligible	1	4	Medium

ID	Hazard	Hazard source and/ or pathway	Receptor	Reasonably foreseeable worst case consequence if event occurred (i.e. potential significant effect)	Maximum study area of potential impact	Pre-mitigation		Proposed mitigation	Post-mitigation			
						Degree of Harm	Impact Category		Description of Frequency	Likelihood Category	Risk Score	Level of Risk
135	Interference to the safety of members of public and site workers	Offshore: Unauthorised access to the installation site; Ionising radiation exposure from stolen goods.	<u>Offshore</u> On site: Installation personnel and equipment Off-site: Commercial and recreational vessels and users	<u>Offshore</u> On site: Death or risk of injury to Installation personnel; Damage to Installation equipment Off-site: Commercial and recreational vessels and users	Scot	Catastrophic	4	OCEMP: On site security provision.	Negligible	1	4	Medium
136	Road Traffic Accident on the wider traffic network	Traffic accident on the wider traffic network involving Installation traffic Traffic accident on the wider network involving the carriage of high consequence dangerous goods associated with Installation Not covered under this item: Could limit the ability to implement emergency response activities (covered under risk ID I451);	<u>Onshore</u> Off-site: Motorised and non-motorised users of routes assigned for proposed development's Installation traffic Properties Sensitive environmental receptors	<u>Onshore</u> Off-site: Death or injury of road users on Installation personnel; Damage to properties; Risk of contact with hazardous substances by general public; Contamination of sensitive environmental receptors and agricultural land.	Area modelled within the Transport Assessment	Severe	3	OCEMP: Prior to construction, a Construction Traffic Management Plan (CTMP) will be prepared to provide details of access junctions, routing plans, and safety measures identifies the traffic management measures required to support the Development	Negligible	1	3	Medium
			<u>Offshore</u> No relevant receptors	<u>Offshore</u> No relevant receptors		N/A	N/A	N/A	N/A	N/A	N/A	None perceived
137	Civil unrest or protest	Members of the public protesting; Installation staff industrial action Not covered under this item: Criminal damage or vandalism (see risk ID I35)	<u>Onshore</u> On site: Installation personnel and equipment	<u>Onshore</u> On site: Disruption to installation activities.	Site only	Negligible	0	The effects are unlikely to result in serious damage as defined for the purposes of the MA&D assessment.	N/A	N/A	N/A	None perceived
			<u>Offshore</u> On site: Installation personnel and equipment	<u>Onshore</u> On site: Disruption to installation activities.		Negligible	0		N/A	N/A	N/A	None perceived
138	Outbreak of disease (emerging infectious disease or pandemic influenza)	Disease outbreak or epidemics impacting Installation workers.	<u>Onshore</u> On site: Installation personnel and equipment <u>Offshore</u>	<u>Onshore</u> On site: Death or risk of injury to installation personnel. <u>Offshore</u>	Site only	Catastrophic	4	No Project specific mitigation is identified. National and regional guidelines would be enforced on site as appropriate.	Negligible	1	4	Medium
			On site: Installation personnel and equipment	On site: Death or risk of injury to installation personnel.		Catastrophic	4		Negligible	1	4	Medium
139	Animal health – notifiable disease	Disease outbreak impacting the movement of installation workers and materials. Not covered under this item: Impacts on limiting emergency response activities are considered under risk ID I51	<u>Onshore</u> On site: Installation personnel and equipment	<u>Onshore</u> On site: Restricted access to site	Area modelled within the Transport Assessment	Negligible	0	The effects are unlikely to result in serious damage as defined for the purposes of the MA&D assessment.	N/A	N/A	N/A	None perceived
			<u>Offshore</u> On site: Installation personnel and equipment	<u>Offshore</u> On site: Restricted access to site		Negligible	0		N/A	N/A	N/A	None perceived
140	Loss or failure of electricity transmission	Damage to electricity transmission network from other developments or meteorological conditions impacting on service provision for proposed development. Not covered within this item: Disruption of utilities can lead to an interruption of communications (covered under risk ID I23 and I43) and services which may increase other MA&D risks.	<u>Onshore</u> On site: Installation equipment and activity	<u>Onshore</u> On site: Failure of equipment reliant on mains power. Disruption to Installation activity. Limited ability for an emergency response plan to be implemented, if reliant on mains power, and delay to emergency response. Limited ability to implement and effective safety, security and environmental management systems	Site only	Minor	1	OCEMP: States an Emergency Response Plan will be developed by the Principal Contractor and will detail the procedures for responding to incidents and emergencies on site, and any reporting obligations. Critical services may require back up power supply or batteries.	Negligible	1	1	Low
			<u>Offshore</u> On site: Installation equipment and activity	<u>Offshore</u> On site: Failure of equipment reliant on mains power. Disruption to Installation activity. Limited ability for an emergency response plan to be implemented, if reliant on mains power, and delay to emergency response. Limited ability to implement and effective safety, security and environmental management systems		Minor	1		Negligible	1	1	Low
141	Loss or failure of gas supply	Damage to gas supply network from other developments or meteorological conditions impacting on service provision for proposed development.	<u>Onshore</u> On site: Installation equipment and activity	<u>Onshore</u> On site: Failure of equipment reliant on gas supply Disruption to Installation activity	Site only	Negligible	0	The loss of gas supply is unlikely to result in serious damage as defined for the purposes of this assessment.	N/A	N/A	N/A	None perceived
			<u>Offshore</u> On site: Installation equipment and activity	<u>Offshore</u> On site: Failure of equipment reliant on gas supply Disruption to Installation activity		Negligible	0		N/A	N/A	N/A	None perceived
142	Loss or failure of water supply	Damage to water supply network from other developments or meteorological conditions impacting on service provision for proposed development.	<u>Onshore</u> On site: Installation equipment and activity	<u>Onshore</u> On site: Disruption to Installation activity Limited ability for an emergency response plan to be implemented, if reliant on water supply, and delay to emergency response. Limited ability to implement and effective safety and environmental management systems	Site only	Severe	3	OCEMP: States an Emergency Response Plan will be developed by the Principal Contractor and will detail the procedures for responding to incidents and emergencies on site, and any reporting obligations.	Negligible	1	3	Medium
			<u>Offshore</u> On site: Installation equipment and activity	<u>Offshore</u> On site: Disruption to Installation activity Limited ability for an emergency response plan to be implemented, if reliant on water supply, and delay to emergency response. Limited ability to implement and effective safety and environmental management systems		Severe	3		Negligible	1	3	Medium
143	Loss or failure of telecommunications	Damage to electricity transmission or navigation/telecommunications networks from other	<u>Onshore</u> On site: Installation equipment and activity	<u>Onshore</u> On site: Interruption of communications and services which may lead to other MA&D risks; Limited ability of an emergency response plan to be implemented and delay to emergency response Limited ability to implement effective safety, security and environmental management systems	Site only	Catastrophic	4	OCEMP: States an Emergency Response Plan will be developed by the Principal Contractor and will detail	Negligible	1	4	Medium

ID	Hazard	Hazard source and/ or pathway	Receptor	Reasonably foreseeable worst case consequence if event occurred (i.e. potential significant effect)	Maximum study area of potential impact	Pre-mitigation		Proposed mitigation	Post-mitigation			
						Degree of Harm	Impact Category		Description of Frequency	Likelihood Category	Risk Score	Level of Risk
143	(including navigation systems)	developments or meteorological conditions impacting on service provision for proposed development.	<u>Offshore</u>	On site: Interruption of communications and services which may lead to other MA&D risks; Limited ability of an emergency response plan to be implemented and delay to emergency response Limited ability to implement effective safety, security and environmental management systems		Catastrophic	4	the procedures for responding to incidents and emergencies on site, and any reporting obligations.	Negligible	1	4	Medium
			On site: Installation equipment and activity									
144	Food supply contamination	Pollution incident	<u>Onshore</u>	<u>Onshore</u>	Site only	Moderate	2	No Project specific mitigation is identified. National guidelines would be enforced on site as appropriate.	Negligible	1	2	Low
			On site: Installation personnel	On site: Risk of injury to Installation personnel.					Negligible	1	2	Low
			<u>Offshore</u>	<u>Offshore</u>		Moderate	2		Negligible	1	2	Low
			On site: Installation personnel	On site: Risk of injury to Installation personnel.								
145	Local fuel supply failure	Risk of disruption to Installation activities associated with availability of Installation workforce	<u>Onshore</u>	On site: Disruption to Installation processes dependent on fuel supply; Limit the ability to implement and effective safety, security and environmental management systems Limited ability for an emergency response plan to be implemented, if reliant on fuel supply, and delay to emergency response.	Site only	Moderate	2	Onshore developments design - connection to mains power would be provided at the early stage of the construction programme. A Construction Method Statement would be prepared post consent. OCEMP: States an Emergency Response Plan will be developed by the Principal Contractor and will detail the procedures for responding to incidents and emergencies on site, and any reporting obligations. Critical services may require back up power supply or batteries.	Negligible	1	2	Low
			On site: Installation personnel									
			<u>Offshore</u>	On site: Disruption to Installation processes dependent on fuel supply; Limit the ability to implement and effective safety, security and environmental management systems Limited ability for an emergency response plan to be implemented, if reliant on fuel supply, and delay to emergency response.		Moderate	2		Negligible	1	2	Low
			On site: Installation personnel									
146	Poor air quality	Off-site event resulting in the release of particulate matter and hazardous gases into the surrounding environment.	<u>Onshore</u>	<u>Onshore</u>	Site only	Negligible	0	Effects are not likely to fall within the scope of the MA&D assessment. First aid will be provided on site.	N/A	N/A	N/A	None perceived
			On site: Installation personnel	Risk of harm to the health of Installation personnel					N/A	N/A	N/A	None perceived
			<u>Offshore</u>	<u>Offshore</u>		Negligible	0		N/A	N/A	N/A	None perceived
			On site: Installation personnel	On site: Risk of harm to the health of Installation personnel								
147	Cyber-attack and digital data security	Hackers Security breach of the Installation site Not covered under this item: Could result in the failure or loss of telecommunications (covered under risk IDs I23 and I43). Unauthorised access to the site and risk of vandalism/ crime/ terrorism (covered under risk ID I35).	<u>Onshore</u>	On site: Loss of sensitive information which can increase the likelihood of crime/ terrorism/ vandalism; Could limit the ability to implement and effective safety, security and environmental management systems	Site only	Catastrophic	4	Procedures should be implemented for dealing with sensitive information. Any contractors working on the installation of the project will be required to comply with requirements for data security.	Negligible	1	4	Medium
			On site: Installation personnel and equipment;									
			<u>Offshore</u>	On site: Loss of sensitive information which can increase the likelihood of crime/ terrorism/ vandalism; Could limit the ability to implement and effective safety, security and environmental management systems		Catastrophic	4		Negligible	1	4	Medium
			On site: Installation personnel and equipment;									
148	Aviation collision	Aircraft incident within the Installation site Not covered under this item. Fire and/ or explosion at the main development site or associated development sites (Covered under Risk ID I14 and I15) Fire at neighbouring site (Covered under Risk ID I32) Explosion or structural collapse at neighbouring site (Covered under Risk ID I33).	<u>Onshore</u>	On site: Risk of death/injury to Installation personnel.	Site only	Catastrophic	4	Design: The project will be fitted with Ministry of Defence accredited aviation safety lighting, in accordance with the 2016 Air Navigation Order (CAP393). As a minimum, in terms of aviation lighting, it is planned for medium intensity (2000 Candela) steady red lighting to be positioned on the nacelle of each wind turbine. OCEMP: States an Emergency Response Plan will be developed by the Principal Contractor and will detail the procedures for responding to incidents and emergencies on site, and any reporting obligations. An ERCoP would be prepared post consent.	Negligible	1	4	Medium
			On site: Installation personnel and equipment;									
			<u>Offshore</u>	On site: Risk of death/injury to Installation personnel.		Catastrophic	4		Negligible	1	4	Medium
			On site: Installation personnel and equipment;									
149	Failure of financial system	Failure of the financial system resulting in a reduced public services Not covered under this item. Impacts on the ability of an emergency response plan to be implemented (Covered under Risk ID I51)	<u>Onshore</u>	On site: Limited ability of an emergency response plan to be implemented and delay to emergency response Increased response time or lack of available resources may lead to other MA&D risks	Site only	Catastrophic	4	No proposed Project-specific mitigation is identified. National guidelines would be enforced on site as appropriate.	Negligible	1	4	Medium
			On site: Installation personnel and equipment;									
			<u>Offshore</u>	On site: Limited ability of an emergency response plan to be implemented and delay to emergency response Increased response time or lack of available resources may lead to other MA&D risks		Catastrophic	4		Negligible	1	4	Medium
			On site: Installation personnel and equipment;									
150	Influx of British Nationals	Displacement of Installation staff in local accommodation resulting in disruption to Installation activity	<u>Onshore</u>	<u>Onshore</u>	Site only	Negligible	0	There is no pathway to create a MA&D.	N/A	N/A	N/A	None perceived
			On site: Installation activity	No pathway to create a MA&D					N/A	N/A	N/A	None perceived
			<u>Offshore</u>	<u>Offshore</u>		Negligible	0		N/A	N/A	N/A	None perceived
			On site: Installation activity	No pathway to create a MA&D								
Installation of the proposed development/ operation of temporary associated developments impacting on the vulnerability of a receptor to a MA&D hazard												

ID	Hazard	Hazard source and/ or pathway	Receptor	Reasonably foreseeable worst case consequence if event occurred (i.e. potential significant effect)	Maximum study area of potential impact	Pre-mitigation		Proposed mitigation	Post-mitigation			
						Degree of Harm	Impact Category		Description of Frequency	Likelihood Category	Risk Score	Level of Risk
IS1	Impacts on the ability of an emergency response plan to be implemented	Access for emergency services to Installation site being restricted	<u>Onshore</u> On site: Installation personnel and equipment Off-site: General Public Agricultural Land	<u>Onshore</u> On-site/ off-site Full or partial obstruction to the operation of emergency services, leading to a slow response time and increased number of deaths/ injuries or spread of contamination for risk events described for Installation.	Construction traffic routes (HGV and AIL routes)	Catastrophic	4	OCEMP: Prior to installation, a Construction Traffic Management Plan (CTMP) will be prepared to provide details of access junctions, routing plans, and safety measures identifies the traffic management measures required to support the Development	Negligible	1	4	Medium
		Installation works impeding or obstructing the response of emergency services for another site.	<u>Offshore</u> On site: Installation personnel and equipment Off-site: Commercial and residential vessels and users Sensitive environmental receptors	<u>Offshore</u> On-site/ off-site Full or partial obstruction to the operation of emergency services, leading to a slow response time and increased number of deaths/ injuries or spread of contamination for risk events described for Installation.		Catastrophic	4		Negligible	1	4	Medium
OPERATION												
Vulnerability of the proposed development (main development and permanent associated developments) to natural disasters during operation												
O1	Flooding from rivers, surface water, groundwater reservoirs and sewers	Flooding of the site and properties downstream Run-off from site <u>Not covered under this item:</u> Release of contaminants into the environment, resulting in a major pollution incident due to run-off from the site (see Risk ID O17); Disruption to utilities (Covered under risk IDs O30 to O33). Malfunctioning of equipment resulting in an accident (see risk ID O14)	<u>Onshore</u> On site: Sensitive environmental receptors on site Operational personnel Project infrastructure Off-site: General public Properties Agricultural land Sensitive environmental receptors (ecological and heritage receptors)	<u>Onshore</u> On site: Damage to infrastructure and risk of injury to operational personnel due to flooding; Off-site: Damage to and evacuation of affected properties due to flooding; Damage to crops; Physical damage to sensitive environmental receptors;	Relevant catchment area modelled in the Flood Risk Assessment (FRA)	Severe	3	No project-specific mitigation provided. National and local guidance would be followed during such an event.	Negligible	1	3	Medium
			<u>Offshore</u> No relevant receptors	<u>Offshore</u> No relevant receptors		N/A	N/A	Design: Each wind turbine will have a minimum clearance between sea level and the lowest position of the blade of 22m	N/A	N/A	N/A	N/A
O2	Coastal flooding	Coastal flooding as a result of a storm event or tsunami or breach of flood defences resulting in the flooding of the main platform and surrounding areas <u>Not covered under this item:</u> Release of contaminants into the environment, resulting in a major pollution incident due to run-off from the site (see Risk ID O14 and O17); Disruption to utilities (Covered under risk IDs O18 and O30 to O33). Malfunctioning of equipment resulting in an accident (see risk ID O14)	<u>Onshore</u> On site: Operational personnel infrastructure Off site: Properties General public Agricultural land Sensitive environmental receptors (ecological and heritage receptors)	<u>Onshore</u> On site: Collapse and subsidence of ground can lead to damage to equipment and death or injury; Off-site: Damage to property and risk of injury to general public; Physical damage to sensitive environmental receptors;	Relevant catchment area modelled in the Flood Risk Assessment (FRA)	Severe	3	No project-specific mitigation provided. National and local guidance would be followed during such an event.	Negligible	1	3	Medium
			<u>Offshore</u> No relevant receptors	<u>Offshore</u> No relevant receptors		Negligible	0	N/A	N/A	N/A	N/A	None perceived
O3	Storms and Gales	Strong winds resulting in the potential movement of debris across the site. <u>Not covered under this item:</u> Road traffic accidents (see risk ID O25)	<u>Onshore</u> On site: Operational personnel Project infrastructure <u>Offshore</u> On-site: Installation personnel and equipment Utilities Off-site: Commercial and Recreational users	<u>Onshore</u> On site: Damage to infrastructure and risk of injury or death of operational personnel and road users; <u>Offshore</u> On-site: Damage to installation equipment and risk of injury or death of Installation personnel. Off-site: Damage to offsite users and risk of injury	Site only	Moderate	2	Design: The proposed wind turbines will operate within a set wind speed range and have a minimum wind speed at which they start generating electricity, and a maximum wind speed at which cannot generate and operates in a standby mode. Design: Anchorage will be required to fix the mooring systems to the seabed. The selected anchor solution will depend on the mooring configuration, seabed conditions and the required holding capacity and will likely be a combination of drag embedment, driven piles, drilled piles and suction pile anchors. Design: Each wind turbine will have a minimum clearance between sea level and the lowest position of the blade of 22m	Negligible	1	2	Low
				Moderate		2	2					
O4	Drought	Prolonged periods of dry weather creating hard and dry surfaces across the site. Potential creation of dust from site due to dry weather <u>Not covered under this item:</u> Heat exhaustion of personnel (considered under risk ID O5);	<u>Onshore</u> On site: Operational personnel and equipment Off-site: Properties General public Agricultural land Sensitive environmental receptors	<u>Onshore</u> On site: Soiling of equipment; Off-site: Dust deposition on properties, agricultural land, and sensitive environmental sites;	500m radius	Negligible	0	The effects are unlikely to result in serious damage as defined for the purposes of the MA&D assessment.	N/A	N/A	N/A	None perceived
			<u>Offshore</u> On site: Operational personnel and equipment Off-site: Sensitive environmental receptors	<u>Offshore</u> On site: Operational equipment; Off-site: Sensitive environmental receptors		Negligible	0		N/A	N/A	N/A	None perceived
O5	Heatwave	Extreme heat impacting operational workers <u>Not covered under this item:</u> Malfunctioning of equipment resulting in an accident (see risk ID O14)	<u>Onshore</u> On site: Operational personnel <u>Offshore</u> On site: Operational personnel	<u>Onshore</u> On site: Heat exhaustion of operational personnel; <u>Offshore</u> On site: Heat exhaustion of operational personnel;	Site only	Negligible	0	The effects are unlikely to result in serious damage as defined for the purposes of the MA&D assessment.	N/A	N/A	N/A	None perceived
				Negligible		0	N/A		N/A	N/A	None perceived	

ID	Hazard	Hazard source and/ or pathway	Receptor	Reasonably foreseeable worst case consequence if event occurred (i.e. potential significant effect)	Maximum study area of potential impact	Pre-mitigation		Proposed mitigation	Post-mitigation			
						Degree of Harm	Impact Category		Description of Frequency	Likelihood Category	Risk Score	Level of Risk
O6	Cold and snow	Extreme cold weather resulting in snow and ice on site <u>Not covered under this item:</u> Utilities freezing on-site - see disruption to utilities (Covered under risk IDs O30-O33). Icy surfaces resulting in traffic accidents (see Risk ID O25) Melting snow and ice washing pollutants and contaminants into surrounding areas (see Risk ID O14 and O17) Malfunctioning of equipment resulting in an accident (see risk ID O14)	<u>Onshore</u> On site: Operational personnel	<u>Onshore</u> On site: Risk to the health of operational personnel due to freezing temperatures;	Site only	Minor	1	No project specific mitigation provided. Relevant health and safety legislation and any national or regional guidance would be adhered to. Compliance with relevant Health and Safety Legislation as detailed in Table 30-1 of Volume 4, Chapter 30: Major Accidents and Disasters .	Negligible	1	1	Low
			<u>Offshore</u> On site: Operational personnel	<u>Offshore</u> On site: Risk to the health of operational personnel due to freezing temperatures;		Minor	1		Negligible	1	1	Low
O7	Lightning and Electrical Storms	Risk of cloud-to-ground lightning striking within site during operation and maintenance activities <u>Not covered under this item:</u> Fire at the main development site (considered under risk IDs O14). Loss of electricity (considered under risk IDs O30) Loss of telecommunications (considered under risk IDs O33)	<u>Onshore</u> On site: Operational personnel	<u>Onshore</u> On site: Damage to infrastructure and risk of injury or death of operational personnel.	Site only	Severe	3	No project specific mitigation provided. Relevant health and safety legislation would be adhered to.	Negligible	1	3	Medium
			<u>Offshore</u> On site: Operational personnel	<u>Offshore</u> On site: Damage to infrastructure and risk of injury or death of operational personnel.		Severe	3		Negligible	1	3	Medium
O8	Reduced visibility, e.g. due to volcanic ash, dust, sand or fog	Volcanic eruptions overseas can produce ash clouds which may reach the UK and impact on the Installation site. Reduced visibility due to weather. <u>Not covered under this item:</u> Traffic accidents (see risk ID O25)	<u>Onshore</u> On site: Operational personnel	<u>Onshore</u> On site: Deposition of ashes and sand on site. <u>Reduced visibility limiting operational activities.</u>	Site only	Negligible	0	The effects are unlikely to result in serious damage as defined for the purposes of the MA&D assessment.	N/A	N/A	N/A	None perceived
			<u>Offshore</u> On site: Operational personnel	<u>Offshore</u> On site: Deposition of ashes and sand on site. <u>Reduced visibility limiting operational activities.</u>		Negligible	0		N/A	N/A	N/A	None perceived
O9	Ground instability hazards, e.g. landslides, ground collapse and sinkholes	Unstable ground conditions, landslides, sinkholes following heavy rainfall. Risks associated with existing ground conditions (e.g. ground instability) get mitigated during the installation of the proposed development. Therefore during operation, no hazard source - receptor pathway remains.	<u>Onshore</u> N/A	<u>Onshore</u> N/A	N/A	N/A	N/A	The effects are unlikely to result in serious damage as defined for the purposes of the MA&D assessment.	N/A	N/A	N/A	None perceived
			<u>Offshore</u> N/A	<u>Offshore</u> N/A		N/A	N/A		N/A	N/A	N/A	None perceived
O10	Seismic hazards such as earthquakes or tremors	Earthquakes, tremors resulting in physical damage <u>Not covered under this item:</u> Traffic accidents (see risk ID 25) Damage to equipment/ structures resulting in a nuclear incident (see risk ID O14)	<u>Onshore</u> On site: Operational personnel Project infrastructure Off-site: General public Properties Agricultural land Sensitive environmental receptors (ecology and heritage sites)	<u>Onshore</u> On site: Collapse and subsidence of ground can lead to damage to equipment and risk of injury or death to operational personnel; Off-site: Damage to property and risk of injury to general public; Physical damage to sensitive environmental receptors.	500m	Catastrophic	4	Design: Anchorage will be required to fix the mooring systems to the seabed. The selected anchor solution will depend on the mooring configuration, seabed conditions and the required holding capacity and will likely be a combination of drag embedment, driven piles, drilled piles and suction pile anchors. Data collated by British Geological Survey and Musson and Sargeant (2007) demonstrate that the seismic hazard of the UK is considered to be very low.	Negligible	1	4	Medium
			<u>Offshore</u> On site: Operational personnel Project infrastructure Off-site: Commercial and recreational vessels and personnel Sensitive environmental receptors (ecology and heritage sites)	<u>Offshore</u> On site: Collapse and subsidence of ground can lead to damage to equipment and risk of injury or death to operational personnel; Off-site: Damage to property and risk of injury to general public; Physical damage to sensitive environmental receptors.		Catastrophic	4		Negligible	1	4	Medium
O11	Space weather (e.g. geomagnetic storms, radiation storms and solar flares)	Disruption of telecommunications <u>Not covered under this item:</u> Loss of telecommunication (covered under risk ID O33) Loss of electricity transmission network (covered under risk IDs O30) Malfunctioning of equipment resulting in an accident (see risk ID O14)	<u>Onshore</u> On site: Operational personnel Project infrastructure	<u>Onshore</u> On site: Increase in exposure to radiation resulting in illness	Site only	Negligible	0	In line with Public Health England guidance, a significant space weather event may cause people on the ground to receive an unusual radiation dose, however it would be far too small to produce an observable health effect	N/A	N/A	N/A	None perceived
			<u>Offshore</u> On site: Operational personnel Project infrastructure	<u>Offshore</u> On site: Increase in exposure to radiation resulting in illness		Negligible	0		N/A	N/A	N/A	None perceived
O12	Wildfires	Wildfire spreading onto the Installation site <u>Not covered under this item:</u> Emergency response activities could result in impacts on sensitive receptors off-site (covered under risk ID O19)	<u>Onshore</u> On site: Operation personnel Project infrastructure Off site: Properties General public Agricultural land Sensitive environmental receptors (ecological and heritage sites)	<u>Onshore</u> On site: Damage to buildings and equipment and risk of injury or death of operational personnel; Indirect effects on human health, property, heritage assets and wildlife due to smoke and ash deposition.	500m	Catastrophic	4	No project specific mitigation provided. Relevant health and safety legislation and any national or regional guidance would be adhered to.	Negligible	1	4	Medium
			<u>Offshore</u> no relevant pathways	<u>Offshore</u> no relevant receptors	N/A	N/A	N/A		N/A	N/A	N/A	None perceived

ID	Hazard	Hazard source and/ or pathway	Receptor	Reasonably foreseeable worst case consequence if event occurred (i.e. potential significant effect)	Maximum study area of potential impact	Pre-mitigation		Proposed mitigation	Post-mitigation			
						Degree of Harm	Impact Category		Description of Frequency	Likelihood Category	Risk Score	Level of Risk
O13	Extreme humidity conditions (high and low);	Periods of high and low humidity impacting the site <u>Not covered under this item:</u> Malfunctioning of equipment resulting in an accident (see risk ID O14)	<u>Onshore</u> On site: Operational personnel	<u>Onshore</u> On site: Risk of illness for operational personnel.	Site only	Negligible	0	The effects are unlikely to fall within the scope of the MA&D assessment.	N/A	N/A	N/A	None perceived
			<u>Offshore</u> On site: Operational personnel	<u>Offshore</u> On site: Risk of illness for operational personnel.		Negligible	0		N/A	N/A	N/A	None perceived
			Vulnerability of the operation of the proposed development to major accidents from on-site sources and the potential major accidents resulting from its operation									
O14	Failure of Wind Turbine Infrastructure (including nacelle, blade and generators)	Pollution of the marine environment; Loss of/damage to equipment	<u>Offshore</u> No relevant receptors	<u>Onshore</u> No relevant receptors	N/A	N/A	N/A	N/A	N/A	N/A	N/A	None perceived
			<u>Offshore</u> On site: Operational personnel and equipment Off-site: Marine environment Sensitive environmental receptors (ecological and heritage sites, groundwater, surface water and marine receptors)	<u>Offshore</u> On site: Loss of/damage to machinery; Risk of injury or death the site personnel Off site: Damage to the marine environment	500m	Catastrophic	4	The design should consider the safety and previous testing of wind turbine generators to minimise the risk of their failure. Protocols should be in place for potential turbine failures to minimise the impacts and associated pollution.	Negligible	1	4	Medium
O15	Bird Collision Risk	Risk of collision of birds with wind turbines	<u>Onshore</u> No relevant receptors	<u>Onshore</u> No relevant receptors	N/A	N/A	N/A	N/A	N/A	N/A	N/A	None perceived
			<u>Offshore</u> On site: Operational equipment Sensitive environmental receptors - birds Off-site: Sensitive environmental receptors - birds	<u>Offshore</u> On site: Mortality and potential mortal injury of bird species. Off-site: Mortality and potential mortal injury of bird species	Site only	Negligible	0	N/A	N/A	N/A	N/A	None perceived
O16	Marine Navigation	Risk of collision, disruption to activities and vessel grounding; Impact on primary surveillance Radars ; Potential for subsea cables to interact with fishing gear and anchors ; Failure of semi-submersible floating platform mooring system; Risk of collision of equipment with marine mammals; Rock protection causing reduction in keel clearance and increased risk of vessel grounding/collision	<u>Offshore</u> No relevant receptors <u>Offshore</u> On-site/ off-site Operational personnel and equipment; Marine environment; Commercial and fishing vessels Sensitive environmental receptors in the marine environment	<u>Onshore</u> No relevant receptors <u>Offshore</u> On-site/ off-site Loss of life or injury; Loss/damage to machinery Contamination of the marine environment; Death or injury of installation personnel. Mortality and potential mortal injury of fish species and marine mammals; Mortality and potential mortal injury of fish species and marine mammals	An assessment of the marine navigation risks is presented in Volume 2 , Chapter 24. The assessment concludes that the all marine navigation risks are considered not significant.		The following measures are relevant to the operation of the Project: -Charting of infrastructure; -Guard vessel(s); -Lighting and marking (Including a Lighting and Marking Management Plan); -Promulgation of information; and -Traffic monitoring.		Broadly Acceptable to Tolerable with Mitigation, Not significant			
O17	Major leaks and spillages at the development site resulting in contamination or release of hazardous substances	Handling and storage of hazardous substances, i.e. chemicals and fuels; Loss of containment; Contaminated run-off from site; Creation of new drainage pathways to sensitive receptors; Pollution of the marine environment; Loss of/damage to equipment.	<u>Onshore</u> On site: Operational personnel and equipment Off-site: Properties General public Agricultural land Sensitive environmental receptors (ecological and heritage sites, groundwater, surface water and marine receptors)	<u>Onshore</u> On site: Risk of contact with hazardous substances to operational personnel Off-site: Risk of contact with hazardous substances by general public; Contamination of sensitive environmental receptors and agricultural land.	5km	Severe	3	An ERCoP would be prepared and submitted to the MCA post consent.	Negligible	1	3	Medium
		Handling and storage of hazardous substances, i.e. chemicals and fuels; Loss of containment; Contamination of marine environment; Accidental events during cable crossing; Semi-submersible floating platform towing failure; Pollution of the marine environment; Loss of/damage to equipment..	<u>Offshore</u> On site: Operational personnel and equipment Off-site: Marine environment Sensitive environmental receptors (ecological and heritage sites)	<u>Offshore</u> On site: Risk of contact with hazardous substances to operational personnel Off-site: Risk of contact with hazardous substances by general public; Contamination of sensitive environmental receptors and marine environment		Severe	3		PEMP: A PEMP is proposed to ensure that the potential for any contaminant release is strictly controlled. All Project vessels shall comply with the International Regulations for Preventing Collisions at Sea (IMO, 1972) and regulations relating to International Convention for the Prevention of Pollution from Ships (the MARPOL Convention 73/78) (IMO,2021) with the aim of preventing and minimising pollution from ships. All vessels shall have a contingency plan for marine oil pollution (Shipboard Oil Pollution Emergency Plan).	Negligible	1	3
O18	Loss or failure of telecommunications	Cyber Attack	<u>Onshore</u> On site: Operation of Llyr windfarm Off-site: Properties served by such utilities	<u>Onshore</u> On site: Disruption to operation Interruption of communications and services which may lead to other MA&D risks; Limited ability of an emergency response plan to be implemented and delay to emergency response Limited ability to implement effective safety, security and environmental management systems	Site only	Severe	3	The ERCoP should consider the procedure to be followed in the event of the loss of communications	Negligible	1	3	Medium

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						Degree of Harm	Impact Category		Description of Frequency	Likelihood Category	Risk Score	Level of Risk
O18	Loss of failure of telecommunications	Damage to electricity transmission or telecommunications networks from meteorological conditions.	<u>Offshore</u> On site: Operation of Llyr windfarm	<u>Offshore</u> On site: Disruption to operation Interruption of communications and services which may lead to other MA&D risks; Limited ability of an emergency response plan to be implemented and delay to emergency response Limited ability to implement effective safety, security and environmental management systems	500m	Severe	3	The ERCoP should consider the procedure to be followed in the event of the loss of communications. An ERCoP would be prepared and submitted to the MCA post consent.	Negligible	1	3	Medium
O19	Emergency response activities implemented on the development site impacting on sensitive receptors	Water from fire extinguishing draining into environmentally sensitive areas and/ or controlled waters	<u>Onshore</u> Off-site: Sensitive environmental receptors (surface water, groundwater, marine); Agricultural land	<u>Onshore</u> Off-site: Contamination and pollution of identified sensitive environmental receptors		Moderate	2		Negligible	1	2	Low
			<u>Offshore</u> Off-site: Sensitive environmental receptors (surface water, groundwater, marine);	<u>Offshore</u> Off-site: Contamination and pollution of identified sensitive environmental receptors		Moderate	2		Negligible	1	2	Low
O20	Absent or deficient safety/ environmental management systems (e.g. inadequate planning, resource provision, procedures)	Increased risk of MA&D hazards described within this register.	<u>Onshore</u> On site: Operational personnel Off-site: General public agricultural land Sensitive environmental receptors (ecological and heritage sites, groundwater, surface water and marine receptors)	<u>Onshore</u> As described within this register for all hazards relevant to the operation phase.	Site only	Catastrophic	4	The Applicant would have an Environmental Management System for the duration of the operation of the proposed Project. All vessels will operate in adherence with Marine Pollution (MARPOL) requirements. Accordance with this will help to ensure that the potential for release of pollutants is minimised during operation and maintenance.	Negligible	1	4	Medium
			<u>Offshore</u> On site: Operational personnel Off-site: Commercial and recreational vessels and personnel Sensitive environmental receptors (ecological and heritage sites, groundwater, surface water and marine receptors)	<u>Offshore</u> As described within this register for all hazards relevant to the operation phase.		Catastrophic	4		Negligible	1	4	Medium
O21	Absent or deficient security provision (e.g. inadequate planning, resource provision, procedures)	Increased risk of vandalism/ crime/ terrorism	<u>Onshore</u> On site: Operational personnel Off-site: General public	<u>Onshore</u> On site: Risk of long term injury or death of operational personnel Damage to infrastructure Off-site: Risk of long term injury of death of members of the public	Site only	Catastrophic	4	The substation will also be complemented with security infrastructure such as 2.4 m high, galvanised steel panelised fencing, CCTV, motion sensor lighting as well as security alarms. Use of operational and maintenance safety zones. 500 m safety zones will be applied for during major maintenance.	Negligible	1	4	Medium
			<u>Offshore</u> On site: Operational personnel Off-site: Commercial and recreational vessels and personnel	<u>Offshore</u> On site: Risk of long term injury or death of operational personnel Damage to infrastructure Off-site: Risk of long term injury of death of vessel users		Catastrophic	4		Negligible	1	4	Medium
Vulnerability of the Proposed Development to major accidents from off-site sources												
O22	Fire at a neighbouring site	Fire at a neighbouring site impacting on the operation of the proposed development <u>Not covered under this item:</u> Potential to result in fire on site (covered under risk ID O14) Impeded access to site, limiting the ability to implement emergency response activities (covered under risk ID O40) Malfunctioning of equipment resulting in an accident (see risk ID O14).	<u>Onshore</u> On site: Operational personnel	<u>Offshore</u> On site: Indirect effects on human health and equipment due to smoke and ash deposition.	Site only	Negligible	0	Effects are not likely to fall within the scope of the MA&D assessment.	N/A	N/A	N/A	Low
			<u>Onshore</u> On site: Operational personnel	<u>Offshore</u> On site: Indirect effects on human health and equipment due to smoke and ash deposition.		Negligible	0		N/A	N/A	N/A	Low
O23	Explosion and structural collapse at neighbouring sites	Explosion and structural collapse at a neighbouring site impacting on the operation of the proposed development <u>Not covered under this item:</u> Impeded access to site, limiting the ability to implement emergency response activities (covered under risk ID O40) Malfunctioning of equipment resulting in an accident (see risk ID O14).	<u>Onshore</u> On site: Operational personnel	<u>Onshore</u> On site: Falling debris or collapse of infrastructure within the neighbouring area resulting in damage to equipment and risk of injury of personnel;	Site only	Moderate	2	An ERCoP would be prepared and submitted to the MCA post consent. Compliance with relevant Health and Safety Legislation as detailed in Table 30-1 of Volume 4, Chapter 30: Major Accidents and Disasters.	Negligible	1	2	Low
			<u>Offshore</u> On site: Operational personnel	<u>Offshore</u> On site: Falling debris or collapse of infrastructure within the neighbouring area resulting in damage to equipment and risk of injury of personnel;		Moderate	2		Negligible	1	2	Low
O24	Contamination or release of hazardous substances by off-site sources;	Contamination or release of hazardous substances from off-site sources impacting on the operation of the proposed development	<u>Onshore</u> On site:	<u>Onshore</u> On site:	Site only	Negligible	0	Effects are not likely to fall within the scope of the MA&D assessment.	N/A	N/A	N/A	None perceived
			<u>Offshore</u> On site: Operational personnel	<u>Offshore</u> On site: Risk of contact with hazardous substances to operational personnel		Negligible	0		N/A	N/A	N/A	None perceived

ID	Hazard	Hazard source and/ or pathway	Receptor	Reasonably foreseeable worst case consequence if event occurred (i.e. potential significant effect)	Maximum study area of potential impact	Pre-mitigation		Proposed mitigation	Post-mitigation			
						Degree of Harm	Impact Category		Description of Frequency	Likelihood Category	Risk Score	Level of Risk
O25	Impacts on road safety caused by the operational traffic of the proposed development	Increase in road traffic and changes to junction layouts Traffic accident on the wider network involving the carriage of high consequence dangerous goods	<u>Onshore</u> On-site/ Off-site Motorised and non-motorised users of the road network	<u>Onshore</u> On site/ Off-site Death or injury of road users or operational personnel Damage to properties; Risk of contact with hazardous substances by general public; Contamination of sensitive environmental receptors and agricultural land.	Area modelled within the Transport Assessment	Negligible	0	The effects are unlikely to result in serious damage as defined for the purposes of the MA&D assessment.	N/A	N/A	N/A	None perceived
			<u>Offshore</u> No relevant receptors	<u>Offshore</u> No relevant receptors		N/A	N/A		N/A	N/A	N/A	None perceived
O26	Vandalism/crime/terrorism leading to increased risk to the safety of members of public and site workers	Criminal damage/ vandalism; Theft; Terrorist acts; Unauthorised vehicles accessing the installation site; Direct Vehicle Impact; Ionising radiation risk radiation exposure from stolen goods.	<u>Onshore</u> On site: Operational personnel	<u>Onshore</u> On site: Death or risk of injury to operational personnel Damage to infrastructure	TBC	Catastrophic	4	An ERCoP would be prepared and submitted to the MCA post consent.	Negligible	1	4	Low
			<u>Off-site:</u> General public <u>Offshore</u> On site: Operational personnel	<u>Off-site:</u> Death or risk of injury to members of the general public <u>Offshore</u> On site: Death or risk of injury to operational personnel Damage to infrastructure <u>Off-site:</u> Death or risk of injury to members of the general public		Catastrophic	4		Negligible	1	4	Low
O27	Civil unrest or protest	Members of the public protesting; Operational staff industrial action <u>Not covered under this item:</u> Criminal damage or vandalism (see risk ID O26)	<u>Onshore</u> On site: Operational personnel and infrastructure	<u>Onshore</u> On site: Disruption to operation and potential damage to infrastructure.	Site only	Negligible	0	No effects resulting in serious damage as defined for the purposes of this assessment are considered likely to occur as a result of civil unrest or protest.	N/A	N/A	N/A	None perceived
			<u>Offshore</u> On site: Operational personnel and infrastructure	<u>Offshore</u> On site: Disruption to operation and potential damage to infrastructure.		Negligible	0		N/A	N/A	N/A	None perceived
O28	Outbreak of disease (emerging infectious disease or pandemic influenza)	Disease outbreak or epidemics impacting the workers.	<u>Onshore</u> On site: Operational personnel	<u>Onshore</u> On site: Death or risk of injury to operational personnel.	Site only	Catastrophic	4	No project specific mitigation provided. Relevant health and safety legislation and any national or regional guidance would be adhered to.	Negligible	1	4	Medium
			<u>Offshore</u> On site: Operational personnel	<u>Offshore</u> On site: Death or risk of injury to operational personnel.		Catastrophic	4		Negligible	1	4	Medium
O29	Animal health – notifiable disease	Disease outbreak impacting the movement of operational workers and materials. <u>Not covered under this item:</u> Impacts on limiting emergency response activities are considered under risk ID O40.	<u>Onshore</u> On site: Operational personnel	<u>Onshore</u> On site: Restricted access to site impacting on operations which may lead to other hazards	Site only	Severe	3	No project specific mitigation provided. Relevant health and safety legislation and any national or regional guidance would be adhered to.	Negligible	1	3	Medium
			<u>Offshore</u> On site: Operational personnel	<u>Offshore</u> On site: Restricted access to site impacting on operations which may lead to other hazards		Severe	3		Negligible	1	3	Medium
O30	Loss or failure of electricity transmission	Power shortage in the wider electricity transmission network. Damage to electricity transmission network by other development or meteorological conditions impacting on the service provision for proposed development. <u>Not covered within this item:</u> Disruption of utilities can lead to an interruption of communications (covered under risk IDs O30 to O33) and services which may increase other MA&D risks; Malfunctioning of equipment resulting in an accident (see risk ID O14)	<u>Onshore</u> On site: Existing infrastructure	<u>Onshore</u> On site: Failure of equipment reliant on mains power. Limited ability for an emergency response plan to be implemented, if reliant on mains power, and delay to emergency response. Limited ability to implement an effective safety, security and environmental management systems	Site only	Minor	1	No project specific mitigation provided. Relevant health and safety legislation and any national or regional guidance would be adhered to.	Negligible	1	1	Low
			<u>Offshore</u> On site: Existing infrastructure	<u>Offshore</u> On site: Failure of equipment reliant on mains power. Limited ability for an emergency response plan to be implemented, if reliant on mains power, and delay to emergency response. Limited ability to implement an effective safety, security and environmental management systems		Minor	1		Negligible	1	1	Low
O31	Loss or failure of gas supply	Shortage in the wider gas supply network. Damage to gas supply network by other development or natural disaster.	N/A	N/A	Site only	Negligible	0	The loss of gas supply is unlikely to result in serious damage as defined for the purposes of this assessment.	N/A	N/A	N/A	None perceived
			N/A	N/A		Negligible	0		N/A	N/A	N/A	None perceived

ID	Hazard	Hazard source and/ or pathway	Receptor	Reasonably foreseeable worst case consequence if event occurred (i.e. potential significant effect)	Maximum study area of potential impact	Pre-mitigation		Proposed mitigation	Post-mitigation			
						Degree of Harm	Impact Category		Description of Frequency	Likelihood Category	Risk Score	Level of Risk
O32	Loss or failure of water supply	Shortage in the wider water supply network. Damage to water supply network by other development or natural disaster.	<u>Onshore</u> On site: Operation of project	<u>Onshore</u> On site: Disruption to operation Limited ability for an emergency response plan to be implemented, if reliant on water supply, and delay to emergency response. Limited ability to implement and effective safety and environmental management systems	Site only	Negligible	0	The effects are unlikely to result in serious damage as defined for the purposes of the MA&D assessment.	N/A	N/A	N/A	None perceived
			<u>Offshore</u> On site: Operation of project	<u>Offshore</u> On site: Disruption to operation Limited ability for an emergency response plan to be implemented, if reliant on water supply, and delay to emergency response. Limited ability to implement and effective safety and environmental management systems		Negligible	0		N/A	N/A	N/A	None perceived
O33	Loss or failure of telecommunications	Power shortage in the wider electricity transmission network. Damage to electricity transmission or telecommunications networks by other development or meteorological conditions. <u>Not covered under this item.</u> Impacts on the ability of an emergency response plan to be implemented (Covered under Risk ID O40)	<u>Onshore</u> On site: Operation of project	<u>Onshore</u> On site: Interruption of communications and services which may lead to other MA&D risks; Limited ability of an emergency response plan to be implemented and delay to emergency response Limited ability to implement effective safety, security and environmental management systems	Site only	Severe	3	The ERCoP should consider the procedure to be followed in the event of the loss of communications.	Negligible	1	3	Medium
			<u>Offshore</u> On site: Operation of project	<u>Offshore</u> On site: Interruption of communications and services which may lead to other MA&D risks; Limited ability of an emergency response plan to be implemented and delay to emergency response Limited ability to implement effective safety, security and environmental management systems		Severe	3		Negligible	1	3	Medium
O34	Food supply contamination	Pollution incident	<u>Onshore</u> On site: Operational personnel	<u>Onshore</u> On site: Death or risk of injury to operational personnel.	Site only	Moderate	2	No project specific mitigation provided. Relevant national or regional guidance would be adhered to.	Negligible	1	2	Low
			<u>Offshore</u> On site: Operational personnel	<u>Offshore</u> On site: Death or risk of injury to operational personnel.		Moderate	2		Negligible	1	2	Low
O35	Local fuel supply failure	Risk of disruption to operational activities associated with travel to site and movement of materials	<u>Onshore</u> On site: Operational personnel and infrastructure	<u>Onshore</u> On site: Disruption to operation; May increase another MA&D risks; Could limit the ability to implement and effective safety, security environmental management systems <u>Could limit the ability of an emergency response plan to be implemented</u>	Site only	Negligible	0	The effects are unlikely to result in serious damage as defined for the purposes of the MA&D assessment.	Negligible	1	1	Low
			<u>Offshore</u> On site: Operational personnel and infrastructure	<u>Offshore</u> On site: Disruption to operation; May increase another MA&D risks; Could limit the ability to implement and effective safety, security environmental management systems <u>Could limit the ability of an emergency response plan to be implemented</u>		Negligible	0		Negligible	1	1	Low
O36	Poor air quality	Off-site event resulting in the release of particulate matter and hazardous gases into the surrounding environment.	<u>Onshore</u> On site: Operational personnel	<u>Onshore</u> On site: Death or risk of injury to operational personnel.	Site only	Negligible	0	Effects are not likely to fall within the scope of the MA&D assessment. First aid will be provided on site.	N/A	N/A	N/A	None perceived
			<u>Offshore</u> On site: Operational personnel	<u>Offshore</u> On site: Death or risk of injury to operational personnel.		Negligible	0		N/A	N/A	N/A	None perceived
O37	Cyber-attack and digital data security	Hackers Security breach of at the operational site <u>Not covered under this item.</u> Could result in the failure or loss of telecommunications (covered under risk IDs O22 and O33). Unauthorised access to the site and risk of vandalism/ crime/ terrorism (covered under risk ID O26).	<u>Onshore</u> On site: Operational personnel and infrastructure	<u>Onshore</u> On site: Loss of sensitive information which can increase the probability of crime/ terrorism/ vandalism; Could limit the ability to implement and effective safety, security and environmental management systems	Site only	Catastrophic	4	Procedures should be implemented for dealing with sensitive information. Any contractors working on the maintenance of the project will be required to comply with requirements for data security.	Negligible	1	4	Medium
			<u>Offshore</u> On site: Operational personnel and infrastructure	<u>Offshore</u> On site: Loss of sensitive information which can increase the probability of crime/ terrorism/ vandalism; Could limit the ability to implement and effective safety, security and environmental management systems		Catastrophic	4		Negligible	1	4	Medium
O38	Failure of financial system	Failure of the financial system resulting in a reduced public services	<u>Onshore</u> On site: Operational personnel and infrastructure	<u>Onshore</u> On site: Limited ability of an emergency response plan to be implemented and delay to emergency response Increased response time or lack of available resources may lead to other MA&D risks	Site only	Negligible	0	The effects are unlikely to result in serious damage as defined for the purposes of the MA&D assessment	N/A	N/A	N/A	None perceived

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						Degree of Harm	Impact Category		Description of Frequency	Likelihood Category	Risk Score	Level of Risk
O39	Influx of British Nationals	Displacement of operation personnel in local accommodation resulting in disruption to operation	<u>Offshore</u> On site: Operational personnel and infrastructure	<u>Offshore</u> On site: Limited ability of an emergency response plan to be implemented and delay to emergency response Increased response time or lack of available resources may lead to other MA&D risks	Site only	Negligible	0	The effects are unlikely to result in serious damage as defined for the purposes of the MA&D assessment.	N/A	N/A	N/A	None perceived
			<u>Onshore</u> On site: Operation of project	No pathway to create a MA&D		Negligible	0		There is no pathway to create a MA&D.	N/A	N/A	N/A
			<u>Offshore</u> On site: Operation of project			Negligible	0			N/A	N/A	N/A
Operation of the proposed development impacting on the vulnerability of a receptor to a MA&D hazard												
O40	Limiting the ability of an emergency response plan to be implemented	Access for emergency services to site being restricted or disruption to public services Impacts on the ability of an emergency response plan to be implemented Delivery of Abnormal Indivisible Loads (AIL) restricting the response of emergency services	On site: Ulyr workers Off-site: General public agricultural land sensitive environmental receptors	On-site/ Off-site Insufficient access to emergency services, leading to a slow response time and increased number of deaths/ injuries or spread of contamination.	AIL routes	Catastrophic	4	An ERCoP would be prepared and submitted to the MCA post consent.	Negligible	1	4	Medium