G+ Integrated Offshore Emergency Response (G+ IOER)

Good practice guidelines for offshore renewable energy developments

G+ Global Offshore Wind
Health & Safety
Organisation

In partnership with

energy institute

G+ INTEGRATED OFFSHORE EMERGENCY RESPONSE (G+ IOER)

GOOD PRACTICE GUIDELINES FOR OFFSHORE RENEWABLE ENERGY DEVELOPMENTS

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FOREWORD

The first edition of these good practice guidelines was published in October 2019. The document provides a structure for accountable organisations to identify offshore renewable risks and the contingency measures that are required to enable an appropriate emergency response.

In this second edition, the original content, derived from historical offshore obligation, international marine and aviation guidance, and renewable industry experience gained over the last two decades, has been reviewed by the G+ regional Focal Groups and revised where needed to become truly global, and the presented high-level principles can be applied internationally.

Furthermore, region specific sections were developed to help with the implementation of these principles in additional regions. Theses sections include the US, Taiwan and Japan.

The document is intended to operate as a living document and its content will evolve as new experiences are gained and more regional guidance is added.

DISCLAIMER

The contents of these guidelines are intended as information and general guidance only. They do not constitute advice, are not exhaustive, and do not indicate any specific course of action. Detailed professional advice should be obtained before taking, or refraining from, action in relation to any of the contents of this guide, or the relevance or applicability of the information herein.

1 INTRODUCTION AND SCOPE

1.1 SCOPE

These guidelines do not fundamentally define or mandate any new industry standards or requirements, but they do consolidate a consensus approach to managing emergencies, taking account of existing and emerging industry good practice.

These guidelines set out an approach that all accountable organisations are encouraged to apply, taking into account the specific risk profile of their projects and their legal and contractual obligations. Accountable organisations throughout the life cycle of an offshore wind or marine energy project continue to be responsible for ensuring compliance with regulatory and contractual obligations, and so must make their own assessment of the relevance and suitability of any guidance provided.

In the context of this document, the term accountable organisation is used to identify the organisation with primary responsibility and control of the project and site. In most cases it is likely to be the client/developer or owner/operator, dependent on project phase.

A Responsible Individual is a nominated individual from the accountable organisation that has the ultimate responsibility for the safety of all personnel within a specified work location. In most cases, this is the duty holder, person in control or the employer.

This document does not recommend an accountable organisation or who the Responsible Individual should be, but to recommend that a single organisation and individual is identified and recognised by all participants.

While acknowledging that the accountable organisation under these guidelines should take the lead responsibility for developing the relevant emergency response plans and support arrangements at a project level, each individual employer, contractor, aircraft operator or vessel owner will continue to have their own responsibilities under applicable national regulations, as referenced in the country specific annexes.

1.2 INTRODUCTION

There is an inherent risk in all offshore activity; this risk increases as structures are placed in the harsher environmental conditions prevalent further offshore. In addition, shore-based emergency support takes longer to arrive. To lessen these concerns, emergency response will need to be rapidly available with clear command and control using processes and procedures developed through regular drills and exercises.

The aim of the G+ IOER guidelines is to provide a structure for accountable organisations to identify offshore renewable risks and the contingency measures that are required to enable an appropriate response.

International organisations, such as International Maritime Organization (IMO), Safety of Life at Sea (SOLAS), International Civil Aviation Organization (ICAO) and the International Aeronautical and Maritime Search and Rescue Organization (IAMSAR) provide guidance and standards on how to respond to emergencies. In addition, national jurisdictions may mandate minimum standards for risk prevention and emergency response. These are upheld

by regulatory authorities such as the Coastguard, police, safety organisations, and statutory incident investigators. A general overview of such organisations is provided within section 3; however, guidance on exact national expectations may be found within country-specific annexes at the rear of this document. Country specific annexes are not intended to duplicate such information, rather to signpost where up to date information may be found.

The G+ IOER document is structured to follow a risk-based approach of Plan, Do, Check, Act.

National emergency services may be able to support an incident, but cannot be relied upon. There is, therefore, an expectation that the accountable organisation shall provide appropriate independent capabilities for the rescue, recovery and medical response to any foreseeable emergency or accident. Should an accident risk life, or quality of life, then national agencies should be approached to determine the best means of rescue for the casualty. This document details how such support may be requested and what activities would be expected from the accountable organisation during such an incident. It is recommended that the accountable organisation's command and control structures follow and align with the levels used by the emergency services in their respective locations.

The key to success in emergency planning is prior preparation. Emergency plans should be developed in conjunction with emergency responders. The effect of, and capabilities available from, neighbouring offshore installations should also be taken into account. 'Area' response plans can be a suitable and effective way to manage emergencies amongst a wider group of installations. Plans may only be produced through the sharing of information, a collective understanding of risk exposure and the level of mutual support that may be needed.

The use of standard terms and procedures during an incident will avoid confusion. The time for discussion is during the preparation of emergency plans. The IOER document aims to provide a catalyst and framework for such discussion. The document is structured as presented in Figure 1.

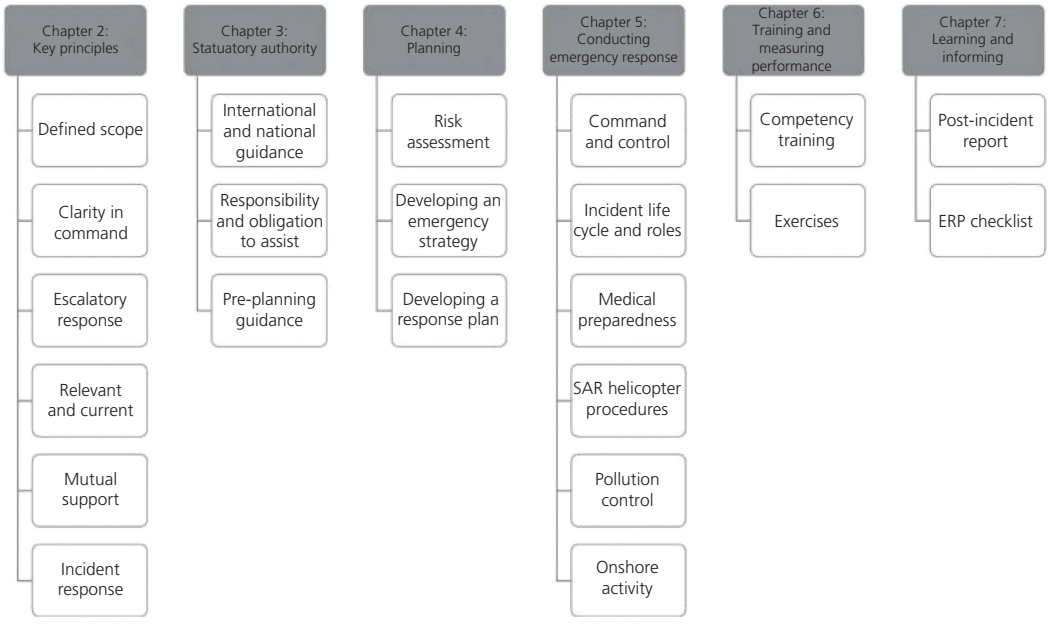

Figure 1: G+IOER guidance structure

2 KEY PRINCIPLES

2.1 KEY PRINCIPLES THAT SHOULD APPLY:

- Defined scope: an Offshore Renewable Energy Development (ORED) (wind or marine) should be clearly identified in terms of geographical coordinates, offshore renewable energy installations, and air and marine points of embarkation/disembarkation and transit routes.
- Clarity in command: the accountable organisation should appoint a single Responsible Individual for all emergency response activities within a designated ORED. ORED and national command response should be aligned.
- Escalatory response: an ORED should be able to cope with reasonably foreseeable eventualities within its boundaries, utilising its own resources and procedures in accordance with its Emergency Response Plan (ERP). Where an incident is beyond the site's capabilities (e.g. an external drifting vessel), or if the incident is a threat to life or quality of life, and/or in-house resources will not provide an effective enough response, then it should be escalated, and external assistance requested in accordance with the applicable national guidance.

Should an incident affect, or require assistance from, adjoining offshore energy locations, then the incident may also be escalated to the pre-agreed mutual support procedures.

Medical provision should be proportional to the assessed medical risk.

Great care must be taken in developing response capabilities, procedures, processes, training and awareness; any emergency in an ORED must be rapidly reported to the appropriate authorities to ensure that the right response is provided as quickly as possible. It is better to request shore-based resources and not need them, than to call for them too late.

- Relevant and current: the site's ERP should be reviewed and amended throughout ORED life. Where temporary changes occur, then a bridging document should be raised.
- Mutual support: although emergency response capability need only be established to cater for those assets deployed to the site, such a capability should be prepared to support any incident within, or near, the ORED when called upon.
- Incident response: an early and precautionary approach should be applied in raising an alarm. Emergency assets may always be stood down if not required.
- Exercise: response plans at all levels should be exercised on a regular basis, using realistic and credible scenarios with lessons identified, shared, and fed back into industry forums so that good practice on processes and procedures may be updated. The harder and more inclusive the exercise the easier real life will become.
- Competence and training: incident response can be complex, fluid and time-sensitive, and develop in an environment where clear and prompt decision making can have a major impact on the success of any response. This requires competent individuals who are well trained, current, and are confident in their expected roles and responsibilities.

3 STATUTORY AUTHORITY

3.1 INTERNATIONAL AND NATIONAL GUIDANCE

Before commencing emergency response planning, it is advisable to consult international and national guidance. Country applicable national organisations are detailed in the country specific annexes.

The following organisations are likely to have a direct impact on emergency preparation and response.

3.1.1 International

The following international organisations and their publications have produced conventions and recommendations that may impact on offshore activity:

- **International Labour Organization (ILO)**: Brings together governments, employers and workers of 187 member States, to set labour standards, develop policies and devise programmes promoting decent work for everyone. The main aims of the ILO are to promote rights at work, encourage decent employment opportunities, enhance social protection and strengthen dialogue on work related issues.
- **International Maritime Organization (IMO):** Is the United Nations specialised agency with responsibility for the safety and security of shipping and the prevention of marine and atmospheric pollution by ships. IMO's work supports the UN sustainable development goals.
  - **International Convention for the Safety of Life at Sea (SOLAS):** Is an international convention by IMO that sets minimum safety standards in the construction, equipment and operation of merchant ships. The convention requires signatory flag states to ensure that ships flagged by them comply with at least these standards.
- **International Civil Aviation Organization (ICAO):** Serves as the global forum of States for international civil aviation. ICAO develops policies and Standards, undertakes compliance audits, performs studies and analyses, provides assistance and builds aviation capacity through many other activities and the cooperation of its Member States and stakeholders.
  - **International Aeronautical and Maritime Search and Rescue (IAMSAR):** Jointly published by IMO and the ICAO, the three-volume IAMSAR Manual provides guidelines for a common aviation and maritime approach to organising and providing search and rescue (SAR) services.

3.1.2 National regulatory organisations

National regulatory organisations are in place to regulate and enforce workplace health, safety and welfare. Countries may have organisations whose jurisdiction is specific to offshore activities. However, work activity may also be overseen by onshore safety organisations, and the rules pertaining to onshore activities may equally apply offshore.

3.1.3 Coastguards

Coastguards' main functions are to develop, promote and enforce high standards of marine safety, to minimise loss of life amongst seafarers and coastal users, and to minimise pollution from ships of the sea and coastline. Coastguards are normally responsible for search and rescue coordination within their allocated search and rescue region (SSR), which includes all estuarial, coastal and territorial waters, and may promulgate safety advice for non-regulated pleasure craft.

3.1.4 National aviation authorities

National aviation authorities have wide-ranging responsibilities, including ensuring the aviation industry meets the highest safety standards. They are also responsible for the oversight of all civilian helicopter operations, including civilian search and rescue (SAR) operators.

3.1.5 Military authorities

Military authorities are responsible for the oversight of military aircraft used to support civilian incidents.

3.1.6 Police

Where applicable, police may have similar authority offshore as they have onshore.

One of the main functions of the police is to protect life and property, and they could be involved in incidents relating to:

- man overboard/missing persons;
- terrorist incidents;
- bomb threats;
- other reported crime;
- sudden and unexplained deaths;
- boarding of offshore assets by protestors, and
- major safety violation.

3.1.7 Fatal accident enquiries

Any unexpected death in the workplace will be investigated. Fundamentally, the role of any such investigations is not to apportion blame but to determine the identity of the deceased person, and then to determine how, why, and where they died, and what caused their death.

3.1.8 Accident investigation

Any accident, marine or air, will be investigated by an appropriate accident investigation organisation. Their responsibility is to determine its circumstances and causes, with the objective of avoiding similar accidents in the future.

3.1.9 Maritime legislation

The International Convention for SOLAS 1974, Chapter 5 includes a general obligation for Masters to proceed to the assistance of those in distress, and for contracting governments to ensure that all ships shall be sufficiently and efficiently manned from a safety point of view.

The ICAO and the IMO publish jointly the *IAMSAR Manual* which provides guidelines for a common aviation and maritime approach to organising and providing search and rescue (SAR) services. The *IAMSAR Manual* has three volumes:

- Volume 1 – Organisation and management discusses the global SAR system concept, establishment, and improvement of national and regional SAR systems, and cooperation with neighbouring states to provide effective and economical SAR services.
- Volume 2 – Mission coordination assists personnel who plan and coordinate SAR operations and exercises.
- Volume 3 – Mobile facilities is intended to be carried aboard rescue units, aircraft, and vessels to help with performance of a search, rescue, or on-scene coordinator function, and with aspects of SAR that pertain to their own emergencies. The purpose of Volume 3, which is intended for carriage aboard SAR units, and aboard civil aircraft and vessels, is to provide guidance to those who:
  - operate aircraft, vessels or other craft, and who may be called upon to use the
  - facility to support SAR operations;
  - may need to perform on-scene coordinator functions for multiple facilities in the
  - vicinity of a distress situation, and
  - experience actual or potential emergencies and may require SAR assistance.

3.2 RESPONSIBILITY AND OBLIGATIONS TO ASSIST

Under long-standing traditions of the sea and various provisions of international law, ship Masters are obliged to assist others in distress at sea whenever they can safely do so. Similar obligation applies to aircraft captains; however, logistic and safety issues may limit engagement to reporting and rebroadcasting information.

The responsibilities to render assistance to a distressed vessel or aircraft are based on humanitarian considerations and established international practice. Specific obligations can be found in several conventions, including:

- Annex 12 to the Convention on International Civil Aviation;
- International Convention on Maritime Search and Rescue, and
- Regulation V/10 of the International Convention for SOLAS 1974.

3.3 PRE-PLANNING GUIDANCE

Prior preparation is essential to success in emergency response. The Responsible Individual should ensure that the following are clearly articulated within their organisation:

3.3.1 Policy

There should be an effective organisational policy that sets out the approach to delivering effective incident command. The approach should ensure interoperability with other organisations involved in dealing with the incident, including principal contractors, nearby asset owners, and emergency services. Consistent language and phrases should be used to remove doubt and ambiguity. English is the primary language for maritime and aviation emergency communication. Terminology must be clear and unambiguous, and understood by all participants. Where any doubt exists, plain language should always be used. SAR terminology should be based on the IAMSAR manual, which should be familiar to all vessels and aircraft responding to the incident. Particular attention should be given to ensuring potential language barriers do not adversely impact communications in regions where English may not be the primary language used in normal operational communications.

3.3.2 Organisation

There needs to be an effective management structure with arrangements in place to deliver the organisation policies on incident command. The arrangements should be underpinned by effective staff involvement and sustained by effective communication that promotes and sustains competence. All involved should understand the organisation's policy and arrangements for incident response, particularly the roles and responsibilities they may be expected to undertake.

3.3.3 Planning

There should be a planned and systematic approach to implementing the policies through an effective management system. The aim is to deliver an effective response that minimises risk. Risk assessment techniques should be used to decide on priorities and set clear objectives for the incident response. Preference should be given to eliminating or controlling risk, rather than relying upon systems of work, or the use of personal protective equipment (PPE) (hierarchy of protective measures).

Figure 2: Stretcher lift

4 PLANNING

This section can be outlined as in the diagram in Figure 3.

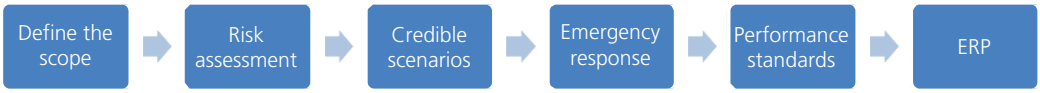

Figure 3: Structure of emergency response planning

For an ORED, the emergency plan is best made the responsibility of one organisation (known for the purposes of this document as the accountable organisation), which should in most cases be the operator/owner during the operation, or during construction the client/developer. Compliance with this guidance will therefore aid the accountable organisation to fulfil their duties as employers.

The accountable organisation should appoint a Responsible Individual to oversee the totality of the work required to create the ERP. This individual should have the seniority, knowledge, and accountability to oversee the task. Should the accountable organisation be found to be in breach of its statutory obligations related to emergency response, it is likely to be this entity who would be held to account by the legal authorities.

Prior to commencing the analytical work to create the ERP, it is essential that the scope of the document be agreed in terms of geography, assets, and participants. Participants include employees, contractors and subcontractors, who should all have a say in the creation of the ERP, agree to their individual role and partake in its use.

The Responsible Individual should appoint suitable trained and competent persons to roles capable of initiating and managing a response. These individuals should be nominated as the point of contact with other emergency services. Contact details should be provided to the Coastguard and other emergency services as needed. There should be a sufficient number of persons competent to carry out this role, taking into account shift patterns, leave, etc.

4.1 RISK ASSESSMENT

To determine the appropriate arrangements a risk assessment should

- Identify the credible events which could give rise to:
  - a major accident, or
  - the need for evacuation, escape, or rescue to avoid or minimise a major accident.
- Evaluate the likelihood and consequences of such events.
- Establish appropriate standards of performance to be attained by anything provided by measures for ensuring effective rescue, medical intervention, evacuation, recovery and escape to avoid or minimise a major accident.
- Protect persons from and during response to a major accident.
- Select appropriate preventive and protective measures.
- Establish mitigation measures to manage the severity and escalation of consequences

The risk assessment methodology applied should be of sufficient detail to enable the ranking of risks, for subsequent consideration of risk reduction. The following are the typical approaches taken towards risk assessments:

– Qualitative (Q) – frequency and severity of identified hazards are determined purely qualitatively.
– Semi-quantitative (SQ) – frequency and severity of identified hazards are approximately quantified within ranges
– Quantified risk assessment (QRA) – full quantification of frequency and severity of identified hazards

Typically, the level of detail involved with the risk assessment approach ranges from the lowest (qualitative) to highest (quantitative) and is selected based on the risk and complexity of situation being assessed.

There are many guidance documents available to aid in the preparation and execution of risk assessments. The following are noted as examples of such guidance:

– NORSOK Z-013 – Risk and emergency preparedness assessment
– IMO Revised Guidelines for Formal Safety Assessment (FSA)
– DNVGL-RP-N101 – Risk management in marine and subsea operations

Further information on country specific requirements related to risk assessments can be found in Annex A.

4.1.1 Mitigating measures

That part of the assessment dealing with evacuation, escape, and rescue should determine the following:

– Organisational structure (including the formal command and control structure) and arrangements to effectively manage the emergency, which might lead to evacuation, escape and rescue.
– Procedures for the evacuation, including type, capacity and location, muster areas and other parts of the Offshore Renewable Energy Installations (OREI) from which access to temporary refuge is not readily available.
– Performance requirements for the rescue and recovery facilities, including their function, capacity and availability.
– Equipment requirements and specifications, including types, numbers and locations of personal survival and escape equipment.
– Performance and equipment requirement for medical intervention, including permanent medical facilities and mobile deployable equipment.
– Environmental factors and weather conditions that may limit the capacity to carry out effective evacuation, escape and rescue.
– Arrangements for providing and receiving mutual support from and/or to adjoining wind or marine sites, or other energy structures.

Setting performance standards for measures, e.g. time to evacuate to a place of safety, is a crucial aspect of the assessment process. Performance standards should relate to the

management arrangements, items of equipment, procedures, etc. which they describe. They may be described in terms of functionality, survivability, reliability and availability. They should be measurable and auditable.

4.1.2 Industry experience to date

In order to help identify foreseeable events, the following information has been obtained and collated from a number of sources including regulator authorities, emergency services, industry trade bodies and individual ORED contractors and operators.

The incidents may be grouped into categories:

- Major offshore structure failure, fixed or mobile, that could lead to multiple survivors:
- jack-up vessel or barge;
- electrical interconnector – manned or normally unmanned installation;
- fire/explosion, and
- structural damage – overload, unexploded ordnance (UXO).

Figure 4: Major offshore structure failure

- Major aviation incident that could lead to multiple survivors in distress, injured and/or exposed to the sea:
  - helicopter crash, and
  - helicopter ditching.

- Major marine incidents that could lead to multiple survivors in distress, injured and/or exposed to the sea:
  - vessel collision with other vessels or structure;
  - vessel drifting into wind farm;
  - vessel fire, and
  - vessel mechanical/structural failure.

Figure 5: Vessel fire

- Non-wind farm incidents requiring wind farm intervention:
  - Coastguard request for support under SOLAS obligation, and
  - direct requests from vessels in difficulty near wind farm assets.
- Incidents leading to individual medical intervention:
  - injury:
    - man overboard, and
    - diving.
  - illness, and
  - pollution.

Fatal diving accident

A diver operating at 41 m in support of an offshore wind farm when his air supply was cut off due to an unintended squeezing of his umbilical. The diver had 3 emergency air supply options; however, he was unable to use these whilst in distress. Unfortunately rescue attempts were unsuccessful.

Service vessel collides with cargo ship

A high-speed wind farm service vessel in transit to an offshore wind farm collided with a cargo vessel. There were four marine crew and 11 technicians on board. German Society for Rescue of Ship wrecked responded to the distress call and escorted the vessel to port. First aid was administered and the injured was transferred to hospital.

Crew member flown to hospital

Technician on board a jack-up vessel suffered a badly lacerated leg. Following site first aid and discussions with the Coastguard, decision was made to transfer casualty to hospital by search and rescue helicopter.

Substation fire

Lightning strike caused uncontained fire on offshore wind farm substation. 19 forced to jump into water, 18 rescued and one missing. Fire subsequently contained.

Figure 6: Typical examples of offshore emergencies

Table 1: Further outline examples of actual incidents that have occurred on, or in, supporting ORED activities

Classification	Details
Major structure	Jack-up with 38 crew members listed following leg damage – evacuated by vessel and helicopter
Major structure	Offshore substation caught fire following lightning strike, 19 workers jumped from substation; 18 rescued, one missing
Major aviation	Commercial SAR helicopter crashed offshore at night whilst undertaking training to deliver a commercial SAR service, three of four occupants killed
Major marine	Barge supporting wind farm activity began to drift requiring 36 personnel to be rescued by wind farm vessels and lifeboats
Major marine	Crew transfer vessel (CTV) struck wind turbine generator at speed; five injured, one individual taken to hospital by lifeboat with head and wrist injury
Major marine	CTV struck object moored in water. Vessel took on water and 15 passengers transferred to other wind farm vessels. Support provided by lifeboats and SAR helicopter
Major marine	Non-wind farm unmanned barge broke tow and drifted towards wind farm. Lifeboats assisted to regain tow
Major marine	CTV caught fire, three crewmen abandoned vessel to life raft and subsequently rescued by SAR helicopter
Major marine	Fire on CTV, two lifeboats responded. One crewman exposed to smoke and transferred by SAR helicopter to hospital
Major marine	CTV became caught in the boat landing of hotel ship leading to the passengers entering lifeboats
Major marine	Support vessel struck wind turbine pile, lifeboat provided escort and support

Table 1: Further outline examples of actual incidents that have occurred on, or in, supporting ORED activities (continued)

Classification	Details
Major marine	CTV sunk following a fire, four crew rescued by fishing vessel
Major marine	Wind farm installation vessel capsized whilst under tow
Major marine	Wind farm CTV with 10 passengers lost steering and propulsion, towed to port by lifeboat
Major marine	Lifeboat tasked to tow wind farm CTV that had lost propulsion – recovered to port
Major marine	Wind farm guardship with fouled propeller towed by lifeboat
Major marine	CTV struck underwater object and took on water. Lifeboat attended, delivered salvage pump and transferred passengers
Major marine	Two lifeboats assisted wind farm CTV that had struck an underwater obstruction and was taking on water
Major marine	CTV suffered engine failure and subsequent fire. Wind farm vessel took on passengers and towed vessel to port
Major marine	Lifeboat supported CTV taking on water – pump out
Major marine	Lifeboat responded to 88 m drifting cargo ship approaching wind farm
Major marine	Wind farm support vessel assisted angling boat with engine failure until relieved by lifeboat
Major marine	CTV took on water following mechanical failure. Three lifeboats provided assistance
Major marine	Wind farm service vessel with 15 persons on board struck a cargo vessel. Injured transferred to hospital. Four crew and two technicians with substantial injuries
Non-wind farm	CTV responded to a Coastguard request to medically evacuate a seriously ill cruise ship passenger
Non-wind farm	Yacht declared a MAYDAY leading to a response from two CTVs, two lifeboats and SAR helicopter
Non-wind farm	Fishing boat abandoned following wind turbine collision. Crew rescued from sea surface by lifeboat
Non-wind farm	Wind farm work boat towed yacht which had lost mast out of wind farm and handed over to lifeboat
Non-wind farm	Wind farm vessel stood by damaged yacht until lifeboat took in tow
Non-wind farm	Wind farm guard vessel assisted lifeboat in the rescue of two from vessel in difficulty
Non-wind farm	Wind farm support vessel with engine fire – two lifeboats responded and escorted vessel to port
Non-wind farm	Wind farm vessel assisted lifeboat in rescuing three men from strong seas
Non-wind farm	Two rescued from sinking yacht by wind farm surveying vessel and transferred to shore by SAR helicopter
Non-wind farm	Wind farm crew transfer vessel rescued two fishermen

Table 1: Further outline examples of actual incidents that have occurred on, or in, supporting ORED activities (continued)

Classification	Details
Diving	Diver died during shallow dive
Diving	Diver killed by falling underwater structure on wind farm
Illness	Ill worker transferred from hotel ship to hospital for operation
Illness	Wind farm technician assessed for possible cognitive disorder and transferred to hospital by SAR helicopter. Symptoms downgraded to eye problem
Injury	Wind farm worker injured following a fall, winched by SAR helicopter and taken to hospital
Injury	Diver injured during dive, recovered to vessel, medically assessed and required medical evacuation by SAR helicopter
Injury	Injured worker rescued from turbine – suspected broken leg
Injury	Crewman with spinal injuries winched from offshore support platform and flown to hospital
Injury	Worker died following a fall from a high-level deck on wind farm hotel ship
Injury	Technician with head injury transferred to hospital. CTVs, lifeboats and SAR helicopter involved in the transfer
Injury	Crew member with leg injury winched from jack-up vessel by SAR helicopter and transferred to hospital
Injury	Injured crewman transferred from offshore support platform to lifeboat and due to severity of injury transferred to hospital by SAR helicopter
Injury	Man lost overboard from wind farm support ship
Diving	Diver killed at 40 m depth whilst working on wind farm

Figure 7: Cockpit view

4.1.3 Statistical information

Figures 8 and 11 provide some background trend information only. The data were drawn from G+, GWO and National Emergency reports.

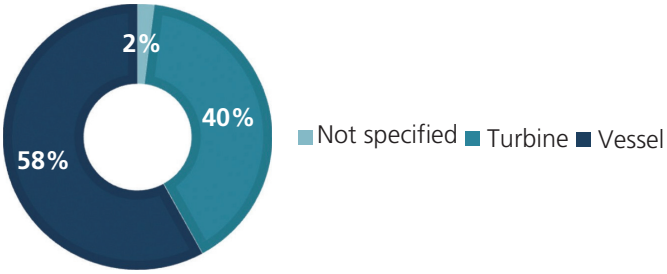

Figure 8: Incidents by location (Source: G+)

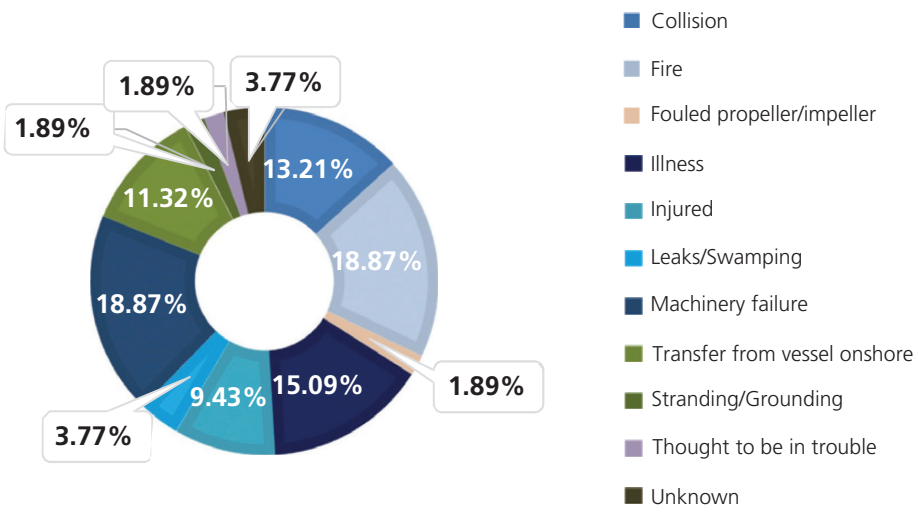

Figure 9: Example for lifeboat launches by cause (Source: RNLI)

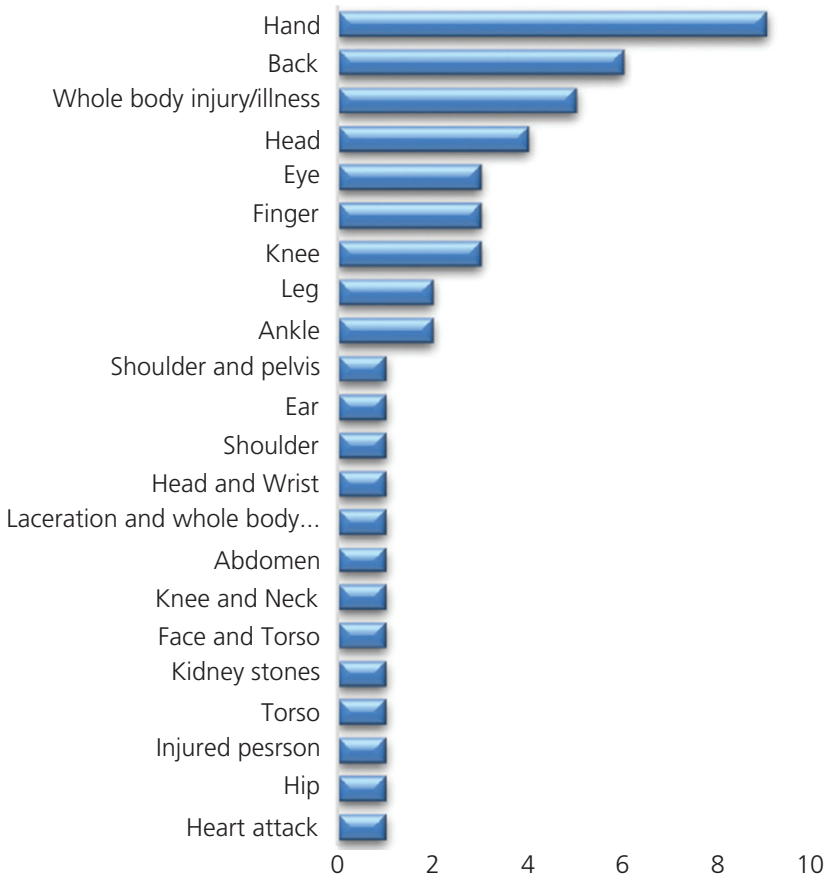

Figure 10: Incidents by injury/illness area (Source: GWO EFA project)

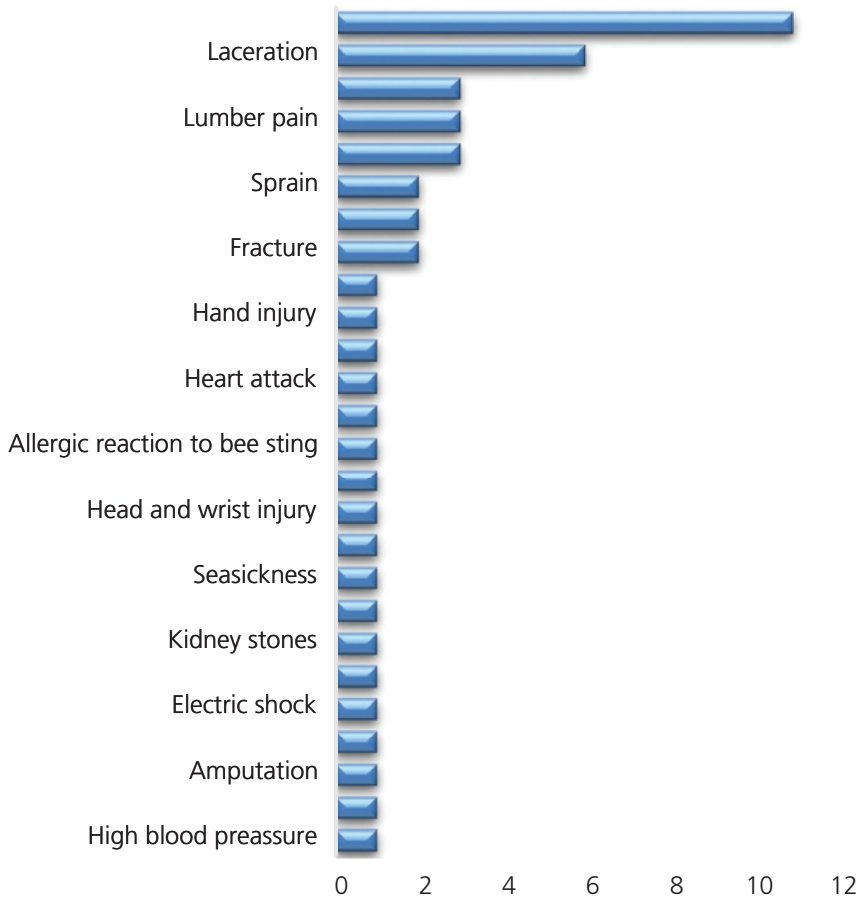

Figure 11: Incidents by injury/illness type (Source: GWO EFA project)

4.1.4 Low probability high consequences

Although past incidents can help inform future planning, the offshore renewable industry is still in its infancy. There have been a number of near misses and accidents in similar industries that point to what could occur in the renewable sector. These are a few scenarios that have been identified by the wider offshore community:

- Jack-up punch-through – particularly in areas where liquefaction may occur following seismic events. A punch-through can lead to instability, structural collapse, and eventually capsize.
- Diving incidents – although ORED developments are trying to eliminate the requirement for diving, there have been many cases where diving has unexpectedly been needed. As diving is not a well-established procedure in ORED developments, the incidents that have occurred would indicate a lack of attention, particularly in risk assessments.

- Simultaneous operations (SIMOPS) – SIMOPS have led to incidents that could easily have been major accidents. CTVs have struck larger vessels whilst in Dynamic Positioning (DP) modes knocking them off station.
- Dropped Heavy Objects – heavy lifting has occurred over marine activity, where a dropped object could have been catastrophic. In addition, loads are getting larger and reaching vessel capacity, leading to little scope for error.
- Transportation – a number of heavy lift barges have been lost during towing procedures. Although not directly in the ORED, such movement is in direct support of ORED activity.
- UXO – unexploded ordinance still poses a high risk to marine sub-surface activity and requires continuous vigilance.
- Man overboard (MOB) – unplanned water entry remains a major concern. This can particularly be the case in inter-vessel transfers and operations in support of tidal stream generation, where tidal rips can make recovery difficult.
- Availability of medical support – as high-risk activity moves further offshore, the availability of onsite professional medical intervention becomes more of a necessity. Large marine specialist assets have well-established medical facilities and have seen more demand for their services. Examples have included major trauma following amputation and diving incidents.

4.1.5 Conclusion

Not all of the emergency response incidents have been captured in current statistics. There are known incidents, especially medical intervention arising from illness, that are missing. However, there are some broad trends that can be drawn:

- ERP activation is not currently recorded within the industry. It is recommended that ERP activation is recorded and shared with G+ (see section 7).
- Support by ORED assets to non-ORED incidents is under-reported within the renewable industry; however, external reporting would indicate a parity in activity. For every ORED request for assistance, ORED assets provide support to a national SAR incident. Although ORED are not expected to establish an emergency response for passing traffic, international convention expects immediate support to be provided for those in distress. Exact procedures on what should occur after such support is provided need to be agreed, ideally in advance. Experience indicates that a casualty (vessel or individual) will be transferred to the emergency services, rescue craft or SAR helicopter. This may occur within or clear of ORED obstructions.
- Taking all estimated ERP activations, half of them resulted in a medical intervention and the other half required some form of emergency service intervention arising from: machinery failure; leaks/swamping; propulsion fouling; grounding or fire. Of those incidents relating to marine activity, the first responder is normally a co-working marine asset. Procedures for such immediate response need to be established e.g. towing, pump-out, vessel-to-vessel firefighting.
- Where medical intervention was needed, the cause (where reported) was equally split between injury and illness, with a broad spectrum of ailments; too many for a volunteer to be confident in identifying and treating, leading to the recommendation that professional support be provided, either through telemedicine or on-site professional medical intervention, or both.

– Three quarters of medical intervention was completed locally with one quarter requiring further medical evacuation. Not all medical incidents lead to onshore repatriation; having medical support offshore can help keep persons at work.
– Minor casualties were transferred by commercial helicopters for commercial rather than clinical reasons. This allowed vessels and personnel to continue routine operations.

4.1.6 Exemplary scenarios

It is recognised that trying to develop an ERP that caters for every single eventuality would produce an excessively complex document; accordingly, for the purpose of this document, incidents have been grouped into the following four categories:

– marine;
– aviation;
– assets, and
– people.

The likely impact from such scenarios should be assessed under the following headings:

– the assets likely to be affected;
– the indicative number of casualties;
– likely means of evacuation and recovery;
– the reception location, and
– requirement for stakeholder management.

Table 2 provides indicative ERP scenarios.

Table 2: Indicative emergency response planning scenarios

Purpose	Hazard study-based identification process to identify and develop scenarios to be used in ERP			
Scope	The scope of the scenario study did not include major third-party incidents, large passenger ship collision, or aviation accidents not operating at the site. (These are already covered in other Coastguard systems and guidance) Four scenarios identified: – Marine – hotel vessel, service operation vessel, specialist barge, jack-up, crew transfer vessels and offshore transfer between vessels and/or structures – Aviation – transport helicopter, heli-hoisting helicopter, Helicopter Emergency Medical Service (HEMS) helicopter – Assets – manned platforms, unmanned platforms, wind turbines, met masts – People – fatality, life threatening, life changing, injuries			
Process	Hazard study using the four scenarios as 'guide words'. All scenarios result in minor injuries to multiple fatalities, with the local intervention being preservation of life until additional support arrives			
Emergency services				
	Marine	**Aviation**	**Assets**	**People**
Assets	Hotel vessel, service operation vessel (CTV etc.), specialist barge, anchor handling tugs, jack-up, guard vessels (out-of-hours), specialist work vessel (geotech, cable laying etc.)	Transport helicopter (including underslung loads), helihoisting helicopter, HEMS helicopter	Wind turbine generators (WTGs) (fixed foundations), WTGs (floating foundations), Offshore Sub Stations (OSS) (manned), OSS (unmanned), met masts, accommodation platform	People – site staff and contractors, People – others

Table 2: Indicative emergency response planning scenarios (continued)

	Marine		Aviation	Assets	People
Scenario Group	Collision, catastrophic fire, grounding, sinking, loss of propulsion/control, MOB, crane/lift failure, jack-up punch-through, shallow gas strike, UXO detonation, anchor Handling/tug operations failure, cable strike Support to non-ORED traffic: canoe to cruise ship		A/C to A/C collision, A/C flight into terrain A/C to drone collision, A/C to asset collision, A/C to vessel collision, A/C catastrophic failure, weather event	Fire, collision from vessel, weather event, OSS explosion, asset abandonment, Catastrophic structural failure	People events requiring outside assistance such as: Single fatality (work and non-work related), life threatening injury/illness or injuries requiring evacuation, such as chemical exposure or asphyxiation related injury/ illness, serious electrical/ mechanical injury, drugs/ alcohol overdose (OD), diving incidents, anchor handling incidents, third-party refuge, protesters, confined space incident
How many casualties could there be	1 to 200		1 to 25	1 to 100	1 to 10
Incident Command	Onshore (dry)	Offshore (wet)	First Line: Other Aircraft commanders	First Line: Vessel Captain/ Platform Operational Manager	First Line: CTV captain/Team Leader/Platform Operation Manager

Table 2: Indicative emergency response planning scenarios (continued)

	Marine		Aviation	Assets	People
First Line (1st)	1st: N/A	1st: Vessel Captain			
Second Line (2nd)	2nd: Marine Coordinator	2nd: Manned OREI, MCA, rescue asset (rescue craft/ helicopter)	2nd: Coastguard, Rescue asset	2nd: Site Management	2nd: Onshore Coordinator, Rescue asset
Third line (3rd)	3rd: Police	3rd: MCA	2nd: Coastguard, Rescue asset	3rd: Coastguard/Police	3rd: Coastguard/Police
Evacuation means	Owner Operator's procedures to evacuate to a safe place Co-working vessels Where incident is catastrophic then Emergency services Assets will be utilised and driven by incident commander		ORED own assets if available, SOLAS, rescue craft, Coastguard, Helicopter	Owner Operator's procedures to evacuate to a safe place Emergency services will not enter or rescue from offshore structures unless cleared in advance Where incident is catastrophic then emergency services' assets will be utilised and driven by incident commander	Owner Operator's procedures to evacuate to a safe place Coastguard coordinated assets to get from safe place to hospital

Table 2: Indicative emergency response planning scenarios (continued)

	Marine	Aviation	Assets	People
Reception Requirements	Hospital Designated Emergency Reception Centre O&M port Local port Local airport Rescue craft station	Hospital O&M port Local port Local airport Rescue craft station	Hospital Designated Emergency Reception Centre O&M port Local port Local airport Rescue craft station	Hospital O&M port Local port Local airport Rescue craft station
Stakeholder Management	Business ERP (Internal Management/Media etc) Next of kin (NOK) notification Local Authority Port Authority Emergency Services Communication Plan	Business ERP (Internal Management/Media etc) NOK notification Port Authority Emergency Services Communication Plan Aviation Authority	Business ERP (Internal Management/Media etc) NOK notification Local Authority Port Authority Emergency Services Communication Plan	Business ERP (Internal Management/Media etc) NOK notification Local Authority Port Authority Emergency Services Communication Plan

4.2 DEVELOPING AN EMERGENCY STRATEGY

Having developed the likely scenarios that may require an emergency response, the **Responsible Individual** must now develop the wind farm's response to such scenarios. Before undertaking this activity, it may be beneficial to read section 5 to understand the likely interaction with external agencies.

The relationship between wind farm emergency preparation and that provided by national agencies (government and volunteer) requires in-depth dialogue between all likely participants. The following topics may form a basis of such dialogue.

4.2.1 International SAR policy and guidelines

The *IAMSR Manual* was first published in 1998 by ICAO and IMO. The primary purpose of the Manual is to assist States in meeting their own SAR needs, and the obligations they have accepted under the Convention on Civil Aviation, the International Convention on Maritime Search and Rescue, and the International Convention for SOLAS. The Manual provides guidelines for a common aviation and marine approach to organising and providing SAR services.

The Manual is written with specific SAR duties in mind. The volumes are titled:

– Volume I – Organisation and management.
– Volume II – Mission coordination.
– Volume III – Mobile facilities.

As signatories to the ICAO and IMO conventions, most nations with renewable offshore activity are committed to providing national aeronautical and maritime cooperation, as well as cooperation with aeronautical and maritime authorities of neighbouring states. Additionally, signatories have to meet the standards laid down jointly by ICAO and IMO establishing economically effective SAR services, to promote harmonisation of aeronautical and maritime services, and to ensure that persons in distress will be assisted without regard to their locations, nationality, or circumstances.

4.2.2 Capability of national assets to respond

Offshore renewable energy zones are mainly coincident with national SAR regions. Modern SAR assets are able to reach most offshore renewable installations. National assets are likely to be subject to limitations, such as:

Shore-based marine rescue assets are constrained by speed and at best may only achieve 25 kts. Accordingly, the time taken to reach wind farms may be measured in hours. In addition, rescue craft are unlikely to be optimised for turbine access (fender construction).

Although shore-based SAR helicopters are able to respond quickly, it may still take in excess of an hour to reach an incident location. A combination of poor visibility and wind farm layout may preclude SAR helicopter access, and in some circumstances, an SAR winch rescue may be impossible e.g. from the transition piece. As SAR helicopters provide a service to the whole SAR region (onshore and offshore), they may be allocated to a higher priority task. Accordingly, it cannot be assumed that SAR helicopters will always be available to respond to an offshore renewable energy incident.

4.2.3 Time to respond

Removal from danger: There may be occasions when personnel may have to abandon offshore structures. Evacuation is defined as leaving the structure without having to enter the water, using normal access and egress systems. Escape should be seen as a last resort and may involve an unplanned water entry. The priority should be to stop personnel from entering the sea unprotected. Should personnel enter the water, either from structures, vessel, or aircraft, the time available to complete a rescue will be determined by personal protection available (PPE, life raft, immersion/survival suit where specified) and the environmental conditions. In some scenarios, death may be instantaneous e.g. cold-shock. Assets and procedures should ensure that personnel can be recovered from water within a specified timescale. This timescale should be determined by, and demonstrated to the satisfaction of, the **Responsible Individual**. Rescue from some locations will require external specialist teams using advanced rescue techniques. The time taken to undertake each level of response should be defined by the **Responsible Individual**. Even though the consequences may be similar, the probability of the event occurring may vary depending on the work being conducted, and the time taken to respond could be varied proportionally with the risk, e.g. an advanced rescue team may be placed on immediate standby during complex internal blade repair but may be on call for routine nacelle inspection.

First aid: A number of scenarios require immediate medical intervention to save life. In their *Enhanced first aid standard*, version 1 the GWO recommends that all personnel have the ability to undertake basic first aid and that a number of volunteers are able to provide enhanced first aid. Both these courses recognise that non-specialist volunteers have a limited level of skill, driven mainly by constraints on training and the ability to maintain currency. Further medical intervention may be provided by specialist medical practitioners working under clinical governance. The **Responsible Individual** should determine the level of medical support required to be delivered by a defines time. The level of support will be based on a medical/ first aid needs assessment and evaluation of response times to get the required medical attention to the casualty to a place of safety.

Evacuation: Extreme environmental conditions may dictate that personnel be removed from a wind farm. In addition, ill health or injury may require urgent onshore treatment. Wind farm assets may provide the fastest means of reaching such a facility. Any such requirement should be defined in terms of capability and time.

Although national emergency services may provide valuable support, they can be constrained by:

– Capability – some technical rescues may be beyond their capability e.g. rescue at height, confined space, rope access.

– Availability – there is a finite limit to national assets; they will be allocated to the highest priority incidents and may not be immediately available to support a renewable incident.

– Time to respond – even if tasked immediately, the time to launch, transit and reach the incident may be measured in hours.

Conversely, it is doubtful whether a wind farm could prepare for all hypothetical eventualities (e.g. a fixed-wing aircraft flies into a wind park) on its own. A compromise will be required to cater for what is needed for foreseeable events and the ability to request adjoining or national assistance when this is insufficient.

It is best to plan for the worst and respond with the best available.

Where life, or quality of life, is at risk, it is better to overreact and subsequently stand down assets, rather than respond too late and not be able to help.

Once an emergency strategy has been developed, it can be converted into a detailed ERP. Experience has shown that an ERP may be broken into three broad areas:

– how the organisation responds to an incident;
– when and how the organisation works with external emergency services, and
– when and how an organisation requests assistance, or provides support, to adjoining organisations.

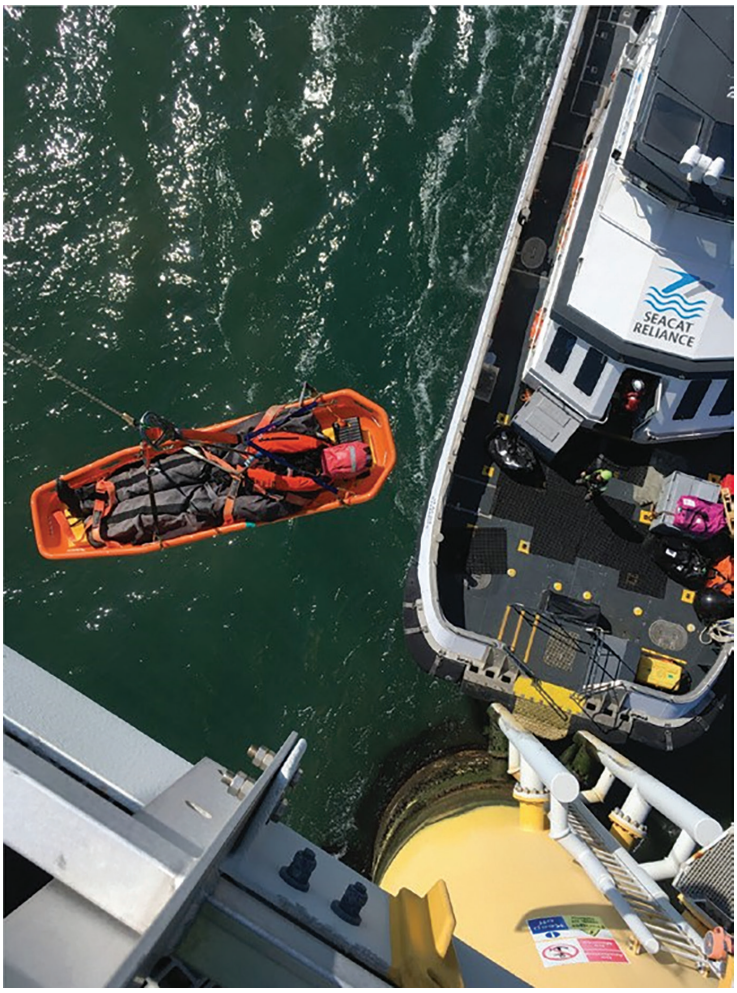

Figure 12: Stretcher to CTV

4.3 DEVELOPING A RESPONSE PLAN

This section aims to provide guidance on the documents required to support a site's emergency response. The relationship between documents is represented in Figure 13.

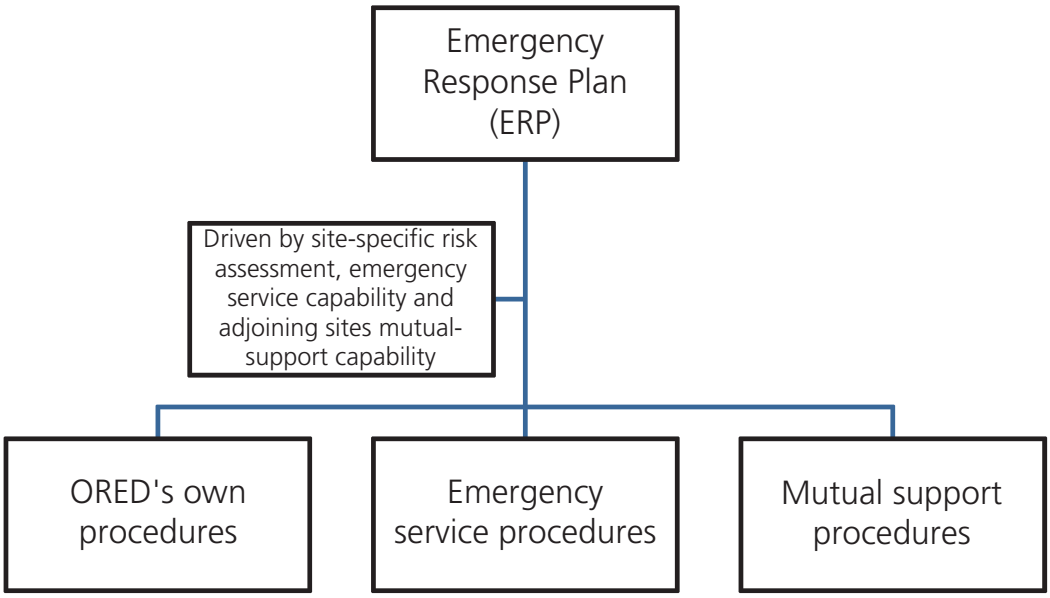

Figure 13: Relationship between ER documents

4.3.1 Introduction

In order to develop an ERP, the Responsible Individual should have systematically identified possible scenarios that could occur within or adjacent to a particular site and then put in place appropriate measures to protect, control, and respond to such scenarios. The ultimate objective is to recover all personnel to a place of safety – normally onshore.

The function of this section is to give guidance on how to develop an ERP; it will concentrate on activity around and in support of ORED. However, ERPs have to take into account scenarios that will develop from non-ORED activity e.g. passing vessels.

4.3.2 ORED's own procedures

A site-specific ERP should detail the site's internal response and give guidance on how assistance may be sought and, should the incident require, how and when it should be escalated to higher authority; internally within the ORED organisation or externally to the national emergency services. There should be only one ERP per site with any principal contractors, contractors, marine or aviation assets, or any other parties involved, working under the same plan. Where this isn't possible, guidelines and procedures should be established e.g. bridging document, to clearly outline the responsibilities for the emergency arrangements.

4.3.3 Emergency service procedures

Unfortunately, incidents do occur that require external assistance, and an escalatory process is required.

Experience has shown that, should an incident require external assistance, the greater the liaison between those requesting assistance and those providing support, the higher the probability of success. Should the incident be beyond the capability of the site to respond or

has the potential to escalate, or where life, or quality of life, is at risk then the procedures within the pre-planned Emergency service procedures should be followed. Emergency Service Procedures should be seen as joint agreement between the accountable organisation and the Lead Emergency Service – normally the Coastguard. Where the same accountable organisation operates more than one ORED in near proximity to each other – combined Emergency Services Procedures may be agreed.

4.3.4 Mutual support procedures

As offshore renewable energy developments are positioned further offshore, they become neighbours to other offshore energy installations, such as oiland gas installations or adjoining sites. The Responsible Individual should assess the likely impact that an incident from an adjoining site could have on the site and what impact an incident on the site could have on the neighbouring installations. All parties should be prepared to provide assistance to personnel in distress; however, the impact of providing such support should be assessed and agreed by the Responsible Individual or their nominated representative. It is recommended that a Mutual Support Guide (MSG) be created between possible collaborators based on a specific geographical region.

The MSG should be a high-level document providing details of assets and capabilities that could be made available and the means by which support could be requested. The MSG should be seen as a combination of call down list and telephone directory.

The creation of the MSG should provide an opportunity for collaborators to meet and understand the risks and consequences of their activities. Regular tabletop exercises should ensure continued collaboration and updating of procedures.

4.3.5 Coping with complexity

ERPs need to be sufficiently flexible to cope with changing nature of ORED. The following give some guidance on topics that may need to be addressed:

– Use of hubs: operational control centres may control a number of OREDs. This can lead to experienced personnel and provide enhanced resilience for individual incidents. However, simultaneous events can stress controlling personnel and overload communication channels. Sufficient resources need to be available to cater for a surge response.
– Multiple Accountable Organisations: in some jurisdictions, elements of the ORED have to be under separate control, e.g. the generation and transmission in the UK. This can lead to multiple ERPs operating in close, if not overlapping, proximity. Activity in these sperate elements of the ORED need not necessarily occur at the same time and cannot therefore support each other. Accordingly, it is recommended that each element has its own Emergency Service Procedures. However, mutual support is likely to be the norm, and this should be covered under Mutual Support Procedures. For this to occur, there has to be a clear means of notifying all stakeholders of ongoing activity together with available emergency response capability.

4.3.6 Notifying stakeholders

All personnel involved in an ORED need to know their specific role in the event of an incident. The exact information required will vary and the means of distributing the information may involve different mediums. As part of their induction to the organisation/ORED, all personnel should be briefed on the overall ERP and their specific role. They should also be given a copy of any appropriate supporting documents.

Documents supporting the decision making, e.g. risk assessment, emergency response criteria, etc., should be kept in a central file available to all on request.

Checklists for controllers can be computer-based with hard copy paper back-up.

Information for those actively engaged needs to be succinct and readily available.

Emergency Response Cards and credit card 'Key Numbers to Call' have been found to work well.

Emergency Service Procedures should follow emergency service guidance and will normally be based on a standard template so that SAR controllers have information readily available. It is crucial that this information is checked and updated regularly. Changes to the ORED may require the issuing of a temporary Bridging Document. These documents, which may form part of the site ERP document, should be provided to the emergency services at their request, normally prior to commencement of construction and updated throughout the ORED development phases e.g. operations and maintenance (O&M), repowering and decommissioning.

Mutual support procedures should be created by, and be available to, all interested parties.

All of the documents listed in this section should be reviewed and updated periodically (not less than annually), at the request of the regulatory authorities and following activation (either exercise or live).

4.3.7 Emergency Response Cards – template

G+ supports the standardisation of Emergency Response Cards and has provided the following templates in *Quick wins – emergency response plans and response procedures*.

SECTION A – GENERAL		Page no.
1	Introduction and scope	
2	Wind farm chart and coordinates	
3	Incident notification	
4	Initial notification	
5	List of contacts	
SECTION B – EMERGENCY PROCEDURES		
Installation (WTG/Met mast)	Evacuation from installation	
	Fire on installation	
	Evacuation from Transition Piece	
	Stranded by weather	
	Electrical accident	
	Thunder and lightning/electrical storm	
	Helicopter rescue (if applicable)	
	Escape from the Nacelle	
	Marine pollution from installation	
Vessels	Man overboard from vessel in dock	
	Man overboard from vessel	
	Injury to person on vessel	
	Fire on vessel	
	Marine pollution from vessel	
	Incapacitated crew boat	
	Collision	
Third-party	Unexploded ordnance	
	Vessels not under command	
	SAR assistance from the wind farm	
Onshore substation	Fire at installation	
	Thunder and lightning/electrical storm	
	Electrical accident	
	Pollution at installation	
	Hazardous gas release	
Offshore substation	Evacuation of personnel	
	Fire at installation	
	Thunder and lightning/electrical storm	
	Electrical accident	
	Pollution at installation	
	Hazardous gas release	
	Stranded by weather	
All	Emergencey ashore	
	Bomb threat	
	Hypothermia	
SECTION C – Marine base emergency plans		
Fire at marine base		
SECTION D – Supplementary information		
SECTION E – References		
SECTION F – Appendices		

Figure 14: G+ template ERP layout/structure for Emergency Response Card

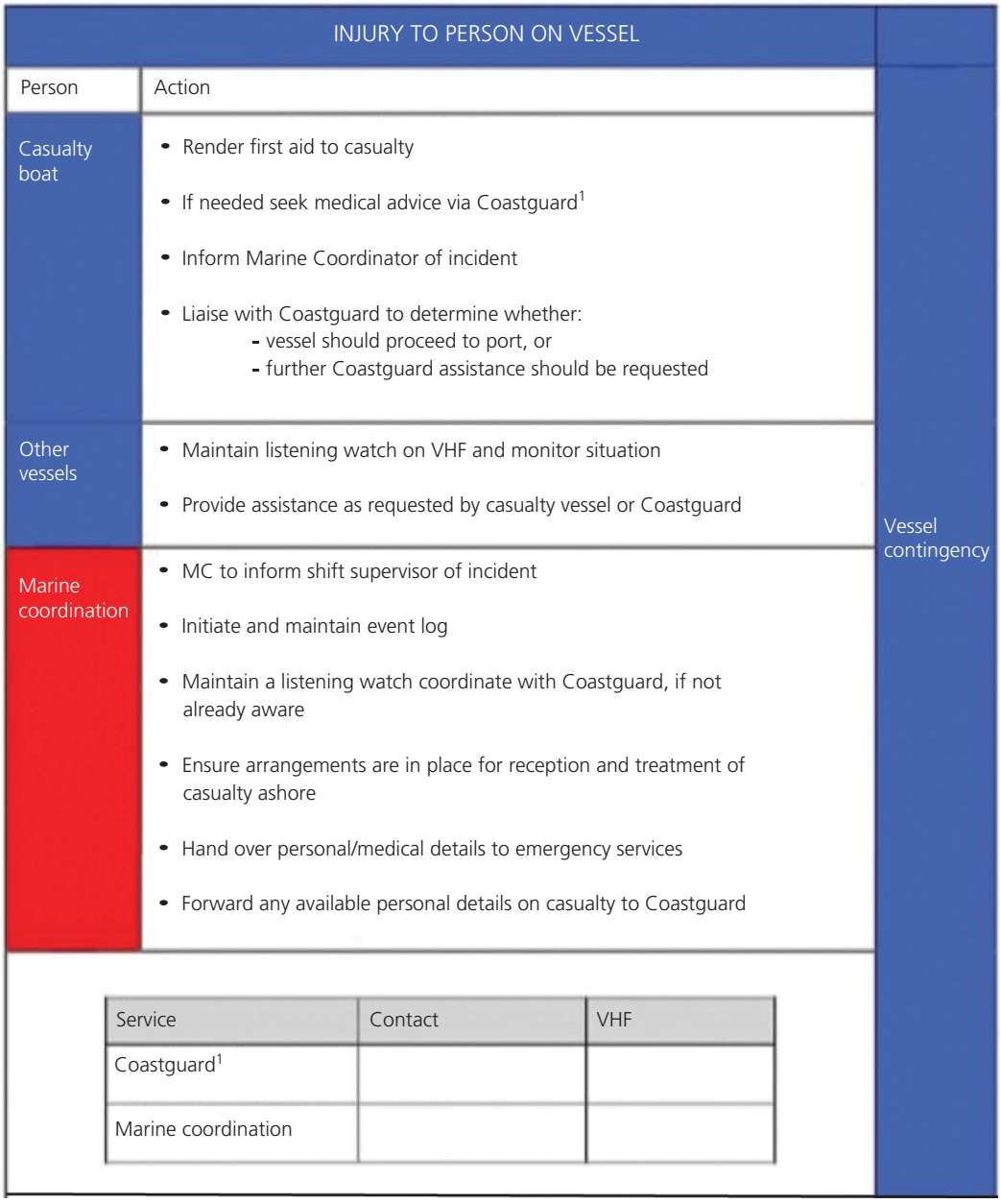

Figure 15: G+ example Emergency Response Card

4.3.8 Emergency Response Cards – content

Although the exact content of Emergency Response Cards will vary between ORED developments and ORED structures and will represent the result of the ERP process, the following suggested content has been derived from proven ERPs.

Actions:

- Overarching – assess, communicate, triage.
- How to raise an alarm:
  - Means – landline, voice over internet protocol (VOIP), radio or distress beacon.
  - Information to be passed:
    - who – call sign, name, telephone number;
    - what – short description of incident;
    - where – OREI designator, location coordinates;
    - when – did the incident occur;
    - weather – at location, and
    - assistance required – rescue, first aid, evacuation.
- Procedures to be followed following:
  - Installation:
    - fire on manned installation, and
    - injury/illness to individual:
      - How to obtain:
        - basic first aid;
        - enhanced first aid;
        - specialist medical support, and
        - telemedicine advice.
  - Electrical accident
  - Evacuation from installation – marine/helicopter – proceed up or down structure:
    - full use of equipment;
    - stretcher;
    - confined/restricted space;
    - during rope access, and
    - OREI preparation for helicopter hoisting.
  - Escape from installation – location of PPE, procedures to follow.
  - Thunder/electrical storm.
  - Stranded by weather.
  - Marine pollution.
  - Hazardous gas release.
- Vessel:
  - MOB: recovery from immersion; cold shock, incapacitation, inhalation, hypothermia;
  - diving incident;
  - fire on vessel;
  - injury/illness to person on vessel;
  - collision;
  - breakdown/damage, and
  - marine pollution.
- Other:
  - fatality;
  - UXO;
  - support to non-ORED incident;
  - vessel not under command, and
  - bomb threat or civil disobedience.

Information:

- Organisational chart for Emergency Response/Emergency Response Flow Chart.
- Roles and responsibilities.
- ORED layout – chart/map showing reporting points.
- ORED vessel support – including medical and fast rescue craft.
- Specific OREI diagram showing:
  - hazardous zones;
  - safe areas during storm, lightning risk, fire;
  - evacuation routes;
  - muster points, and
  - escape points.
- Location of:
  - communication equipment;
  - location aids;
  - life saving/first aid equipment;
  - firefighting equipment;
  - life rafts;
  - extra PPE, and
  - escape equipment including personal descenders.
- Contact details:
  - emergency services;
  - internal management;
  - communication plan, and
  - means and procedures for communication.
- Coastguard requirements – full message content:
  - identity of casualty (name of installation, ID number, call sign, flag state);
  - position (latitude/longitude, and range and bearing from land or sea mark reference point e.g. '25 miles southeast of Lowestoft');
  - situation (type of message, e.g. distress/urgency, date/time, nature of distress/urgency, perceived threat to installation/life/limb e.g. fire, collision, medical);
  - number of persons at risk;
  - assistance required;
  - description of casualty (physical description, owner/charterer, cargo carried, turbine status e.g. operational, blades feathered and pinned);
  - weather on scene, including sea state;
  - initial actions taken and Site Operations Manager's intentions;
  - on-scene resources, and
  - status of helicopter facilities.

5 CONDUCTING EMERGENCY RESPONSE

5.1 COMMAND AND CONTROL

5.1.1 Responsible Individual command and control responsibilities

This section provides guidance to the **Responsible Individual** on the key command and control requirements for their emergency response. It will describe the required arrangements when dealing with incidents where they have sole control. This section will also provide guidance to the **Responsible Individual** on the arrangements they should have in place to assist the emergency services. Exact national command and control arrangements will be promulgated within country-specific documents and these will have to be met.

In preparing the emergency plan, the **Responsible Individual** should identify those under their responsibility, the likely scenarios to be encountered, and the assets required to provide continuous support for an ongoing response. Part of the preparation will be liaison with local onshore responders.

Notwithstanding the requirement for a site to plan for eventualities, where available, national assets should be requested from the Coastguard in any circumstances where an individual's life, or quality of life, is or may be endangered.

Reluctance to escalate an incident

Crew member on a Service Operations Vessel suffers a fall from within domestic accommodation. Although able to walk, they reported severe rib pain. As they were unable to work it was decided to transfer to shore using a crew transfer vessel. Injured person was unable to climb and was therefore stretchered to CTV. Tidal restriction required a four-hour transit to the nearest available port. Their condition worsened and an ambulance transfer requested on port arrival through the coast guard. On admittance to hospital, injured person assessed to have broken a number of ribs and ruptured their spleen. They were rushed to surgery for an immediate operation. With hindsight, telemedicine advice should have been sought and a transfer by the on-contract Helicopter Emergency Medical Service asset arranged. Injured party subsequently made a full recovery.

Figure 16: Example of reluctance to escalate an incident

5.1.2 Clarity of responsibility

The Responsible Individual's role and area of responsibility should be clearly defined within the site's Emergency Plan by geographical coordinates. Assets outside of these boundaries will be subject to their own Emergency Response Procedures. Where major assets are temporarily introduced into a site e.g. jack-up vessel, a Bridging Document to the ERP should be raised detailing the command and control arrangements with transfer of responsibility specified by time or geographical coordinates. The **Responsible Individual** should clearly delegate and authorise nominated individuals to initiate an emergency response, direct the emergency response, and liaise with the emergency services. Clear Terms of Reference should be provided.

5.1.3 Layered control

Emergency services have developed layered control to assist and protect individuals engaged in emergency response. At the centre of the measures are those actively involved in responding to the incident. In some situations, a safety zone may be placed around the incident to keep non-responders away. Command and control of the incident should be positioned at a safe distance away from the incident, at a location with good communication and appropriate support. Personnel are only permitted in and out of the incident location with the controller's permission. The majority of historical renewable incidents have been controlled by this two-level approach. However, there are some incidents that may require extra resources, or may have an impact on wider business objectives, where senior management decisions and allocation of resources are required. Some national authorities and business organisations use military derived terms for this layered convention, namely:

– First line – is the immediate response to protect and preserve life.
– Second line – is the site support provided to those dealing with the incident.
– Third line – is the response to resource and support the site including its return to normality; may also be known as crisis management.

This document will use these terms to define the different levels of activity expected during an incident. It is recommended that the layered approach be adopted; however, the labels within an ERP may vary nationally.

The Responsible Individual should, when preparing the ERP, contact the National Coastguard, regulating body and the Police to confirm whether a national approach applies and the type of incidents that should be reported as a national emergency.

5.1.4 Responding to an incident

The Responsible Individual has the obligation to ensure that the initial response to an incident is provided, including local command and control arrangements.

A key principle is that it is better to overreact initially, rather than under-resource the response. Assets may always be stood down if not required; trying to regain control once time is lost is very difficult, if not impossible.

If the incident is reported to the statutory authority (e.g. Coastguard) and they determine whether an emergency should be declared, then they may take coordination of the offshore response. The statutory authority may request the use of vessels or other offshore assets when dealing with an emergency. Such vessels should follow the direction provided by the statutory authority.

Generally, if the incident is declared a national Major Incident, then the statutory authority will continue to control and coordinate the at sea responses and the police will coordinate and control the onshore emergency services response.

The **Responsible Individual** should assist, as directed, in providing and coordinating the facilities and resources required.

5.1.5 First line, second line and third line roles

The decision on the level of response will be dependent upon a number of factors and subject to continual assessment of the incident and effectiveness of the response. The **Responsible**

Individual should have arrangements in place, described in the ERP, to ensure the following requirements can be met.

5.1.5.1 First line

The emergency arrangements should ensure that there are sufficient competent persons available when the alarm is raised to:

- assess the incident, raise the alarm and respond in accordance with organisational policies, procedures and systems of work;
- account for all persons during the emergency;
- report the incident to an appointed person e.g. marine coordinator;
- determine if the incident can be controlled locally or whether further assistance is required either internally or externally from the emergency services;
- arrange for the Coastguard to be alerted;
- develop, communicate and control the specific plan of response;
- continually evaluate the effectiveness of the plan, changing circumstances, etc.;
- consider the escalation to a second line level response, and
- record or log decisions and actions for future review and investigation.

5.1.5.2 Second line

Where an incident is beyond the capabilities of the immediate responders at the first line level, a second line response should be initiated. The second line Control should be located away from the operational activity, most likely onshore at the site's support facility, or from a remote location covering a number of sites.

There should be sufficient competent individuals to carry out all the required tasks, provided with sufficient space/resources and effective equipment including maps, charts, telephone, radio and IT. Cover should be available to deal with a protracted incident. The tasks may include:

- Deciding on the most appropriate location to base the second line response, e.g. in, or adjacent to, the on-site marine coordination centre. There will be benefit if the emergency services have easy access to these facilities, ensuring those in operational roles do not become overloaded and that deputies are available.
- Determine the ultimate place of safety for personnel involved in the incident – maybe more than one location.
- Review the effectiveness of the response, ensuring the emergency services are provided with all required facilities.
- Continually assess the need to escalate to a third line response in accordance with the Responsible Individual's policies and criteria.
- Prepare, coordinate and agree media communications with relevant authorities.
- Provide immediate Human Resource/administrative support to casualties, co-workers, families and, where requested, emergency responders.
- Assist as directed in the recovery phase of the incident.
- Record or log decisions and actions for future review and investigation.

5.1.5.3 Third line

If a third line incident is declared, then the accountable organisation should appoint a third line responder to ensure the requirements of the emergency services are met. There may be other incidents where the accountable organisation may also wish to appoint a third line responder to enable a prompt recovery to normal business operations. The strategic level of command should be independent from the scene of the incident. The role includes the following:

- establish a framework for the overall management of the incident;
- determine the strategic objectives and periodically review;
- provide resources and/or determine limitations;
- ensure there are resources for command resilience;
- develop a corporate media plan ensuring consistency with emergency services and regulatory requirements;
- plan beyond the initial incident and recovery phases, and return the site to a state enabling operations or construction to continue;
- set the scope of investigations into the initial incident and the emergency response, to enable organisational policies and arrangements to be reviewed and revised accordingly, and
- record or log decisions and actions for future review and investigation.

Note: all response activities should be coordinated with/informed to the Coastguard.

5.1.6 Ensuring alignment with the emergency services

The Responsible Individual should ensure that the arrangements will provide effective engagement and support to the emergency services. Table 3 gives some indicative examples on how renewable energy sites and the emergency services may react during an incident. The decision on whether to escalate an incident to a higher response state will be dependent on numerous variables, one of which will be whether a particular entity can cope with the situation. There should never be reluctance to escalate.

It is always better to overreact than underreact.

Table 3: Examples of site and emergency service actions during an incident

Level of response	Site	Coastguard/emergency services
First line The response to an incident on scene	– Recovering a man overboard from the sea – Extinguishing a local fire on a CTV – Provide immediate first aid– Tier 1 – Activation of the site's ERP – Reporting/informing directly to Coastguard	– Monitor development and prepare appropriate response to the accident if needed – All coordination stays local with site including transport to a safe place and hospital. This should be covered in an ERP and if the accident is within capabilities of the ERP the Coastguard is not activated only informed
Second line The coordination of assets and assistance to those undertaking the first line response	– Allocation of site assets to assist in the incident response – Provide extended immediate emergency care capable of sustaining life until transferred to a final medical place of safety (Tier 2) – Liaison with emergency services such as Coastguard and Police – Coordinate the site response to the incident e.g. turbine shutdown, informing NOK, media release	– Coastguard assumes SAR formal coordination of the incident – Tasking of appropriate resources e.g. Search and Rescue Helicopters, national rescue craft – Conduct search and/or winch from nacelle – Police providing support to the company e.g. NOK notifications, evacuee reception, investigation. Liaise with emergency services to provide permanent medical facilities/hospital (T.3)
Third line Crisis response to an incident	– Activation of the Site Crisis Plan – Allocation of business assets to support the site – Prioritise incident response over the business activity – Activate business continuity procedures – Support statutory investigation	– Declaration of a Major Incident – Establishment of a Strategic Coordinating Group (SCG) – Establish survivor reception centres – Minister briefings – Press conferences – National and on occasion, international liaison

Figure 17: Escape to rescue craft

5.2 INCIDENT LIFE CYCLE AND ROLES

The example of a real incident in Table 4 gives an indication of the pace and response during an emergency. Initial activity can be hectic; however, waiting for emergency support may take considerable time.

Table 4: Real incident example (Source: UK marine accident investigation branch (MAIB) report)

Time	Description
1712:15 (night)	Aluminium twin hull CTV with three crew and 12 wind farm technicians on board, whilst on return passage from wind farm to port, making 22 kts at night struck a large tethered floating object, resulting in port hull holed, forepeak, accommodation space and engine room flooded
1713	Engines disengaged – very high frequency (VHF) radio Digital Selecting Calling distress alert transmitted. MAYDAY declared
1716	Another CTV, from the port of departure, responding to distress call arrived on scene – identifies a list to port. Designated Person Ashore informed of situation
1716	Passengers don immersion suits and lifejackets and move to deck
1720	Attempt to pump out unsuccessful and technicians instructed to transfer to supporting CTV
1733	Coastguard informs that all-weather lifeboat proceeding and will be on scene in 20 minutes Master and crew abandon vessel and transfer to supporting CTV
1748	Lifeboat arrives on scene
1802	Coastguard allows supporting CTV to return to port with technicians and crew, arriving 1850. Normal recovery to operations base
1820	SAR helicopter arrives on scene and transfers two salvage pumps for use by lifeboat crew
1850	Situation stabilised. Lifeboat takes vessel in tow and is joined by second lifeboat as escort
2150	Vessel arrives in port
	Incident vessel sustained extensive damage, no crew or passengers physically injured Regulatory authorities undertake formal in-depth investigation Note: within an hour a second vessel at a different wind farm struck a stationary object. As both incidents were remarkably similar, there was confusion in higher level communication, leading to an initial assumption that a single incident was being reported through two different reporting chains. Although offshore incidents are rare, emergency response procedures need to cope with simultaneous events. Isolating the incidents; for example, providing dedicated communication channels, can help limit distraction and avoid confusion

In order to explain the relationship between command and control, and to understand the command and control requirements an escalatory incident will be considered to show how offshore incidents can be multifaceted, involve many participants, and can occur rapidly or develop slowly over a period of hours. Nevertheless, the escalatory principles of incident response including command, control and alerting will remain, although on occasions of Major Incidents, some of the steps may be missed.

The guidance on how to respond and control an incident is found within the IAMSAR manual. This three-volume publication provides the international guidance on how incidents will be

managed globally. It is primarily a document for emergency practitioners, but a working knowledge would be expected of the **Responsible Individual**, particularly regarding their role in any incident. This section is written to signpost the information available and will not go into specific detail.

5.2.1 Phases of an incident

Incidents may start with no warning and the initial instinct is to save life. However, the temptation to get involved in firefighting and first aid may preclude the requirement to raise the alarm. All those that may be called to engage in immediate emergency response should be trained to **Assess, Communicate and Triage.** IAMSAR requires incidents to be categorised into one of three ascending Emergency Phases; Uncertainty, Alert and Distress:

– Uncertainty Phase refers to a situation where doubt exists as to the safety of an aircraft or a marine vessel, and of the person on board (IAMSAR Vol II). An offshore renewable example would be the loss of power on a service operation vessel that is currently at anchor and with a deteriorating weather forecast. Declaring an Uncertainty allows the emergency services to alter their posture and start planning for an incident without committing resources. Note: SAR resources will not normally be tasked during the Uncertainty Phase.
– The Alert Phase, also known as declaring a PAN (or PAN-PAN), refers to a situation where apprehension exists as to the safety of an offshore structure, aircraft or marine vessel, and of the persons on board (IAMSAR Vol II). If there is a probability that the situation could deteriorate, then emergency assets may be deployed to the area as a precautionary measure. An example would be a CTV taking on water but believed to be under pump control; SAR resources may be tasked if the situation has the potential to escalate to the Distress Phase.
– The Distress Phase, also known as declaring a MAYDAY, exists when there is reasonable certainty that a vessel or other craft, including an aircraft or a person, is threatened by grave and imminent danger and requires immediate assistance (IAMSAR Vol II). This will normally lead to an instant response proportional to the number and danger of those exposed.

Emergency Phases can be upgraded or downgraded by the Master, aircraft captain or **Responsible Person**'s representative, in consultation with the Search and Rescue Mission Coordinator (SMC), as the incident progresses. It is the responsibility of the SMC to ensure that all participating/responding units are kept informed of the relevant Emergency Phase.

An incident can start by being observed; for example, an explosion, the absence of an activity for example, a missed radio 'operations-normal' call or an automated alert such as a Personal Locator Beacon (PLB) activation indicating a person in the water.

ORED may also detect a non-site related incident by way of their routine monitoring activity. A drifting vessel may be identified by closed circuit television (CCTV)/marine radar or personnel seeking refuge on a wind turbine may trigger an alarm. ERPs should cater for such eventualities and procedures should be predetermined.

The use of Emergency Position Indicating Radio Beacons (EPIRB) and Personal Locator Beacons (PLB) can greatly aid SAR. Beacons can raise an alarm without the need for human interaction. Signals can be detected by satellite and located by direction-finder equipped

vessels or aircraft. Information included within the emergency transmission can assist e.g. Global Positioning System (GPS) coordinates may be embedded, thereby assisting the SAR services to prepare and conduct any rescue. Beacons must be registered, and information must be up-to-date to remain effective.

Any operator planning on purchasing an emergency beacon should contact the Coastguard in the first instance to obtain advice on current requirements. Further information on the registration of beacons can be found in national guidance.

5.2.2 Alerting procedures

When contacting the statutory authority (e.g. Coastguard), include all relevant information such as:

- identity of casualty (name of installation, ID number, call sign, flag state);
- position (latitude/longitude + range and bearing from land or sea mark reference point e.g. '25 miles southeast of Lowestoft');
- situation (type of message, e.g. distress/urgency, date/time, nature of distress/urgency, perceived threat to installation/life/limb e.g. fire, collision, medical);
- number of persons at risk;
- assistance required;
- description of casualty (physical description, owner/charterer, cargo carried, turbine status e.g. operational, blades feathered and pinned);
- weather on scene, including sea state;
- initial actions taken and Site Operations Manager's intentions;
- on-scene resources, and
- status of helicopter facilities.

As soon as an incident occurs, contact should be made with the statutory authority, although this does not necessarily mean that they are required to provide any assistance. Alerting them early, however, enables them to monitor the situation and assist when required. Waiting until a situation deteriorates could result in an unnecessary delay in SAR units arriving on-scene.

During an incident where national assistance has been requested by the Responsible Individual and/or a Distress or Urgency situation is declared, or an incident is within/nearby an ORED that is not connected with the operations of the site, national SAR assets or vessels responding under SOLAS obligations will most likely find themselves operating alongside assets provided by the site. Those assets will be coordinated at the scene of the incident in accordance with the following IAMSAR terminology:

5.2.3 Search and rescue mission coordinator

The SMC is the officer responsible for coordination of the response to an actual or apparent emergency situation. Under IAMSAR, each and every incident will come under the coordination of a nominated SMC. For offshore renewables' incidents, this will most likely be a designated officer at the coordinating Coastguard Rescue Coordination Centre.

The SMC will collect information, including assets available, weather on scene etc. The SMC will liaise with those in distress and with emergency responders to determine the most appropriate rescue plan for each emergency. The SAR Plan will be enacted, its progress will

be monitored, and regular updates will be passed to all those involved or that could become affected.

For protracted incidents, the role may be handed over from one SMC to another. Such handovers will be formally recorded. The SMC has overall responsibility for appointing or confirming the roles of On-scene Coordinator (OSC) and/or Aircraft Coordinator (ACO).

5.2.4 OSC

The OSC is a person designated by the SMC to coordinate SAR operations within a specified area. The role of the OSC is to carry out the SMC's action plan on-scene. An OSC may be appointed by the SMC whenever an incident requires a number of resources to be coordinated at the scene and/or is complex and/or of long duration. The OSC normally coordinates on-scene resources, communicates the SMC's instructions to units, and acts as a communications link between all participants. The OSC will also provide the SMC with regular situation reports (SITREPS) on the progress of the incident offshore.

The role of OSC is normally assumed by the first competent asset on scene or arriving on scene; this should be verified with the SMC at the earliest opportunity. The SMC can appoint a more suitable asset if considered appropriate e.g. nearby vessel or installation.

It is essential that the SMC communicates the appointment of an OSC and the identity of the OSC to all other participants in the response at the earliest opportunity. Any change to the role should be similarly broadcast to all participants.

Any large asset within a site (e.g. hotel ship, service operation vessel or manned platform) could be tasked to undertake this role and should be familiar with their responsibilities in accordance with IAMSAR Vol 3.

Personnel tasked with this role should undertake initial and regular recurrent training.

5.2.5 ACO

The ACO is a person or team who coordinates the activities of multiple aircraft SAR operations in support of the SMC working with the OSC. If two or more aircraft are likely to respond to the incident, an ACO will be appointed.

The primary function of the ACO is to ensure the safe management of aircraft responding to the incident.

Although the overall responsibility for appointing the ACO lies with the SMC, this responsibility may be delegated, following discussion, to the National Aeronautical Rescue Coordination Centre (ARCC)

It is the responsibility of the SMC to communicate the appointment of an ACO and the identity of the ACO to all other participants in the response at the earliest opportunity. Any change to the role should be similarly broadcast to all units.

5.2.6 Responsible Individual command, control and coordination arrangements

In establishing an effective emergency response organization, the Duty Holder or company accountable for the operations should nominate a **Responsible Individual** (e.g. Incident Commander) within the company that should take the following points into account:

- Liaison with the authorities and governmental representatives.
- One person should be given responsibility for taking overall charge in an emergency and should be given clear authority to take decisions on emergency response including the decision on whether to escalate an incident to a higher response state.
- Roles and responsibilities of those in the command structure should be clearly defined and understood.
- Contingency arrangements should cover situations when primary personnel are absent or unavailable.
- All personnel involved in emergency response must have demonstrable capabilities in their roles.

5.3 MEDICAL PREPAREDNESS

It is the accountable organisation's responsibility to identify the health and safety hazards that can impact the workforce, and put in place appropriate processes and procedures to cover all foreseeable eventualities. This includes defining the level of on-site care, providing trained and competent individuals, and equipment appropriate to the assessed medical risk.

As offshore renewable energy developments become more complex and located further from an onshore permanent medical facility, medical provision must be appropriate to the medical risk identified. Considerable work has been done in similar risk and located industries; however, the dispersed working environment within a site does not lead to a direct copy of other industry solutions. Work teams tend to be smaller and structures are likely to be an inherent place of refuge. In some situations, it will be easier to bring first aid to a casualty than to move a casualty to an offshore medical facility.

Therefore, a Responsible Individual should assess the first aid needs appropriate to the circumstances (hazards and risks) of each workplace. Medical risk may be generated by health or injury, and should be identified as low, medium or high. For example, a walk-through on a near-shore turbine carries a similar risk to office/factory work and could be assessed as low. Individual work on live appliances could cause single, or low numbers of, severe injuries and may be classed as medium. The dropping of a heavy load during construction far offshore could lead to multiple severe injuries and may be assessed as high. Further guidance on medical risk assessments can be found in the Institute of Remote Healthcare for Energy and associated Maritime activities. In order to standardise medical provision, the following terminology is used within this document.

Medical provision will be categorised in tiers depending on the capability being provided:

- Tier 0 – no medical intervention, raising the alarm only.
- Tier 1 – immediate first aid capable of intervening and maintaining an airway, breathing and circulation, including the use of an automatic defibrillator.
- Tier 2 – extended immediate emergency care capable of sustaining life until transferred to a final medical place of safety. (Tier 3).
- Tier 3 – a permanent medical facility with the capability to sustain life and provide long-term recuperation. For the renewable offshore industry this is likely to be an onshore hospital with appropriate capability for the injuries sustained. This may not be the nearest medical facility to the site to point of disembarkation.

As guidance:

– Tier 1 should be available in around four minutes.
– Tier 2 should be proportional to the medical risk exposed and the time taken to reach Tier 3 in normal circumstances.

Any change in medical risk exposure may lead to a change in provision, or a change in risk exposure. For example, poor marine conditions could preclude a fast marine transfer, and freezing fog could stop helicopter transfer. In addition, risk could alter between day and night, and may also affect response times.

There should be effective arrangements for first aid, emergency medical care and rescue work. This should include suitable onshore facilities for the emergency and rescue services to: operate command and control arrangements for the incident; assess and provide medical provision to casualties including facilities to transport to medical centres; facilities to contact, and provide information to, NOK and media handling facilities.

5.3.1 External support

Although the Responsible Individual has the responsibility to put appropriate medical facilities and transport procedures in place, nations may have additional medical and transport resources to assist. An incident should initially follow the site's ERP; however, should the incident exceed the capability of the site or where life or quality of life is at risk, or believed to be or become at risk, then the incident should be escalated where available, to national authorities.

5.3.2 Terminology and definitions

IAMSAR defines medevac as 'evacuation of a person for medical reasons'.

An expanded definition could be 'evacuation of a sick or injured person from a hostile environment to a place of safety where the appropriate level of medical attention can be provided'.

Medevacs can be carried out by helicopter or by surface craft such as lifeboats or high speed CTVs.

5.3.3 Coordination

When national SAR is involved, all requests for medevacs from vessels or offshore installations include consultation with approved medical professionals. Approved medical sources include:

– Vessels or OREI requiring medical advice will be put in contact with doctors trained in providing remote medical advice and assessment. If appropriate, the doctor will recommend that the patient or casualty be evacuated (i.e. medevac). Additional resources from the Coastguard may be provided to assist.
– It is accepted that foreign flag vessels may elect to seek medical advice through the SAR or radio medical advice services provided by the relevant flag state. Medical advice provided via this route is also accepted as 'equivalent medical source'.
– Accountable organisation's own contracted approved medical provider.

5.3.4 Procedures for requesting medevac assistance

TMAS is given by a doctor, generally a consultant with specialist knowledge of maritime-related conditions, to the Master/Skipper of a vessel at sea or personnel on board an OREI, who are requesting assistance. This is usually in the form of a telephone or radio link-call (Medilink) through Rescue Coordination Centre (RCC).

TMAS is free of charge and provides support in cases where an individual suffers illness or injury at sea. The advice is intended to supplement the first aid and any other medical capabilities a ship/OREI's personnel has available.

Appropriate first aid trained persons should always be available on any OREI or supporting vessel/installation. Should the nature of illness/injury exceed the capability of the company's personnel/resources, then contact should be made with the nearest RCC as soon as possible.

When making the request, the first aider or nominated person will be expected to provide the RCC with basic medical information about the patient's or casualty's condition. Standard information on weather conditions on-scene, confirmation of position, helideck availability (nearby installation or vessel), refuelling capability and radio air frequency should also be provided. The RCC will then connect the call through to a doctor.

Taking into account the symptoms and implications of the patient's condition, weather and sea conditions, location of nearest hospital and availability/suitability of nearby rescue assets, the doctor and SMC will determine a course of action which may include: to treat on board; proceed to the nearest or next port, or to evacuate by SAR resources. Should evacuation be the course of action selected, the medical urgency of such evacuation will be agreed and implemented.

In certain exceptional circumstances, such as traumatic injury, where there is a perceived imminent threat to life, limb, or quality of life, and an immediate decision and response are required, the vessel/installation should provide the RCC with as much information regarding the condition as possible. The SMC may then request helicopter assistance from the ARCC before medical authorisation has been obtained. Consultation with the doctor should be undertaken subsequently, and at the earliest opportunity, in order to confirm the tasking and to provide relevant medical advice.

5.3.5 SAR procedures

Upon receiving the request and authorisation for medical evacuation, the SMC will decide on which type of resource will be best placed to carry out the evacuation. In the case of SAR helicopters, the RCC will forward the details to the ARCC who will task the most appropriate aircraft. Of note, this may not be the nearest asset. Once the SAR crew have recovered the casualty, they will make a clinical assessment of the casualty's condition. This might confirm the destination hospital. It may, however, require upgrading or downgrading the plan – either of which may require a change in destination.

5.3.6 Routine or emergency medevacs using commercial air transport helicopters

Where already provided, there may be times when the contracted commercial air transport helicopter might be used to transport a medically incapacitated passenger back to shore in circumstances that would otherwise preclude the normal carriage of passengers. This will be a matter for the helicopter operator to determine and assure in accordance with its procedures and approvals.

5.3.7 Routine medevacs

If the casualty is physically mobile (e.g. capable of unassisted emergency escape or evacuation, can don a survival suit if needed, has a non-urgent medical condition and/or does not need a paramedic escort) these evacuation flights can be undertaken using a helicopter operating for the commercial air transport of passengers and conducted to the full set of rules offering the highest mitigation of risk (e.g. scheduled crew change).

5.3.8 Emergency medevacs

As helicopters used in support of the offshore renewable industry become more capable, and through the introduction of offshore refuelling, they are able to operate within ORED for a sustained period. Helicopters are therefore likely to be one of the first assets available to respond to an emergency.

Although not currently equipped, or trained, to conduct SAR operations, they nevertheless could provide a timely asset for intervention. Specialist medical support is likely to be centrally located, and may be away from an incident scene.

A helihoisting helicopter is capable of transporting the medical specialist together with mobile first aid equipment. Such activity needs to be pre-planned and included within the Air Operator's Operating Procedures and personnel/equipment must be trained and pre-cleared for such transfer.

In addition, injured persons may be transferred by the same asset to either an offshore medical facility, or to an onshore hospital. This may be the quickest option to gain specialist care, rather than waiting for shore-based helicopter support. The transfer of casualties by non-specialist air assets is not without risk, and those risks can be managed and mitigated in advance with air asset owners, regulators, and work force.

Such risks include: the carriage of an injured person without full PPE, a casualty who may not be able to escape the helicopter unaided, and a helicopter not designed for contamination. Nevertheless, the risk may be acceptable in life endangering situations.

Figure 18: SAR helicopter at Dan Tysk

5.3.9 Medical evacuation of a psychologically distressed person

It is not possible to give definitive advice on the medical evacuation of psychologically distressed persons, given the wide range of factors that may apply.

If the person requiring evacuation is on board a vessel, the best option may be for the ship to return to port, with the individual being closely monitored at all times.

If the person requiring evacuation is on board an OREI or supporting installation, the only option may be to return the injured person to shore by ORED asset or SAR resource. There may be risks involved and the evacuation will only be undertaken after detailed discussion between all interested parties. This will normally include the doctor recommending the evacuation, the vessel captain, the Coastguard, the SAR helicopter captain or lifeboat coxswain and, in certain circumstances, the police. It should be noted that as long as the individual is being closely monitored on board the installation, there is likely to be no requirement for an immediate response, and that time will normally be available to explore all options.

5.3.10 Completion of a medical emergency

Once an injured person has been delivered to a Tier 3 facility, then maritime responsibility is complete. There may be a requirement for incident investigation by regulatory authorities. Once released from Tier 3, the return of the casualty to a home location is the responsibility of the accountable organisation, or in the case of subcontractors, the employer.

5.4 SAR HELICOPTER PROCEDURES

5.4.1 Requirements for SAR helicopter operations on OREI

SAR helicopters operate under civilian or military regulations. These ensure that aircraft and crews are equipped and trained to undertake helicopter rescue in demanding locations and environments.

Commercial air transport helicopters, including the provision of hoist operations, are certified in accordance with European Air Operation Regulations and are not normally permitted to carry out rescue winching.

5.4.2 Search and rescue helicopters

National SAR helicopters may be required to rescue personnel from OREI. OREI include Offshore Support Platforms (OSP)/OSS with purpose built and certified helidecks, OSP with helihoist platforms, WTG with helihoist platforms and WTG. The decision on whether to attempt a rescue, and whether to land or hover, will be at the captain's discretion and will be determined with reference to a number of factors including:

- the size, location and certified capacity of any helideck;
- the wind direction and any prevailing obstructions and induced turbulence;
- the helicopter's rotor diameter and clearance to the nearest obstruction;
- visual cues available to the helicopter crew, and
- weather and light levels available.

It is the **Responsible Individual's** responsibility to ensure that any rescue location is prepared for an SAR helicopter transfer. Areas should be clear of obstructions and any item that could be dislodged by helicopter downwash that could become a flight safety hazard to the helicopter or strike those on or below the OREI. Lighting should be controlled and set at the request of the helicopter captain. Where possible, direct communication should be established between the SAR helicopter and the rescue location; this can be by Marine band VHF Radio (preferred), Aviation band VHF Radio, or mobile telephone. Helicopter winch-men may not be familiar with OREI and are not qualified to undertake technical rescues from within structures. The casualty should be transferred by qualified work colleagues to a recognised transfer location. This will normally be the usual or pre-identified helicopter landing or hoisting location, or a clear area surrounded by some form of safety structure that will minimise the risk of being blown off the OREI, whilst not endangering the rescue operations. Examples could be winching from within a safety-rail enclosed area or from within a nacelle with a vertical opening. As these turbines are not normally exposed to helicopter downwash, there is a greater risk of damage to doors and openings, which may result in loose objects, which may damage the helicopter or personnel operating below.

5.4.3 Helicopter rescue from a WTG

Offshore turbines may be fitted with a certified helihoist platform. The maximum rotor diameter permitted to hover over the platform is detailed within the certification and recorded within the Helideck Certification Agency (HCA) Register, or similar. SAR helicopters may use the normal helihoist procedures if there is sufficient space between the helicopter rotor and the turbine blades. Where this is not the case, the pilot may elect to hover higher to provide safety separation. SAR helicopters have their rescue hoist fitted on the starboard side. Accordingly, the WTG should be prepared for rescue hoisting by:

- The nacelle yawed so that the nose cone heading is 90 degrees to the right from the prevailing wind as viewed from above. This means the helicopter will be positioned into wind with the cabin door on the right-hand side of the aircraft, over the nacelle.
- The blades should be positioned for helicopter transfer. The exact configuration will be dependent on helicopter type, safe hovering criteria, and in particular the availability of pilot hover references when in the hoisting position next to the structure. Exact requirements should be determined through discussion and exercise with SAR helicopter units that may be called upon to respond. This may involve liaison with more than one unit and may be from adjoining SAR regions/countries.
- The three recognised configurations are:
  - Retreating blade horizontal (preferred where hoist positioned close to pilot in command e.g S92): one blade positioned horizontally pointing away from the wind, to minimise the possibility of tail rotor/turbine blade collision.
  - Bunny ear: with one blade vertically pointing down the tower with the other two blades in the 'bunny ear' position.
  - Advancing blade horizontal: one blade positioned horizontally, pointing into wind, to minimise turbulence to the hovering helicopter.
  - Blades and nacelle must be positioned, braked and/or preferrably locked to stop induced movement from the wind or rotor downwash. This will also include overriding/disabling any anemomenter and nacelle yaw-motors. Such actions should be completed in consultation with and where possible before the arrival of the SAR helicopter to expedite rescue.

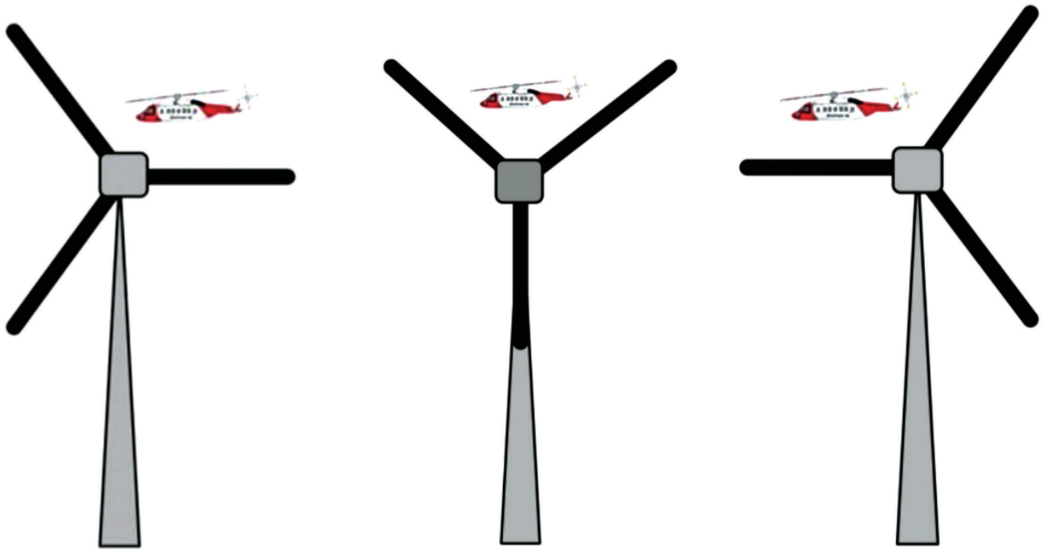

Figure 19: OREI – requirements, guidance and operational considerations for search and rescue and emergency and response (Source: MCA)

Where the helicopter is larger than permitted under the helihoist certification, or where the nacelle cannot be correctly positioned, the helicopter captain will decide the optimum height, orientation and location for winch transfer. In general, the hovering position is likely to be higher and more demanding to hold than normal helihoisting. Where helihoist platforms are not fitted, then nacelle roofs should have safety rails or grab-handles so that winch-men can be lowered into a safe area, or obtain a safe hand-hold and, if required, attach to WTG-provided safety restraint or anchor point. Should the roof of a nacelle be unsuitable, with no safe area, SAR winch operations may not be possible.

During SAR winching, site personnel should be present to assist the winch-man. At no point should any helicopter cable or guide rope be tethered to the WTG. Care should be taken to avoid static electric shock as the winch-man reaches the WTG. The winch-man should not be approached or touched until he has discharged any static shock through the electrical discharge cable attached to the hoist hook. Stretcher bound casualties will normally be transferred in the helicopter's own stretcher by either transferring the casualty, or placing the WTG stretcher e.g. spine board, into the helicopter-provided stretcher. Local SAR helicopter units may, following discussion/exercise, clear WTG stretchers for live winching.

5.4.4 Helicopter rescue from an ORED, non-WTG

SAR helicopters have standard procedures for rescuing from marine and offshore platforms. In broad terms:

– Marine transfer – SAR helicopters prefer, for aircraft safety, to hoist from a vessel under way, ideally on a course provided by the aircraft captain. This requires clear sea-room and would normally be conducted outside the confines of the ORED development.

– OSP, OSS and Offshore Transformer Module (OTM) – Marine rescue from offshore platforms can be particularly time-consuming and hazardous. Prior to committing to a descent, the option of a helicopter transfer (SAR or commercial) should be considered, taking into account aircraft availability and casualty severity. In order of preference – helicopters would prefer to:
  1. land on a certified helideck;
  2. hoist from a pre-determined and annotated location (helihoist spot or deck), or
  3. hoist from an area clear of vertical obstructions and displaceable hazards.

Figure 20: Sheringham shoal

These procedures should be discussed in advance with the emergency services and included within the applicable ERP. Upwind WTG may need to be stopped, or placed at idle, to minimise the effect of turbulence on helicopter operations. Although lighting may help identify those requiring rescue at night, all lights that could impact on helicopter operations should be capable of being controlled, either by dimming, or by being switched off at the helicopter captain's request.

As an ORED is developed, there will be various activities that in themselves could lead to activation on an ERP. Examples include:

– Marine and sea bird survey – relatively small vessels operating in isolation have succumbed to the weather, requiring rescue.
– Met masts, and associated survey equipment, may be positioned years before development commences and require regular isolated maintenance.
– Seabed survey, preparation and construction have led to unexpected incidents, from seabed erosion to abandoned UXOs.
– Transition pieces will be positioned in advance, and incidents have occurred where individuals have been rescued from incomplete structures. In helicopter rescue terms these substructures are no more demanding than similar sized moored marine vessels. However, protective coverings ('Chinese hats', tarpaulins) may cause a hazard to helicopters and personnel, as they are relatively light and could lift under helicopter downwash, which could reach in excess of 50 kts on a calm day. Accordingly, such structures need to be secured prior to helicopter arrival.

In addition, as the ORED evolves, new structures will pose an obstruction to normal SAR and for ORED support. Accordingly, the location and timing of positioning must be passed to the

emergency authorities on a regular basis. A zonal development map with accurate locations covering constructed and expected planned activity has proved beneficial.

Winching from the surface of the sea, or from a vessel amongst wind turbines or other OREIs, may be possible depending on the incident situation, development layout, weather, day or night, visibility and sea conditions. However, there is no guarantee that an SAR helicopter will be able to conduct a winch from the sea surface, or from a vessel amongst wind turbines or other OREIs. Vessels may be requested to move clear of obstructions before any transfer can be attempted. The final decision on where to transfer a casualty will be at the discretion of the SAR aircraft captain.

5.4.5 Non-search and rescue helicopters

Survival suits, life jackets and emergency breathing systems (EBSs) would normally be worn by crew and passengers. However, there are certain situations where the contracted commercial air transport helicopters may carry medically incapacitated passengers unable to wear survival suits, lifejackets or EBS in accordance with the operator's approved operating procedures.

5.4.6 Lighting for SAR aviation purposes

In poor visibility or at night, any lighting on WTGs may be required to be switched on or off at the discretion of the helicopter captain. Hand-held strobe lights and nacelle internal lights can aid in identifying the WTG requiring support, particularly when dedicated red SAR lights are not fitted; however, they should be extinguished once a helicopter is on-scene to minimise glare and distraction. As part of the site's certification and acceptance process, aviation hazard lighting requirements will be specified. These will aid safe SAR aircraft operations and ensure that confusion with marine navigation lights is mitigated.

5.4.7 Non-ORED rescues by national SAR helicopter

SAR helicopters may be tasked to conduct SAR from within wind farm boundaries. Turbines will act as an obstruction for search, and limit the helicopters' ability to manoeuvre safely.

The optimum wind farm layout for energy production may have to be modified to allow for an ordered layout (linear lines of orientation), safe marine/aviation lanes, and helicopter refuge areas. During live rescues, turbines may have to be stopped for helicopter safety and to minimise downwind turbine turbulence. Clear communication between the Coastguard operations centre and wind turbine operations will be essential, and should be practised regularly. Grid requirements may preclude the immediate shutdown of a wind farm, and early notification is required to enable a phased wind farm power reduction.

5.4.8 Technologies that may have leveraged

SAR assets, helicopter and rescue craft, can spend considerable time and effort to locate casualties, especially those in the water who are subject to wind and tidal drift. ORED can act as a considerable obstacle to search activities and even where a search can be contemplated, structures can reduce the probability of detection. Accountable organisations can improve the probability of rescue by providing means to locate those in distress. Ideally search assistance should be built into ORED design; however, as technology develops, retrofitting should also be considered. The following technologies may be considered for positioning

offshore (the list is not exhaustive, some are proven and currently deployed, and some are under development):

– CCTV;
– marine radar;
– beacon identification;
– heat sensitive cameras;
– remotely deployable and operated search drones;
– artificial intelligence software-discrimination programmes on optical systems, and
– remotely deployable and operated marine autonomous vessels.

5.5 POLLUTION CONTROL

5.5.1 General principles

This section outlines the overarching legal and practical obligations placed on accountable organisations regarding environmental protection or pollution prevention. It does not aim to provide specific advice or direction regarding how to satisfy these obligations. The overarching priority for all parties concerned should be the prevention of pollution incidents. However, as pollution incidents are likely to be reasonably foreseeable, accountable organisations should have suitable and effective pollution response procedures in place, in line with the ERPs set out in these guidelines.

Accountable Organisations are likely to have environmental and pollution prevention and control duties in two main areas:

1) Offshore assets: Owners and Responsible Individuals with responsibilities for the construction, operation, and decommissioning of offshore installation (e.g. substations, turbines).
2) Vessels: Owners and Operators of vessels will have responsibilities under applicable IMO Conventions, including pollution prevention responsibilities enforced by the Coastguard.

Most international regulations on marine pollution come from the International Convention for the Prevention of Pollution from Ships (Marine Pollution (MARPOL) 73/78). The primary aim of MARPOL is to prevent and minimise pollution from ships from accidental and routine operations. Technical annexes for marine pollution cover:

– oil;
– noxious liquid substances carried in bulk;
– harmful substances carried in packaged form;
– sewage from ships;
– garbage from ships, and
– air pollution from ships.

5.5.2 The Bonn Agreement

The Bonn Agreement is discussed as an example of a region-specific agreement aimed at combating pollution. Refer to Annex A for country/region specific information on relevant

regulations, agreements, mechanisms and parties for combating pollution from ships, offshore installations and maritime disasters.

The Bonn Agreement is the mechanism by which the North Sea States, and the European Union (the Contracting Parties), work together to help each other in combating pollution in the North Sea Area from maritime disasters and significant pollution from ships and offshore installations, and to carry out surveillance as an aid to detecting and combating pollution at sea.

The North Sea States are: Belgium; Denmark; France; Germany; the Netherlands; Norway; Sweden; the United Kingdom of Great Britain and Northern Ireland, and Ireland.

While the Bonn Agreement does not cover OREIs, it does contain useful information on responding to pollution events in and around OREDs.

Information on this can be found in the following Bonn Agreement web page, Chapter 8: www.bonnagreement.org/site/assets/files/3946/ bonn_agreement_counter_pollution_ manual.pdf UK Application.

5.6 ONSHORE ACTIVITY

5.6.1 Background

There is a natural tendency to concentrate on the offshore element of an incident, as this is where activity is directly related to saving life. However, all offshore incidents at some point return to shore. Preparing for this is key to emergency response planning. The availability of independent communication means and the proliferation of social media, means that the notification of an incident can reach those on shore whilst incident response is still ongoing. Accordingly, having a robust, quickly activated, simple to operate and flexible response will be seen as key to success. Prior preparation is the foundation of such a plan.

The following are some of the onshore activities that may require addressing:

- informing NOK of deceased or seriously injured personnel;
- media handling;
- providing practical and timely support to NOK;
- recovery of personnel affected by the incident that do not require further medical treatment;
- immediate debrief of personnel involved in the incident;
- incident investigation;
- practical support to enable those affected to return home, and
- long-term care of those affected.

5.6.2 Role of the police

In the event of a death, persons reported missing or with life threatening injuries, the police will have an immediate role. In addition, they may also respond to pollution, bomb or security threats. The time to engage with the police is during the creation of the ERP to develop an understanding on how the police will support the specific ORED. Some countries have dedicated police personnel permanently qualified to go offshore at short notice. These may

not be located near the ORED control centre. In addition, police liaison officers may be deployed to the ORED operations centre to provide advice and support. Police liaison officers may also be sent to statutory authority operations centre.

How the notification of death or serious injury is to be notified to an NOK has to be determined in advance. In most countries with ORED, the responsibility lies with the police. The Responsible Individual should be prepared to provide the authorities with the accurate NOK details in a timely manner if requested. The international make-up of offshore employees can make this task particularly difficult.

Major incidents will be investigated.

5.6.3 Incident investigation by enforcing authorities

The relevant authorities use discretion in deciding whether to investigate incidents. When making such decisions, including the level of resource to be used, they can take the following factors into account:

– severity and scale of potential or actual harm;
– seriousness of any potential breach of the law;
– relevant enforcement or other priorities;
– practicality of achieving results, and
– wider relevance of the event, including serious public concern.

The relevant authorities will have different duties for health and safety enforcement and accident investigation. There are memorandums of understandings and/or other agreements between the relevant authorities to determine the lead authority and, where overlap exists, use their best endeavours to cooperate effectively to enable and assist each other to carry out their responsibilities and functions, and to maintain effective working arrangements.

The Responsible Individual should be prepared to offer whatever assistance the authorities may require. This may involve:

– preserving evidence, physically and photographic (if there is likelihood of a delay and/or environmental damage);
– providing logistics to the incident location;
– providing a safety escort to the scene, and
– ensuring the availability of witnesses and a location for interview (see 5.6.4).

5.6.4 Survivor/evacuee reception centres

Following an offshore incident, personnel may be returned to a location other than their port or airport of departure. Personal possessions, including clothes, phones and travel documents, may be missing. Although not physically injured, personnel may be traumatised by their experience and could be seen as second casualties. Friends and relatives are likely to hear about an incident through public means, and may proceed to an operator's onshore centre. An ERP should take into account such possibilities and have contingency measures readily activated. Core to such contingency is to have a location where personnel may be welcomed and processed.

A survivor/evacuee reception centre is a secure area where evacuees not requiring hospital treatment can be taken for short-term shelter, first aid, documentation and, if necessary,

police interview. Such locations may also be used to receive NOK; however, depending on the circumstances, segregation may be required.

Reception centres may be set up close to sea or airports, or at some other convenient and pre-arranged location. Close liaison with local emergency/statutory services should be undertaken to determine whether existing arrangements for other offshore industries are sufficient for renewable activity or whether dedicated facilities need to be established.

Faced by challenging emergencies, responders may be forced to prioritise resources, thereby offering less immediate support to some individuals or communities. This is an acknowledgement of the reality of emergency situations. Given this reality, businesses, communities and individuals must also bear a responsibility for their own resilience.

Whether or not a reception centre will be opened is dependent on many factors, including the size of the emergency and the number of staff or facilities available. Non-emergency situations may include failure of facilities, or adverse weather may also require evacuation. In these circumstances, controlled recovery is conducted without the need for consultation with the emergency services. In general, the evacuation of a work crew of 12 or less from an offshore wind installation is unlikely to trigger the implementation of a reception centre.

The mass evacuation of staff from offshore installations poses a number of challenges for operating companies to consider. These include the:

– ability to source suitable facilities to host a reception centre at short notice;
– provision of trained staff in sufficient numbers to fulfil the various reception centre roles;
– repatriation of evacuees and their family or friends when the reception centre is run in conjunction with a family and friends reception centre;
– ability to facilitate contractor representatives for evacuees who are contracted staff;
– provision of security to prevent intrusion from members of the press or persons not connected with the incident, and
– provision of food and replacement clothing for evacuees.

5.6.5 Family, friends and NOK reception centre

A family, friends and NOK reception centre is a safe and secure place, away from public view, that is established to act as a focal point for the family and friends of those believed to be involved in the emergency, especially in the case of mass casualties. Its purpose includes:

– registration, confirmation of identity and interviewing of family and friends;
– providing information about the incident;
– recording full details of persons believed to be missing by the police;
– assisting with investigation into the incident;
– providing initial practical and emotional support to families and friends, and
– in the case of fatalities and missing persons, to collect samples to assist in the identification and/or investigation process.

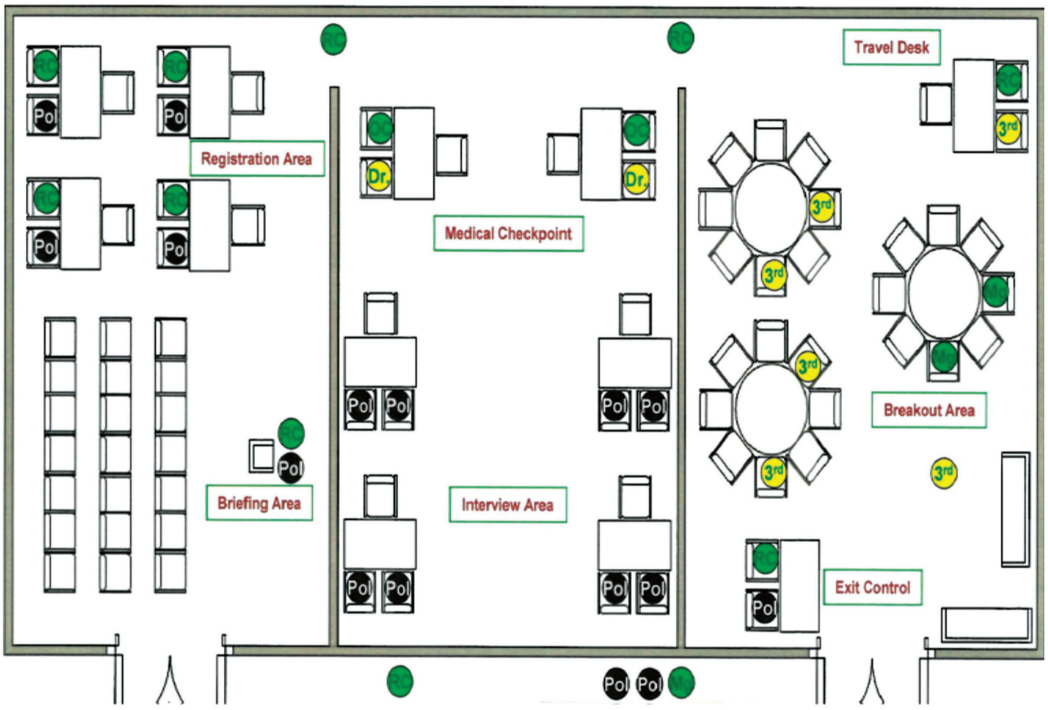

Figure 21: Example of the layout of a basic reception centre

In addition to location, it is important that procedures are agreed in advance and exercised by the personnel likely to be asked to support an incident. Having pre-prepared forms, lists of available accommodation, overnight personal clothes/toiletries, emergency dry rations and transportation options can reduce the burden on personnel.

5.6.6 Providing support to next of kin

Personnel employed in the offshore renewable industry often work away from their home location for extended periods of time. NOK may therefore be located at a great distance from the ORED shore base and in some cases in different countries. In situations where employees may be suffering life threatening conditions, the timely transportation of NOK to the employee will be of considerable importance to those involved and of reassurance to the wider workforce. Contingency measures for such an eventuality should be put in place in advance. This may require the establishment of on-call contracts with specialist support companies.

As news of an incident spreads, NOK are likely to try and contact the onshore operations base for information. Lines of communication and personnel can quickly become overloaded. Consideration should be given to providing a dedicated contact number for NOK. Again, an on-call contract with a specialist support centre may allow critical staff to concentrate on their core duties.

Figure 22 shows a reception centre control record form for use by companies to document the passage of individual evacuees through the reception centre process.

RECEPTION CENTRE CONTROL RECORD	
Personal details	
Full name	
Date of birth:	
Employer:	
Home address:	
Home tel:	
Mobile tel:	
Next of kin (NOK)	
Full name:	
Relationship:	
Address:	
Contact tel:	
Checked by:	
(Company representative)	
Private consultations We recommend you talk to the health team while in the Reception Centre.	
Seen by Doctor at:	
Time:	
Doctor's initials	
Released to travel	
Received by: Company representative	
Met employer's representative	Evacuee's initials:
Received clothes	Evacuee's initials:
Received cash £ sum =	£
	Evacuee's initials:
Received accommodation details	Evacuee's initials:
Received tickets train/plane	Evacuee's initials:
Departure details	
Date/time left:	
Destination Method of travel	
Exit desk representative initials	

Figure 22: Reception centre control record

5.6.7 Media relations

5.6.7.1 Communications

Good public communication is vital to the successful handling of any incident and should be incorporated in all contingency planning.

The inadvertent release of sensitive information can compromise emergency response, cause unwarranted distress, and prejudice subsequent investigations. Accordingly, a coordinated, measured, and timely release of accurate information is in the best interest of all those concerned with an incident, thereby protecting individuals whilst fulfilling the requirement for open and honest reporting.

When an incident occurs, the key communications objective is to deliver the following.

Accurate, clear, timely and up-to-date information and advice

The need for formal cooperation between all press officers of interested parties, i.e. a Lead Government Department; the OREI accountable organisation, ship owner/salvor (for a shipping incident), Air Operator (for aviation), and Devolved Administrations (depending on the location of the incident) is vital.

Briefings should be established between all the Heads of the Response Cells. These briefings can be physical or virtual.

Partner responsibilities for issue of information

Realistically, the lead agency may not be able to give all partners advance sight of information to be released in the very early stages of an incident.

However, the advance view by partners of each other's releases should become an important part of the process once the communications cell is set up. Partners should aim for the following:

- Each partner will be responsible for the release of information for which they are the primary source.
- Ensure that the other partners have advance sight of information to be released.
- Give 10 minutes for response unless there is mutual agreement for longer.
- Provide a written reason if a partner's amendment is not accepted.
- Provide partners with a copy of the final release no later than its media distribution.
- Only use information provided by other partners once it has been released.

6 TRAINING AND MEASURING PERFORMANCE

6.1 COMPETENCY TRAINING

In order to ensure that all personnel engaged in the renewable wind industry are suitably trained and have the necessary skills to respond in emergency situations and perform initial emergency response activities, specific training shall be followed.

Training curricula should only be acquired from reputable and accredited institutions that offer proven and widely adopted means and methods. Different safety training standards exist, including:

- GWO – main body for the renewable energy industry.
- Offshore Petroleum Industry Training Organization (OPITO)
- International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) – main body for the marine industry.

These training standards provide relevant safety and emergency response training, including:

- basic safety training;
- first aid training;
- fire awareness and basic firefighting training, and
- working at heights and rescue from heights training (GWO only).

Which training standard is best suitable for the individual shall be risk assessed based on the activities performed.

Offshore Installation Managers' (Renewables), Operational Controllers' and Marine/Air Coordinators' attendance at a specialist Emergency Response Planning and Control course is recommended. Courses are likely to cover the following topics and will be country-specific to ensure compliance with National requirements:

- General background:
  - International and National Requirements for SAR;
  - National SAR organisation, and
  - Coastguard responsibilities and working practices.
- Other statutory authorities:
  - roles and responsibilities;
  - legislation, and
  - inspection.
- SAR Hierarchy and Mission Control.
- SAR assets and helicopter winching awareness.
- SAR challenges with offshore renewables and benefits they provide:
  - incident coordination, and
  - search planning.
- Police procedures.
- Medical procedures – evacuation.

– Emergency response documentation.
– Practical operations room visit.
– Tabletop exercise.

Top-up courses on Continuous Professional Development (CPD) should be completed regularly.

6.2 EXERCISES AND DRILLS

Skills-based training drills may concentrate on individual components of incident response. Examples would include: escape from restricted work areas; rescue from height and MOB. These should be conducted regularly so that all those expected to partake in an incident know and practise their roles. Exercises should be developed that can be conducted at short notice, when normal operations may be curtailed e.g. a bad weather day. The same exercise may be used on many occasions and should take a matter of hours to prepare.

Team-based exercises should be conducted to develop leadership, communication and familiarity with site-specific ERP. Such exercises are likely to impact on routine operations, and may need to be built into the site programme. The importance of these exercises cannot be overemphasised, and management must be prepared to schedule and support such activity. As these exercises will affect the operational programme, they may need to be prepared weeks in advance. Training personnel should assist in the development and delivery, and special safety measures may be required above and beyond normal operating procedures. Such measures should be identified by an exercise risk assessment e.g. double connection to practise an emergency descent.

Joint exercises with external emergency responders provide an important opportunity for the emergency responders to familiarise themselves with wind farm operations, equipment and procedures. Again, such an exercise will impact on operations; however, the benefit of such interaction will be found should a real incident occur. Emergency services are on constant readiness, and therefore exercises may be called off at short notice. Planning is likely to require pre-meetings and detailed risk analysis, together with an agreed and scripted scenario programme. Experience has shown that an experienced directing staff, mirroring the senior stakeholders to be exercised, may be required. A moderate exercise involving Coastguard and rescue craft services may take over three months to organise.

Major incident exercise will involve a number of stakeholders and is likely to be beyond the capability and experience of a single wind farm operator to organise. Such coordination may best be left to the Coastguard, with a number of wind farms participating in accordance with the Internal Emergency Response Plan (IERP). National exercises may take months to arrange and, as the emergency assets participating will be dedicated for the exercise, a guaranteed commitment from the wind farm operators to partake. This may have a substantial impact on wind farm operations and extra personnel may need to be programmed to take part. Such exercises are likely to rotate around wind farms and the emergency services may only be able to cope with a few per year. A cross-border exercise involving SAR assets from a number of countries may take over 18 months to organise and may only occur once in a decade.

6.2.1 Measuring performance

Setting performance standards, e.g. time to evacuate to a place of safety, for measures is a crucial aspect of the assessment process. Performance standards should relate to the management arrangements, items of equipment, procedures, etc. which they describe. They may be described in terms of Functionality, Survivability, Reliability and Availability. They should be measurable and auditable.

Exercises give an ideal opportunity to confirm that the performance standards expected within emergency plans can be met. Should exercises demonstrate that they are unachievable then strategic planning will require revisiting.

7 LEARNING AND INFORMING

Following any real incident or emergency response exercise, there should be a structured debrief. The objective is to capture not only what went well but also learn from experience. There is no such thing as a bad exercise; it is an opportunity to learn.

A structured debrief should look at all aspects of the live/exercise incident. As many of the participants as possible should participate, ideally face-to-face, or for remote participants by a conference call. Flexibility should be applied to ensure that external participants e.g. Coastguard and rescue services, take part.

For an exercise, the structure may be based on the scenario, including the planning phase and exercise risk assessment, to see whether the intended outcomes were seen and followed. For a live incident, the site risk assessment and Emergency Plan may be an appropriate structure. Where lessons are acknowledged, priorities for change should be identified and an implementation plan created with objectives and deadlines for completion.

The Emergency Plan should be challenged, and amendments proposed if needed. Notwithstanding the requirement for regular exercises, Emergency Plans should be reviewed periodically following a timetable laid down by the Accountable Organisation.

Lessons and experiences should be shared openly within the industry. G+ will act as a conduit for members. A suggested reporting format is attached for both incidents and exercises. Positive experiences and lessons identified from real ERP activation should be collated and shared widely within the industry. Such information will assist maintenance of this document, inform emergency services, and identify industry change. It is recommended that information should be anonymised to enable wide distribution.

As the time and effort to conduct a major exercise can be extremely high, consideration should be given to recording as much of the exercise as possible. Not only can this help the debrief and identify issues but may also provide a medium to share experiences with a wider audience.

Examples:
Exercise Sancho (UK) https://ore.catapult.org.uk/?industryreports=offshore-renewable-energy-emergency-forum-exercise-sancho-report
Floatgen (France) https://www.youtube.com/watch?v=vkBxe2IGmp0

7.1 POST-INCIDENT REPORT

In order to achieve consistency in reporting, it is recommended that the forms in Table 5 are used to report when an ERP has been activated and when a substantial Emergency Exercise has been completed. Information should be anatomised before distribution.

Table 5: Example post-incident report form

POST-INCIDENT REPORT FORM
Identity of casualty
(Name of vessel, call sign, flag state)
Position
(Latitude/longitude + geographical proximity reference e.g. 'Off Lands End')
Situation
(Type of message, e.g. distress/urgency, date/time, nature of distress/urgency, e.g. fire, collision, medico)
Number of persons at risk
Assistance required
(By coordinating Ops Centre)
Coordinating Ops Centre
Description of casualty
(Physical description, owner/charterer, cargo carried, passage from/to, lifesaving appliances carried, etc.)
Weather on scene
Initial actions taken
(By casualty and co-ordinating Ops Centre)
Search area
(As planned by the co-ordinating Ops Centre)
Co-ordinating instructions
(OSC/ACO designated, units participating, communications, etc.)
Future plans
Details of the response actions taken or omitted with recommendations to improve the response in the future. (Lessons identified)
Additional information/conclusion
(Include time SAR Operation terminated)
POST-EXERCISE REPORT FORM
References
(What documents or procedures were being tested)
Introduction
(General information about the company/scope of exercise/why the exercise was held/etc.)
Exercise aim
(The overall purpose of the exercise)
Exercise objectives
(What were the objectives set to help you meet the aim?)

Table 5: Example post-incident report form (continued)

Exercise participants
Which organisations took part
Exercise Scenario
Brief overview of scenario including cause and consequence that needed to be managed
Observations and recommendation
Details of the response actions taken or omitted with recommendations to improve the response in the future. (Lessons Identified)
Further information
Details of who to contact if more information is required
Appendices
List of exercise objectives and evidence of how they were met
Full list of participants
Debrief feedback
Action plan of recommendations (with status and column for follow-up action)

7.2 ERP CHECKLIST

Regular audits of ERPs will ensure that documents are accurate and in date. A suggested ERP audit checklist is provided in Table 6. It is further recommended that organisations consider undertaking partner audits, where an adjoining ORED audits its neighbour, reciprocating at a later date.

Table 6: Suggested ERP audit checklist

ERP AUDIT CHECKLIST	
Accountable Organisation	Legal entity
Responsible Individual	CEO/COO
Area of ORED	Coordinates
Assets Placed Within ORED	
Fixed – WTG, OSP	
Mobile – SOV, CTV, Jack-up, Helio	
Marine Port of Departure	
Air Port of Departure	
Operations Centre	
Organisations covered and consulted	
Adjoining assets consulted	
Worst consequence planning scenarios	
(phase of ORED development)	Construction/O&M
Structure	
Marine	
Aviation	
Work party	
Individual	
Non-ORED	
Medical objectives/transport	Time and means of transport (e.g 15 min by helio)
Tier 0 (raising the alarm)	
Tier 1 (Immediate FA, AED and Tq)	
Tier 1 Enhanced FA	
Tier 2 Qualified medical intervention	
Tier 2 Place of stabilisation	
Tier 3 Transportation to	
Tier 3 location	
All casualties to Tier 3 by (mins)	
Rescue objectives	Time and means of transport (e.g. 5 min at work location)
Basic Rescue available in	
Advanced Rescue available in	

Table 6: Suggested ERP audit checklist (continued)

ERP AUDIT CHECKLIST	
Specialist rescue (Cas, Diving, Rope) in	
Command and Control	
Communication plan – site	
Operational procedures	
Second line level control located	
Second line level control activated in	(min)
Third line level control located	
Third line level control activated in	(min)
Documentation	
ERP	
Risk assessment	
Command arrangements – diag	
Call-out measures	
Emergency Service Procedures	
Communication plan – external	
Mutual Support Procedures	
Communication plan – adjoining	
Onshore procedures (HR, Reception)	
Incident investigation	
Post-incident report	
Preparation	
Exercise objectives	
Exercise timetable	
Post-exercise report	

ANNEX A
NATIONAL PROCEDURES

The purpose of the G+ Offshore Emergency Response – Renewables is to share industry good practice on post-incident emergency response and the preparation for such activity.

G+ recognises that not all national requirements or country-specific procedures can be captured within the main body of the document. National Procedures are included as annexes to inform organisations/personnel working across international boundaries. It is intended that National Procedures will be developed and owned by country-specific working groups within country G+ representatives.

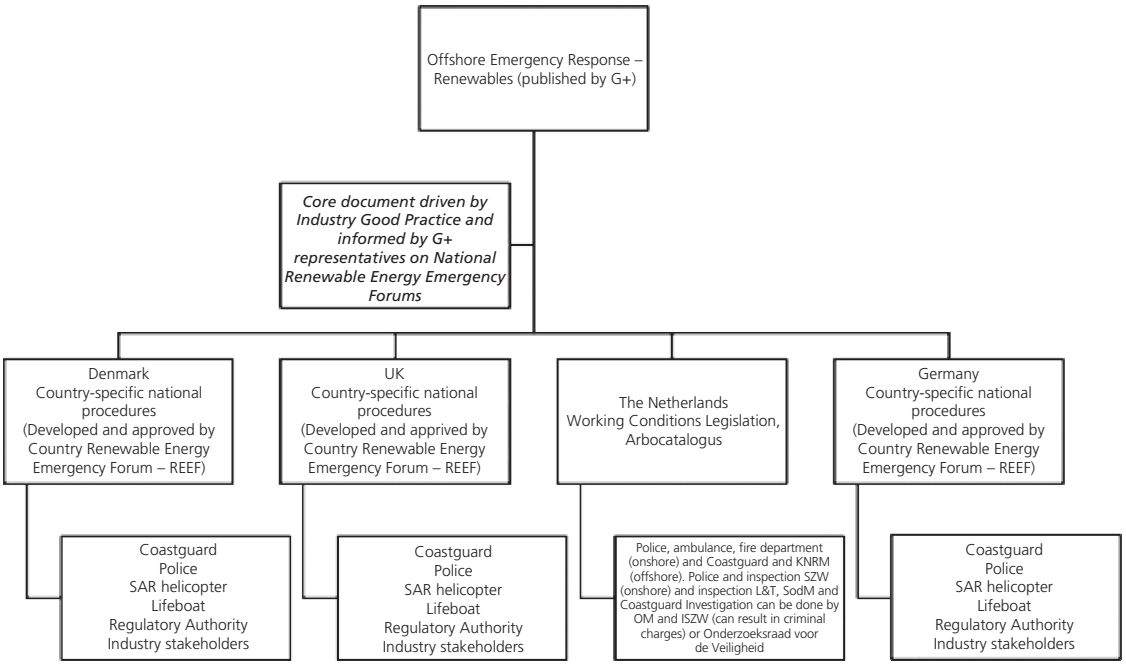

Figure 23: Overview of national procedures

A.1 UNITED KINGDOM

A.1.1 Emergency response overview

The UK's SAR region is coincident with its Renewable Energy Zone (REZ). As part of national licensing for offshore renewable developments, the National Landlord for the seabed, The Crown Estate, requires an ERCoP approved by the MCA. In addition, marine navigation, lines of orientation and SAR refuge areas are to be incorporated into ORED design.

The MCA coordinates SAR activity within the SSR through regional Maritime Operations Centre and a National Maritime Operations Centre (NMOC) in Fareham. The national ARCC is also co-located with the NMOC. The MCA can:

– task its own coast personnel and cliff rescue teams to support an incident;
– request the launch of lifeboats through the RNLI, and
– task civilian contracted SAR helicopters and fixed wing aircraft through the ARCC.

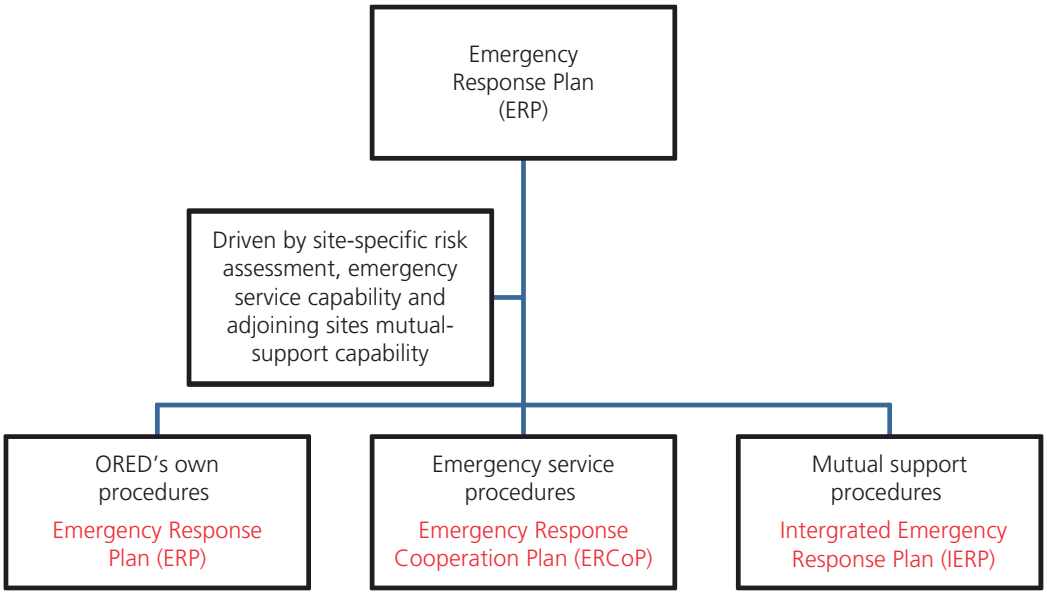

Figure 24: ER – Terms used in the UK

The content of the ERCoP should follow the guidance provided by the MCA within their OREIs, ERCoP Template for Construction, Operation and Decommissioning Phases:

www.gov.uk/government/publications/offshore-renewable-energy-installations-orei

A.1.2 UK Statutory Authorities

UK Statutory Authority guidance for offshore renewable energy developments is provided by:

A.1.2.1 Health and safety executive (HSE)

The UK HSE Regulatory Expectations For Emergency Response Arrangements For The Offshore Renewable Energy Industry may be found at: www.hse.gov.uk/osdr/assets/docs/is2-2019.pdf

A.1.2.2 MCA

The UK MCA guidance offshore renewable energy installation may be found at:

www.gov.uk/guidance/offshore-renewable-energy-installations-impact-on-shipping

www.assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/441130/371.pdf

www.assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/440734/MGN_372.pdf

A.1.2.3 Civil Aviation Authority (CAA)

The CAA is the UK's specialist aviation regulator with wide-ranging responsibilities including ensuring the aviation industry meets the highest safety standards. The CAA is responsible for the oversight of the helicopter operations, including the civil SAR operator, and is the certifying authority for helidecks.

Standards for offshore helicopter landing areas, including helihoisting platform, can be found on the CAA website:

www.publicapps.caa.co.uk/modalapplication.aspx?appid=11&mode=detail&id=523

A.1.2.4 Police

The UK police's responsibility for policing and responding to incidents involving the offshore energy industry is laid down in sections 1(7) and 11 of the Continental Shelf Act 1964, section 10 of the Petroleum Act 1998, the Criminal Jurisdiction (Offshore Activities) Order 1987, section 85 of the Energy Act 2004 and The Criminal Jurisdiction (Application to Offshore Renewable Energy Installations etc.) Order 2009. By virtue of these, sea-based installations have been declared by statute to have:

– the same standing in law enforcement as is the case on the UK mainland;
– the same standing before all of the courts in the UK as if the installation was based within existing territorial waters, and
– all existing police powers applied to them.

A.1.2.5 Coroners and fatal accident enquiries

Any unexpected death in the workplace will be investigated either by the Coroner in England and Wales or by means of a Fatal Accident Inquiry (FAI) if under jurisdiction of Scottish Law. Fundamentally, the role of any such investigations is not to apportion blame, but to determine the identity of the deceased person, and then to determine how, why, and where they died, and what caused their death.

A.1.2.6 MAIB

The MAIB was set up in 1989 with responsibility for investigating accidents to determine their circumstances and causes, with the sole objective of avoiding similar accidents in the future. It is not the purpose of an MAIB investigation to determine liability nor, except so far as is necessary to achieve its objective, to apportion blame. Its legislative powers are primarily contained in Part XI of the Merchant Shipping Act 1995 and associated secondary legislation. The Chief Inspector of Marine Accidents reports directly to the Secretary of State on the investigation of specific accidents.

Further information may be found at (including past wind farm incidents):

www.gov.uk/government/organisations/marine-accident-investigation-branch

A.1.2.7 Air Accident Investigation Branch (AAIB)

The UK AAIB is part of the Department for Transport (DfT) and is responsible for the investigation of civil aircraft accidents and serious incidents within the UK and its overseas territories.

Further information may be found at:

www.gov.uk/government/organisations/air-accidents-investigation-branch

With offshore investigations reported at:

www.gov.uk/aaibreports?parent=&keywords=offshore&date_of_occurence%5Bfrom%5D=&date_of_occurence%5Bto%5D=

A.1.2.8 RNLI

Although not a statutory authority, the RNLI may be the first response for marine rescue by vessel. The RNLI is an independent, charitable organisation that provides a 24-hour lifeboat service around the coasts of the British Isles, the Channel Islands, and the Republic of Ireland. The RNLI operates a fleet of fast, all-weather lifeboats, inshore lifeboats and hovercraft which are declared facilities to Her Majesty's Coastguard (HMC(G)). RNLI lifeboats are alerted, tasked and coordinated by HM Coastguard CGOCs. Operational control of RNLI lifeboats remains at all times with the RNLI. Use of RNLI lifeboats in offshore renewable energy zone incidents will depend primarily on incident location/distance offshore

A.1.3 United Kingdom – Local Resilience Forum (LRF)/Local Resilience Partnership (LRP) liaison

A.1.3.1 What is an LRF/LRP?

LRF/LRP (Scotland) are not legal entities, nor do they have powers to direct their members.

Nevertheless, the Civil Contingencies Act 2004 (CCA) and the Contingency Planning Regulations 2005 provide that responders, through the Forum, have a collective responsibility to plan, prepare, and communicate in a multi-agency environment.

This responsibility is best fulfilled where the LRF/LRP is organised as a collaborative mechanism for delivery, equipped to achieve the mutual aims and outcomes agreed by the member organisations (partners), able to monitor its own progress and strengths, and active in identifying and developing necessary improvements.

A total of 42 LRFs (England and Wales) and 10 LRPs (Scotland) have been established and serve communities defined by the boundaries of Police Areas across England and Wales and by geography in Scotland.

A.1.3.2 How can an LRF/LRP assist in delivery of an ERP offshore?

As every police area has an LRF/LRP, they form a national network, focused locally, to help plan for suitable response to civil emergencies/Major Incidents. The multi-agency approach ensures minimal duplication of activities and effort and minimal confusion in the application of suitable resources to deal with a Major Incident.

LRFs are already established under the CCA using common criteria supported by specific Regulations and associated guidance. They therefore offer a resource of information and a discussion forum for any organisation which has identified that an ERP is required as part of their Emergency Preparedness Plan (EPP).

With multi-agency contacts in the local area of the site, the organisation wishing to develop its IERP can develop relations with each of the member agencies, and become aware of what resources and support is available via the LRF.

Some LRFs are very active, others in more remote areas less so; however, they still offer an established forum to discuss major incidents that require multi-agency input. As such, this is a key resource to explore when setting up an IERP.

A.1.3.3 How to make contact with the local LRF

1. First download and read the PDF found at www.gov.uk/government/publications/the-role-of-local-resilience-forums-a-reference-document or Scotland LRP
2. As the government website does not list or link to any LRF, use a search engine on the internet to search for the local LRF/LRP (for example Merseyside LRF brings up Mersey Prepared web page).
3. Email/phone the most appropriate LRF/LRP for the site to make contact and find out when the next meeting or event is, and explore with the LRF what mutual discussions can be had to develop the unified approach to deployment of an IERP.

A.1.3.4 Costs

Any agreement or involvement of any agency or third party in the deployment of an IERP should be made on the basis that no organisation/stakeholder will profit from the activity. It is reasonable that costs can be recovered, as is done in the oil and gas industry, but without profit.

This should be written into any plans or agreements made when setting up an IERP with the LRF/LRP and other interested parties, such as oil and gas assets in the area.

A.1.4 United Kingdom – incident investigation

A.1.4.1 Incident investigation by enforcing authorities

The relevant authorities use discretion in deciding whether to investigate incidents. When making such decisions, including the level of resource to be used, they can take the following factors into account:

- severity and scale of potential or actual harm;
- seriousness of any potential breach of the law;
- relevant enforcement or other priorities;
- practicality of achieving results, and
- wider relevance of the event, including serious public concern.

The relevant authorities: MCA; MAIB; AAIB; police and HSE, have different duties for health and safety enforcement, and accident investigation. There are memorandums of understandings and/or other agreements between the relevant authorities to determine the lead authority and, where overlap exists, use their best endeavours to cooperate effectively to enable and assist each other to carry out their responsibilities and functions, and to maintain effective working arrangements.

For a sudden death at work, different arrangements apply in Scotland than in England and Wales.

In Scotland, where there has been a sudden, suspicious or unexpected death, it is the responsibility of the Procurator Fiscal to investigate it, although this will usually be done (for crimes other than health and safety ones) in the first instance by the police, who will report the result of their investigation to the Procurator Fiscal. Where the death is believed to be work-related, the police will conduct an investigation (subject to any guidance or instruction from the Procurator Fiscal) jointly with HSE (or other enforcing agency). On the rare occasions where joint investigation would not be appropriate, there will still be effective liaison and cooperation among the investigating parties.

Further details can be found at:

www.hse.gov.uk/scotland/workreldeaths.pdf

For England and Wales the arrangements are described in a protocol for which the Crown Prosecution Service (CPS), Police, HSE, MAIB and MCA are signatories, and can be found at:

www.hse.gov.uk/pubns/wrdp1.pdf

When an incident occurs which does not, or is unlikely to, result in a sudden death, then HSE, MCA, AAIB and the MAIB may be involved in conducting investigations. MCA and MAIB are the lead authorities for the inspection and investigation of accidents on any ship. HSE will be the lead authority for enforcement and investigation of occupational accidents (including accidents to workers on the vessel) resulting from land-based works or undertakings, including construction, operation and maintenance activities at an offshore renewable energy development. Where there is potential overlap between the relevant authorities, the organisations undertake to use their best endeavours to cooperate effectively to enable and assist each other to carry out their responsibilities and functions, and to maintain effective working arrangements for that purpose.

Further details can be found at:

www.hse.gov.uk/aboutus/howwework/framework/mou/mcamou.pdf

The police may also investigate other criminal activity.

All cases involving an unexpected death in the workplace will be investigated either by the Coroner in England and Wales 12 or a FAI 13 if under jurisdiction of Scottish Law. Fundamentally, the role of such investigations is not to apportion blame, but to determine the identity of the deceased person and then to determine how, why, and where they died, and what caused their death.

A.1.5 United Kingdom – pollution control

A.1.5.1 UK counter pollution

The Lead Government Departments (LGD) for counter pollution preparedness, regulation and response are the Department of Energy and Climate Change (DECC) for offshore installations and DfT for shipping. The MCA is designated as the United Kingdom Competent Authority for counter pollution response, and is the custodian of the National Contingency Plan (NCP) 14.

The NCP sets out:

- the arrangements for dealing with pollution, or the threat of pollution, spilled from ships and offshore installations, and
- the responsibilities of DfT, DECC and the MCA, harbour authorities, offshore installations operators, and other bodies with relevant functions.

The NCP coexists with other UK ERPs or contingency arrangements including:

- HM Government's 'Emergency Response and Recovery'
  - www.gov.uk/emergency-response-and-recovery
- Preparing Scotland
  - www.scotland.gov.uk/Publications/2012/03/2940
- Pan-Wales Response Plan
  - https://www.gov.wales/emergency-preparation-response-recovery

– A Guide to Emergency Planning Arrangements in Northern Ireland
  – www.ofmdfmni.gov

The legal basis for the NCP is set out under:

– Section 293 of the Merchant Shipping Act 1995, as amended by the Merchant Shipping and Maritime Security Act 1997;
– Pollution Prevention Control Act 1999;
– Marine Safety Act 2003, and
– Section 293 of the Merchant Shipping Act 1995 which gives the Secretary of State for Transport the function of taking, or coordinating, measures to prevent, reduce and minimise the effects of marine pollution.

In addition, the Offshore Installations (Emergency Pollution Control) Regulations 2002, made under section 3 of the Pollution Prevention and Control Act 1999, provides powers for the Secretary of State for DECC to give directions and to take such other actions as may be necessary in respect of an offshore installation to prevent or minimise pollution or the threat of pollution.

OREIs are not Offshore Installations in the context of the NCP, but again the NCP would be activated in the event of a significant shipping incident near to, or within, an offshore renewable energy zone. Search and/or Rescue operations and counter pollution operations may have to run concurrently although it is recognised that SAR or lifesaving will always take priority.

A.1.5.2 Secretary of state's representative (SOSREP)

EU Directive 2002/59/EC (as amended) provides that Member States are to draw up plans to accommodate, if the situation so requires, ships in distress in their ports or any other protected place affording the best possible conditions, in order to limit the consequences of accidents at sea. In accordance with Article 20 of Directive 2002/59/EC, the SOSREP for Maritime Salvage and Intervention, has been designated as the UK competent authority to take independent decisions concerning the accommodation of ships in need of assistance. The MCA is responsible for drawing up plans and conducting risk assessments and analysis for the accommodation of ships in places of refuge which it provides to support the SOSREP in this decision making process.

Full details of the role and responsibility of the SOSREP are outlined in the NCP and on the DfT website:

– www.dft.gov.uk/mca/mcga07-home/emergencyresponse/mcga-dops_cp_environmental-counter-pollution_and_response/mcga-dops_cp_sosrep_role.htm

It should be noted SOSREP's powers do not currently extend to OREIs except where a vessel may be involved.

Under certain circumstances, SOSREP can authorise the establishment of a Temporary Exclusion Zone (TEZ). This specifies an area either bounded by geographical coordinates, or a defined radius around a casualty vessel from which other vessels are excluded. It is an offence to enter the TEZ without the express permission of the SOSREP, or a delegated authority such as the OSC, if deemed appropriate by the SOSREP.

A TEZ can only be established where a ship, structure or other thing is either wrecked, damaged or in distress. A TEZ cannot be established in anticipation of an incident occurring. An OREI is not considered, within the Merchant Shipping Act, to be a 'structure' or 'other thing' but may sit within a TEZ established for a shipping incident.

Other relevant legal reference sources that may need to be taken into account when formulating pollution prevention plans include:

– The Merchant Shipping (Oil Pollution Preparedness, Response Co-operation Convention) Regulations 1998. While strictly applying only to fixed or floating offshore installations or structures engaged in gas or oil exploration or production activities, or loading or unloading of oil, those do none the less provide a useful reference source. These regulations require that every offshore installation and oil- handling facility must have an approved oil pollution emergency plan (OPEP) setting out arrangements for responding to incidents that cause, or may cause, marine pollution by oil, with a view to preventing such pollution or reducing or minimising its effect.
– The Offshore Installations (Emergency Pollution Control) Regulations 2002 give the government powers to intervene in the event of an incident or accident involving an offshore installation where there is, or may be a risk of, significant pollution or an operator is failing, or has failed to, implement effective control and preventative operations.

While the duties regarding pollution prevention and response regarding shipping and associated vessels are well established, the legal obligations as they apply to OREIs are less clear. Duty Holders are nonetheless encouraged to:

– Adopt a precautionary and preventative approach to managing foreseeable pollution incidents.
– Where specified obligations exist (e.g. MARPOL) then these should be applied as appropriate. In situations where the legal requirements may be unclear, then the principles set out in established legal reference sources (e.g. MARPOL, Oil and Gas Installations) should in general be applied.
– Duty Holders should have robust planning processes in place to identify all foreseeable pollution risks, using suitable risk assessment processes. (Note: ISO: 14001 – 2015 provides a helpful framework to carry out this process and for its integration into core business processes.)
– Ensure the findings of risk assessments and additional compliance obligations (mandatory and voluntary) are fully aligned and integrated into the ERPs set out in these guidelines. Specific account should be taken of any licence conditions imposed by any statutory authority (e.g. Marine Management Organisation (MMO)) which could include measures to both prevent and respond to pollution incidents. Regular testing of response plans should also take into account the significant pollution incidents identified.
– An up-to-date record of these communication arrangements should be within the ERP.

A.1.6 List of UK organisations and stakeholders

A.1.6.1 Regulators and investigation bodies

– AAIB
www.gov.uk/government/organisations/air-accidents-investigation-branch
– CAA
www.caa.co.uk

- Environment Agency (EA)
  www.gov.uk/government/organisations/environment-agency
- HSE
  www.hse.gov.uk
- MAIB
  www.gov.uk/government/organisations/marine-accident-investigation-branch
- MCA
  www.gov.uk/government/organisations/maritime-and-Coastguard-agency
- Scottish Environment Protection Agency (SEPA)
  www.sepa.org.uk/

A.1.6.2 Emergency planning/response

- Chief Fire Officers Association (CFOA)
  www.cfoa.org.uk
- Emergency Preparedness Offshore Liaison (EPOL)
  www.epolgroup.co.uk
- Bristow Search and Rescue
  http://bristowgroup.com/uk-sar
- RNLI
  www.rnli.org/Pages/Default.aspx
- Trinity House
  www.trinityhouse.co.uk
- Cabinet Office (Resilience)
  www.gov.uk/guidance/resilience-in-society-infrastructure-communities-and-businesses
- LRFs
  www.gov.uk/guidance/local-resilience-forums-contact-details
- Joint Emergency Services Interoperability Programme (JESIP)
  www.jesip.org.uk

A.1.6.3 Government

- Department for Business Innovation and Skills (BIS)
  www.gov.uk/government/organisations/department-for-business-innovation-skills
- DfT
  www.gov.uk/government/organisations/department-for-transport
- Department of Enterprise Trade and Investment (Northern Ireland) www.detini.gov.uk/
- DECC
  www.gov.uk/government/organisations/department-of-energy-climate-change
- Scottish Enterprise
  www.scottish-enterprise.com/
- Scottish Government
  www.gov.scot/
- Welsh Assembly Government
  www.gov.wales/?skip=1&lang=en

A.1.6.4 Trade associations

- RenewableUK (RUK)
  www.renewableuk.com
- Association of Diving Contractors (ADC)
  www.adc-uk.info/website/home
- British Rig Owners Association (BROA)
  www.broa.org/
- Association of Oil and Gas Producers (OGP)
  www.iogp.org
- International Jack-up Barge Operators Association (IJUBOA)
  www.ijuboa.com/
- International Maritime Contractor Association (IMCA)
  www.imca-int.com/
- National Workboat Association (NWA)
  http://workboatassociation.org/
- Oil and Gas UK (OGUK)
  www.oilandgasuk.co.uk
- UK Chamber of Shipping
  www.ukchamberofshipping.com/

A.1.6.5 Other stakeholders

- G+ Offshore Wind Health and Safety Organisation
  www.gplusoffshorewind.com
- Offshore Renewable Energy Emergency Forum (OREEF)
  https://www.linkedin.com/company/offshorerenewableenergyemergencyforum/
- The Crown Estate (TCE)
  www.thecrownestate.co.uk/
- MMO
  www.gov.uk/government/organisations/marine-management-organisation
- Marine Scotland
  www.gov.scot/About/People/Directorates/marinescotland
- UK Hydrographic Office (UKHO)
  www.ukho.gov.uk/Pages/home.aspx
- Commissioners of Irish Lights
  www.cil.ie/
- IMO
  www.imo.org/en/Pages/Default.aspx
- International Association of Lighthouse Authorities (IALA)
  www.iala-aism.org/about/
- International Hydrographical Organization (IHO)
  www.iho.int/srv1/index.php?lang=en
- Kingfisher Information Service – Offshore Renewable Cable Awareness (KIS – ORCA)

www.kis-orca.eu/

– Society for Underwater Technology (SUT)
www.sut.org/
– National Federation of Fishermen's Organisations (NFFO)
www.nffo.org.uk annex b

A.2 UNITED STATES OF AMERICA

A.2.1 Acronyms

The following acronyms as used throughout this Annex:

BOEM	Bureau of Ocean Energy Management
BSEE	Bureau of Safety and Environmental Enforcement
CDC	Center for Disease Control
CFR	Code of Federal Regulations
COP	Construction and Operation Plan
EA	Environmental Assessment
EIS	Environmental Impact Statement
EMI	Emergency Management Institute
EOC	Emergency Operations Center
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
GPG	Good Practice Guideline
IAMSAR	International Aeronautical and Maritime Search and Rescue Manual
ICS	Incident Command System
JIS	Joint Information System
MAC	Multiagency Coordination Group
MARAD	The Maritime Administration
MARSEC	Maritime Security
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
NEPA	National Environmental Policy Act
NIMS	National Incident Management System
NSRA	Navigation safety risk assessment
NTAS	National Terrorism Advisory System
NTSB	National Transportation Safety Board
NVIC	Navigation and Vessel Inspection Circulars
OCS	Outer Continental Shelf
ORED	Offshore renewable Energy Developer

OREI	Offshore renewable Energy Installation
OSH	Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
SAR	Search and Rescue
SMS	Safety Management Systems
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard

A.2.2 Emergency response overview

As part of the requirements for issuance and administration of leases for renewable energy production on the Outer Continental Shelf, applicants are required to submit a Construction and Operation Plan (COP) for an OREI. The COP should include the implementation of a Safety Management Systems (SMS) and an associated emergency response procedure as per 30 CFR 585.810.

As a part of this process, applicants submit a navigation safety risk assessment (NSRA) which is then reviewed by the US Coast Guard (USCG) and BOEM to ensure compatibility with safe navigation. See 30 CFR 585 – Renewable Energy And Alternate Uses Of Existing Facilities On The Outer Continental Shelf for further details.

The content of the NSRA should be based on the Navigation and Vessel Inspection Circular (NVIC) 01-19, which provides guidance on OREI layout design process to account for any impacts the OREI may have on navigation and response mission activities.

The US SAR region generally includes all navigable waters subject to the jurisdiction of the United States, but also includes international waters stretching far into the Atlantic and Pacific Oceans and the Gulf of Mexico. USCG conducts SAR activities in accordance with the Coast Guard Addendum to the United States National Search and Rescue Supplement, which is a supplement to the International Aeronautical and Maritime Search and Rescue Manual (IAMSAR). The USCG uses framework of the National Incident Management System (NIMS) Incident Command System (ICS) for managing all incidents including those where emergency response operations are conducted.

Use and understanding of the ICS framework by all organizations in the offshore renewable sector will ensure Accountable Organizations apply the principles detailed in this GPG in a manner that will integrate with other party's incident management framework.

A.2.3 US Statutory Authorities

US Statutory Authority guidance for offshore renewable energy developments is provided by:

A.2.3.1 Bureau of Ocean Energy Management (BOEM)

The Department of the Interior's Bureau of Ocean Energy Management (BOEM) manages the responsible development of US offshore energy and mineral resources.

30 CFR 585 – Renewable Energy and Alternative Uses of Existing Facilities on the Outer Continental Shelf delegates jurisdiction to BOEM to develop offshore energy resources within the US outer continental shelf (OCS). BOEM works directly with federal, state, local and tribal governments, and other key stakeholders to help identify wind energy areas and issues

related to offshore renewable energy projects.

BOEM has published the information guidelines for a Renewable Energy Construction and Operation Plan, as guidance for the information requirements of a COP.

https://www.boem.gov/renewable-energy

A.2.3.1.1 BOEM Memorandum of Understanding and Memorandum of Agreement (MOU/MOAs)

BOEM have established MOU/MOAs to agree framework with other agencies in relation to renewable energy developments on the OCS, details of which can be found on the BOEM website.

https://www.boem.gov/MOUs-MOAs

A.2.3.1.2 BOEM guidance documents

The BOEM guidance portal contains the following applicable guidance documents for OREIs:

- Information Guidelines for a Renewable Energy Construction and Operations Plan (COP)
- Guidelines for Lighting and Marking of Structures Supporting Renewable Energy Development
- Guidelines for Providing Information on Fisheries Social and Economic Conditions for Renewable Energy Development on the Atlantic Outer Continental Shelf
- Guidelines for Providing Information on Marine Mammals and Sea Turtles for Renewable Energy Development on the Atlantic Outer Continental Shelf

Guidance Portal | Bureau of Ocean Energy Management (boem.gov)

A.2.3.2 Bureau of Safety and Environmental Enforcement (BSEE)

In 2023 the regulations for Renewable Energy on the OCS were split between BOEM and BSEE. Among the regulations transferred to BSEE through this rule making are provisions related to oversight of facility design, fabrication, installation, and safety management systems; ensuring the safety of operations, including inspection programs and incident reporting and investigations; enforcing compliance with all applicable safety, environmental, and other laws and regulations through enforcement actions (such as noncompliance notices, cessation orders, and certain lease suspensions), and overseeing decommissioning activities.

Under Safety Management, BSEE is responsible for the oversight of:

(a) How you will ensure the safety of personnel or anyone on or near your facilities;
(b) Remote monitoring, control, and shut down capabilities;
(c) Emergency response procedures;
(d) Fire suppression equipment, if needed;
(e) How and when you will test your safety management system, and
(f) How you will ensure personnel who operate your facilities are properly trained.

BSEE Expectations for SMS can be found at the following link: https://www.bsee.gov/sites/bsee.gov/ files/2023-03/ren-sms-expectations-march-2023.pdf

https://www.bsee.gov/what-we-do/renewable-energy

A.2.3.3 The Occupational Safety and Health Act (OSHA)

The Occupational Safety and Health Act of 1970 (OSH Act) was passed to prevent workers from being killed or seriously harmed at work. This law created the Occupational Safety and Health Administration (OSHA), which sets and enforces protective workplace safety and health standards and is the main regulator for safety and health in the US. OSHA has jurisdiction for wind developments in state waters and onshore. For OREIs on the OCS, OSHA is collaborating with BOEM with respect to safety and will consider standards used in OSHA regulations as a baseline.

- OSHA 29 CFR 1910 – General industry safety and health regulations
- Emergency Action Plan details (29 CFR 1910.38)
- Fire Prevention Plan (29 CFR 1910.39)
- Fire Protection Program (29 CFR 1926.150)
- OSHA 19 CFR 1926 – General construction industry regulations

https://www.osha.gov/

A.2.3.4 United States Army Corps of Engineers (USACE)

USACE has jurisdiction over the review and regulation of certain structures, and work, that are located in or can affect navigable waters. Their jurisdiction includes submarine cabling systems utilized by offshore wind facilities for electricity collection and export and OREIs within 3 nm of the coast.

https://www.usace.army.mil/

A.2.3.5 United States Coast Guard (USCG)

The USCG is responsible for ensuring the enforcement of domestic and international shipping regulations, and the inspection of vessels which are registered in the US or are foreign ships in US waters. In addition, the Coast Guard is responsible for organizing and coordinating available SAR activities as defined in the National SAR Supplement.

At current time, OREIs are not subject to regulation by the USCG under the provisions of 33 CFR Subchapter N, however the USCG is considered a cooperating agency and will support BOEM as applicable. As per guidance provided by the USCG:

> *'An OCS activity, for the purposes of 33 CFR Subchapter N, is currently associated with the exploration, development or production of minerals of the OCS. [emphasis added]. Therefore, the actual renewable energy installation or facility (e.g. a wind turbine) is not subject to oversight by the U.S. Coast Guard under the provisions of Subchapter N.*
>
> *Depending on the location of the OREI, the USCG may have an interest related to safety of navigation (i.e., Waterways management) both during construction activities and after completion of the OREI. Local operational units, such as Sectors, Air Stations and Small Boat Stations also have interests related to emergency response/rescue from an OREI.'*

The USCG has published Navigation and Vessel Inspection Circular (NVIC) No. 01-19 – 'Guidance on the Coast Guard's Roles and Responsibilities for Offshore Renewable Energy Installations (OREI)'.

https://www.uscg.mil/

A.2.3.5.1 U.S. Coast Guard Maritime Security (MARSEC) Levels

The USCG employs a three-tiered system of Maritime Security (MARSEC) Levels designed to easily communicate to the USCG, and maritime industry partners, the pre-planned scalable responses for credible threats. If the Secretary of Homeland Security issues a National Terrorism Advisory System (NTAS) Alert, the Commandant of the USCG will adjust MARSEC Level, as appropriate.

MARSEC Levels are set to reflect the prevailing threat environment to the marine elements of the national transportation system, including ports, vessels, facilities, assets and infrastructure located on or adjacent to waters subject to the jurisdiction of the USCG. MARSEC Levels are defined as follows:

– MARSEC Level 1 means the level for which minimum appropriate security measures shall be maintained at all times.
– MARSEC Level 2 means the level for which appropriate additional protective security measures shall be maintained for a period of time as a result of heightened risk of a transportation security incident.
– MARSEC Level 3 means the level for which further specific protective security measures shall be maintained for a limited period of time when a transportation security incident is probable, imminent, or has occurred, although it may not be possible to identify the specific target.

MARSEC Level 1 generally applies in the absence of an NTAS Alert or when the Commandant determines that the Alert is not applicable to the Marine Transportation System. If an NTAS Alert is applicable, the Commandant will consider a MARSEC Level change for the maritime industry, Coast Guard, or both.

www.uscg.mil/What-Is-MARSEC/

A.2.4 US incident management

A.2.4.1 The National Incident Management System (NIMS) – Incident Command System (ICS)

As noted in Section 3.0 of this GPG, before commencing emergency response planning it is advisable to consult international and national guidance to ensure compliance with requirements.

In the US, the National Incident Management System (NIMS) Incident Command System (ICS), provides the necessary framework for Accountable Organizations to develop their emergency response approach. In general, NIMS guides all levels federal, state, local and tribal government, nongovernmental organizations, private sector and local agencies to provide a systematic process to prevent, protect against, mitigate, respond to, and recover from incidents.

This annex is not intended to duplicate the requirements of the NIMS or ICS framework, but to provide an overall summary of how the framework applies to an ORED and signpost where up to date information may be found.

A.2.4.2 NIMS

NIMS supports unity of effort by providing stakeholders across the community with the shared vocabulary, systems, and processes to meet challenges that are beyond the capacity of any single jurisdiction or organization. It defines the following systems and structures that guide how personnel work together during incidents.

- Incident Command System (ICS),
- Emergency Operations Center (EOC)
- Multiagency Coordination Group (MAC Group)
- Joint Information System (JIS)

While an Accountable Organization should be aware of, and understand the objective of all these systems, it is the ICS that will be most applicable to emergency response planning for an ORED.

More information on the implementation of NIMS for private sector organizations can be found at the following links:

https://www.fema.gov/sites/default/files/documents/fema_nims-private-sector-fact-sheet_05-2021.pdf

https://www.fema.gov/sites/default/files/2020-07/fema_nims_doctrine-2017.pdf

A.2.4.3 ICS

ICS is a standardized approach to the command, control, and coordination of incident management activities that provides a common hierarchy within which personnel from multiple organizations can be effective. ICS specifies an organizational structure for incident management and includes five major functional areas:

- Command
- Operations
- Planning
- Logistics
- Finance/Administration

Accountable Organizations, and their emergency response plans, should be prepared to allow for interaction within the ICS framework when responding to emergency scenarios.

A.2.4.3.1 ICS roles and responsibilities

ICS defines specific position titles which should be understood and adopted by all Accountable Organizations. These titles will be consistent across all organizations using the ICS framework and thus avoid confusion of roles during an emergency response activity. Figure 25 depicts an example organizational structure for an ICS organization with an Incident Commander or under a Unified Command. Accountable Organizations should appoint personnel for each functional area, however, depending on their resource level, multiple position titles can be assigned to a single resource and, depending on the nature of the response required, the Incident Commander can fulfil all roles.

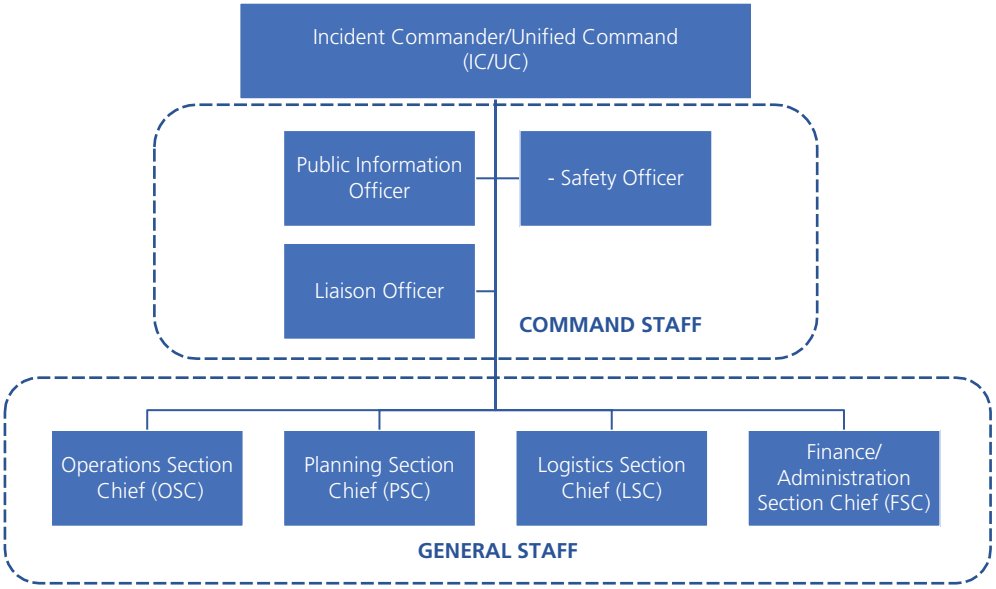

Figure 25: Example organisational structure for an ICS organisation

A summary of the ICS position titles include:

- Incident Commander – Responsible for the management of the incident. The Incident Commander may appoint one or more Deputies. Deputy Incident Commanders (DPIC) must be as qualified as the Incident Commander and equally capable to assume the position.
- Command Staff:
  - Public information Officer: Responsible for interfacing with the public and media and/or with other agencies with incident-related information requirements.
  - Safety Officer: Responsible for the safe conduct of incident management operations.
  - Liaison Officer: Incident Command's point of contact for representatives of other governmental agencies, NGOs, and the private sector (with no jurisdiction or legal authority) to provide input on their agency's policies, resource availability, and other incident-related matters.
- General Staff
  - Operations Section Chief (OSC) – Responsible for the tactical second line level operations related to an incident.
  - Planning Section Chief (PSC) – Responsible for providing planning services for the incident, managing/providing the information to the incident command. The PSC is responsible for developing and maintaining the Incident Action Plan (IAP) which establishes the incident strategy, objectives and tactical action.
  - Logistics Section Chief (LSC) – Responsible for all service support requirements (e.g., transportation, supplies, fuel, food, medical supplies) needed to facilitate effective and efficient incident management.
  - Finance/Administration Section Chief (FSC) – Responsible for managing all financial aspects of an incident.

A Unified Command will be established depending on which federal, state and local entities have jurisdiction over the incident, and if an incident requires response from multiple organizations.

- Unified Command:
  - A structure that brings together Incident Commanders, that have jurisdictional authority for the incident, in order to coordinate an effective response. This structure will link organizations responding to the incident and provide a forum for incident decision making and common terminology. Typically, the Unified Command will consist of representatives from the USCG, federal, state and local agencies/organizations, and the ORED organization.

A.2.4.3.2 ORED in ICS structure and integration with the Unified Command

The ICS is updated and revised periodically. For this reason, it is important for an Accountable Organization to stay up to date on their roles and expectations within the ICS structure. Organizations should nominate a Responsible Individual, as defined in the main body of the GPG, who should ensure that sufficient internal resources, trained in accordance with the ICS structure, are allocated to support in emergency response.

The level of response required for a specific scenario will be directly related to the scale of incident and jurisdictional authorities. It is expected that an ORED should be able to cope with reasonably foreseeable eventualities within its boundaries, utilizing its own resources and procedures in accordance with its Emergency Response Plan and without support from outside parties (please see Section 2.0 of this GPG for further discussion on key principles of emergency response). It should also be noted that the USCG ability to respond to, and their availability of assets to support, an incident may differ from district to district. Where an incident is beyond the site's capabilities and external assistance is requested, it is important that the Accountable Organization have adopted an ICS compatible structure and are represented in the Unified Command for response to the incident.

The Unified Command for a major marine incident will typically include representatives from local, state, and federal agencies (USCG), as well as a representative(s) of the owners of the facility where the incident is taking place. It is important that an Accountable Organization have identified a representative(s) who is appropriately trained, has the appropriate decision making authority within the Accountable Organization, and is able to join the Unified Command to establish communications as quickly as possible. This representative will be in the best position to provide the Unified Command with key information, such as the current status of assets in the field (e.g., which WTGs are operating or shut down), real time information on activities in field, number of persons at risk, weather in the field, etc. See Section 5.2.2 of GPG for examples of information which may be required. It is to the benefit of all the parties involved that the Accountable Organization is represented on the Unified Command in order to ensure information and resources are available to support.

A.2.4.3.3 ICS Resource Center

The ICS Resource Center as part of the Federal Emergency Management Agency (FEMA) – Emergency Management Institute (EMI) provides information to support Accountable Organization's implementation of ICS. More information is included in the following section and at the below link:

https://training.fema.gov/emiweb/is/icsresource/

Resource Training

Accountable Organizations should ensure that all resources to be involved in incident management and fulfilling the roles noted in A.2.4.3.1 have the appropriate NIMS and ICS Training. The ICS Resource Center includes links to available courses offered through the FEMA – Emergency Management Institute.

https://training.fema.gov/emiweb/is/icsresource/trainingmaterials/

ICS Forms

ICS forms for support and documentation of ICS activities are available through ICS Resource Center. Printable and fillable pdf versions of standard ICS forms can be found at the following link:

https://training.fema.gov/emiweb/is/icsresource/icsforms/

A.2.4.4 The maritime administration (MARAD)

The Maritime Administration's (MARAD) Office of Emergency Preparedness develops and maintains plans for civil

maritime transportation support to military mobilizations and response to national emergencies. https://www.maritime.dot.gov/ports/strong-ports/emergency-and-preparedness-response

A.2.5 US incident investigation

All external incident reporting should be conducted in accordance with applicable legislative requirements.

A.2.5.1 BOEM/BSEE

BOEM has indicated that BSEE is acting on behalf of BOEM in connection with the incident reporting and investigation. All Incidents should be reported in accordance with 30 CFR 585.

A.2.5.2 USCG – Marine casualties and investigations

Incidents involving renewable energy support vessels will be investigated by the USCG in accordance with 46 CFR 4 – Marine Casualties and Investigations. This regulation defines applicable events that will trigger a marine casualty investigation and reporting requirements.

A.2.5.3 National Transportation Safety Board (NTSB)

The NTSB is responsible for accident investigation for all aviation accidents in the US and in some circumstances, the NTSB will involve the Federal Aviation Admiration (FAA) to support onsite data collection. The NTSB will also be involved in marine investigations for incidents resulting in major marine casualties or incidents involving US public and nonpublic vessels as defined in 46 CFR 4.

A.2.5.4 Other Organizations

As applicable, incidents should be reported to OSHA and USACE for OREIs located outside of the BOEM jurisdiction.

A.2.6 Pollution control

The federal National Environmental Policy Act (NEPA) is the principal US environmental law applicable for offshore wind projects in the US.

Prior to permitting and construction, an offshore wind project under NEPA review will undergo an Environmental Assessment (EA) and potentially an Environmental Impact Statement (EIS). BOEM acts as the lead agency for the EIS and coordinates with other federal and local agencies to ensure all relevant federal and state requirements are considered.

USCG has jurisdiction for pollution prevention, contingency planning and response activities within the 200 mile Exclusive Economic Zone for oil and hazardous substances.

A.2.6.1 Oil Spill and Hazardous Materials Management Preparedness

National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR 300, provides an organizational structure and procedures for preparing for and responding to discharges of oil and releases of hazardous substances.

Further, notice of all oil discharges should also be in accordance with 40 CFR 110.6 and notification to be provided to the National Response Center (NRC). Notification to USCG or EPA predesignated On-Scene Coordinator for the geographic area where the discharge occurs is also acceptable provided the NRC is notified as soon as possible.

Reporting to BSEE as per 30 CFR 285.831 is also required.

A.2.7 Severe weather – hurricane preparedness

OREIs should develop severe weather/hurricane preparation plans for areas in which severe weather/hurricane (or tropical storm) are credible scenarios and can impact the safety of personnel or the operations of the site. Severe weather/hurricane preparation plans should include a timeline of activities to shut down the operations (if necessary) and should address the following, at a minimum:

- Activities that could be impacted by a hurricane
- Roles and responsibilities for key personnel associated with initiation and implementation of the plan
- Use of a meteorological service to monitor weather and sea conditions and provide real time alerts using forecasting tools
- Timeline of events, with T-times that indicate when the activities are to occur in relation to the anticipated time of impact. The T-time is the transition time, typically in hours, it takes to secure a platform/vessel and evacuate/evade the weather event. The timeline should include the following information:
  - timeline and method for evacuation of staff
  - movement of marine vessels, including the location of where the vessels will travel to
  - relevant Coast Guard port conditions as they may affect vessel movement
  - shutdown of operations
  - secure loose material and make facilities storm-safe and secure
- Method of communication and accounting for employees during the evacuation.

A.2.8 Center for Disease Control (CDC) and COVID-19

Workplace mitigation strategies regarding public health measures are required to protect the health and well-being of workers. Clear guidelines regarding the mitigation strategies should be communicated to the workforce and strategies should include special consideration for workers that are intended to stay in close proximity for long durations (e.g., offshore).

For example, as the risk of COVID-19 and the federal and local regulations change, it is recommended that up-to-date COVID-19 Management Plan is maintained and its requirements communicated to the workforce. The latest and official information related to COVID 19 is found at the website for the CDC.

Centers for Disease Control and Prevention (cdc.gov)

American Clean Power Association (ACP) has also published the following guidance in relation to COVID 19:

Environmental, Health, and Safety Guidance for Pandemic: COVID-19

https://cleanpower.org/wp-content/uploads/2021/02/ACP_EHS_Guidance-Pandemic-COVID-19_2021.pdf.

A.2.9 List of national organizations and stakeholders

American National Standards Institute (ANSI) https://www.ansi.org/
Bureau of Ocean energy Management (BOEM) https://www.boem.gov/
Bureau of Safety and Environmental Enforcement (BSEE) https://www.bsee.gov/
Federal Aviation Administration (FFA) https://www.faa.gov/
Federal Emergency Management Agency (FEMA) https://www.fema.gov/
Fish and Wildlife Service (USFWS) https://www.fws.gov/
National Marine Fisheries Service (NMFS) https://www.fisheries.noaa.gov/
National Oceanic And Atmospheric Administration (NOAA) https://www.noaa.gov/
National Transportation Safety Board (NTSB) https://www.ntsb.gov/Pages/home.aspx
Occupational Safety and Health Administration (OSHA) https://www.osha.gov/
The American Clean Power Association (ACP) https://cleanpower.org/
United States Coast Guard (USCG) https://www.uscg.mil/
US Army Corps of Engineers (USACE) https://www.usace.army.mil/

Typical organizations and stakeholders for Port operations include:

- Coast Guard Command Center (Sector or District)
- Captain of the Port (COTP)
- Port Control and Authority
- State Environmental Agency
- Shipping Agencies
- Industrial Companies
- Road, Rail, Transport operators
- General Emergency Services – 911

A.2.10 Other guidance

A.2.10.1 The American Clean Power Association (ACP)

The ACP succeeded The American Wind Energy Association (AWEA) as the national trade association for the US renewable industry. ACP/AWEA published the following guidelines to establish best practices for offshore wind development in the US.

- ACP OCRP-1-202x – ACP Offshore Compliance Recommended Practices (OCRP) (supersedes AWEA – Offshore Compliance Recommended Practices 2012)
- AWEA – Health and Safety Best practice Guidelines for Offshore Wind Energy (2013)

A.2.11 References

- AWEA Health and Safety Best Practice Guidelines for Offshore Wind Energy, 2013
- AWEA – Offshore Compliance Recommended Practices 2012
- BOEM 30 CFR Part 585 – Renewable Energy and Alternative Uses of Existing Facilities on the Outer Continental Shelf
- Guidelines for Providing Information on Marine Mammals and Sea Turtles for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585 – United States Department Of The Interior – Bureau of Ocean Energy Management Office of Renewable Energy Programs – June 2019
- https://nap.nationalacademies.org/catalog/18327/worker-health-and-safety-on-offshore-wind-farms- special-report-310
- https://www.boem.gov/renewable-energy/regulatory-framework-and-guidelines
- https://www.bsee.gov/sites/bsee.gov/files/tap-technical-assessment-program//709aa.pdf
- https://www.fema.gov/sites/default/files/2020-07/fema_nims_doctrine-2017.pdf
- Information Guidelines for a Renewable Energy Construction and Operations Plan (COP) -BOEM
- National Incident Management System Third Edition October 2017 – FEMA
- OSHA 29 CFR 1910 – General industry safety and health regulations
- OSHA 29 CFR 1926 – General construction industry regulations
- OSHA 29 CFR Subtitle B Chapter XVII Part 1915 – Safety and health of shipyard employment
- Safety Management System (SMS) Considerations for Renewable Energy Projects on the OCS (bsee.gov)
- United States National Search And Rescue Supplement to the International Aeronautical and Maritime Search and Rescue Manual Version 2.0

– U. S. Coast guard addendum to the United States national search and rescue supplement to The International Aeronautical and Maritime Search and Rescue Manual (IAMSAR)
– US EPA Title 40 – Protection of the environment regulations

A.3 JAPAN

A.3.1 Acronyms

The following acronyms as used throughout this Annex:

BOSIET	Basic Offshore Safety Induction and Emergency Training
FOET	Further Offshore Emergency Training
GWO	Global Wind Organisation
IMO	International Maritime Organization
ISO	International Organization for Standardization
JCG	Japan Coast Guard
JIS	Japanese Industrial Standards
JISC	Japanese Industrial Standards Committee
JISHA	Japan Industrial Safety and Health Association
JWPA	Japan Wind Power Association
MAFF	Ministry of Agriculture, Forestry and Fisheries
MLHW	Ministry of Health, Labour and Welfare
MOE	Ministry of Environment
METI	Ministry of Economy, Trade, and Industry
MLIT	Ministry of Land, Infrastructure, Transport and Tourism
STCW	Standard for Training, Certification and Watchkeeping

A.3.2 Japan Statutory Authorities

Link to the websites for statutory authorities are included in Section A.3.9.

A.3.2.1 Applicable Ministries of Japan

The governance for offshore wind energy involves several ministries at the central government level including:

– Ministry of Economy, Trade, and Industry (METI) – Responsible for the care of economic and industrial development and major policies for supporting the wind industry.
– Ministry of Land, Infrastructure, Transport and Tourism (MLIT) – Responsible for designating site locations for potential offshore wind farms due to their use of the ocean.

– Ministry of Environment (ME) – Responsible for climate change and environmental, where offshore wind energy development is identified as one of the important means to control greenhouse gases emissions. ME does not play a substantial regulation role in the management of offshore wind.
– Ministry of Agriculture, Forestry and Fisheries (MAFF) – involved related to potential impacts of offshore wind farms on fishery resources pulls MAFF into the governance network.

A.3.2.2 Japan Coast Guard (JCG)

The mission of the JCG is to ensure security and safety at sea including but not limited to; Maritime law enforcement and national security, search and rescue and disaster response, and maritime traffic management.

A.3.3 Emergency response overview

Japan does not have an extensive offshore oil and gas industry, and to date, offshore wind development has been limited. In addition, the marine/offshore industry in Japan does not have a well-established emergency response system which allows for standardized incident management designed to allow responders to adopt an integrated structure which can be scaled to meet the requirements of any single incident or multiple incidents effectively (such as the Incident Command System in the United States). It is noted that specific policies related to offshore wind are rapidly being added and therefore should be monitored closely for any change in national requirements.

In Japan, disaster management planning is implemented at three levels, the national government, prefectures, and municipalities. The head of each level takes responsibility for that jurisdiction. The following disaster prevention plans are developed in accordance with the roles to be performed at each stage:

– Basic Disaster Management Plan – prepared by the Central Disaster Management Council and basis plan for disaster management activities
– Disaster Management Operation Plan – made by designated government organizations and public corporations based on the Basic Disaster Management Plan
– Local Disaster Management Plan – made by prefectural and municipal disaster management councils, subject to local circumstances and based on Basic Disaster Management Plan.

The role of state agencies is limited in Japan, and there is not a system to perform disaster responses in place of local governments. The role of state agencies is to provide support to the local governments. It is also noted that the Disaster Management System is intended to deal with natural disasters such as earthquakes, tsunami, flooding, etc. as opposed to offshore marine incidents/emergencies. Further information on the Disaster Management System is available here: https://www.bousai.go.jp/1info/pdf/saigaipanf_e.pdf.

The Japanese Industrial Standards Committee (JISC) has also adopted ISO 22320 which is known locally as JIS Q 22320 : 2013 emergency management – Requirements for incident response (see further info in Section A.3.3).

The following documents provide guidance on considerations and scenarios to be taken into account during emergency response planning and execution.

– Guidelines for Examination of Installation of Offshore Wind Power Generation Facilities in Ports and Harbours released by MLIT

  - https://www.mlit.go.jp/report/press/content/001409192.pdf
  - Provides guidance on planning for emergency events during installation.
- Explanation of Offshore Wind Power Standards for Maintenance and Management1F published by the METI Committee on Study of Developing Offshore Power Generation Facilities in Ports and Harbours
  - 310329-1.pdf (meti.go.jp)
  - Provides guidance on planning for emergency events during operation and maintenance phase 1F

As these documents do not provide guidance on how to implement an integrated emergency/ incident response and management framework, the framework provided by ISO 22320 can be used in emergency and incident planning and response.

A.3.4 Japan incident management

As noted in Section 3.1 of the main body of the GPG, before commencing emergency response planning it is advisable to consult international and national guidance to ensure compliance with requirements. However, as there is currently no common agreement on how to implement an incident response framework in Japan, an Accountable Organization should develop an Emergency Response Plan to react to reasonably foreseeable eventualities within its boundaries, utilizing its own resources and procedures in accordance with a standardized framework. Further the Accountable Organization should fully understand the limitations of its internal capabilities and ensure its organizational structure can interact appropriately with outside support organizations and have a system in place for contacting the necessary authorities (port facility offices, government agencies, coast guards, etc.)

Please refer to Section 2.0 of this GPG for further discussion on key principles of emergency response.

A.3.4.1 JIS Q 22320/ ISO 22320

The JISC has adopted ISO 22320 which is known locally as JIS Q 22320 : 2013 emergency management – Requirements for incident response. In lieu of national requirements, this can be used to provide necessary framework (including roles and responsibilities) for Accountable Organizations to develop their emergency response approach. In general, JIS Q22320/ISO 22320 can be used by all organizations that are involved in responding to incidents of any type and provides guidance to government, non-governmental organizations, private sector, and local agencies to provide a systematic process to prevent, protect against, mitigate, respond to, and recover from incidents.

Accountable Organizations, and their emergency response plans, should be prepared to allow for interaction within the JIS Q22320/ISO 22320 framework when responding to emergency scenarios.

This annex is not intended to duplicate the requirements of JIS Q22320/ISO 22320, however, Figure 26 and Figure 27 provides an overview of the incident management process for a single organization and multiple organizations as defined by the standard.

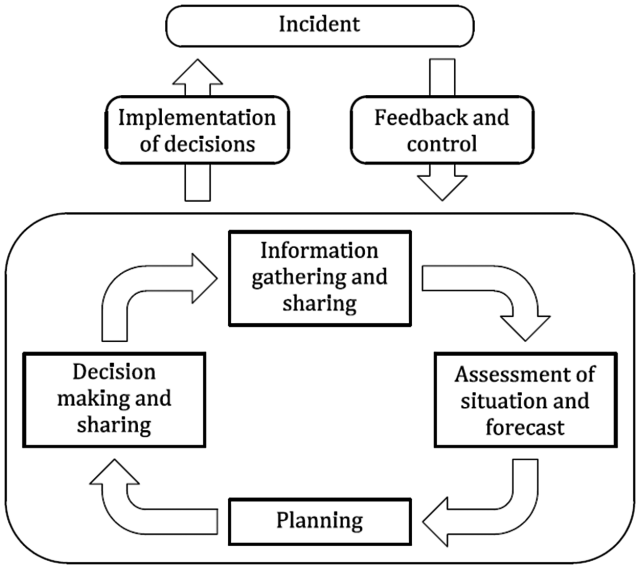

Figure 26: Incident management process

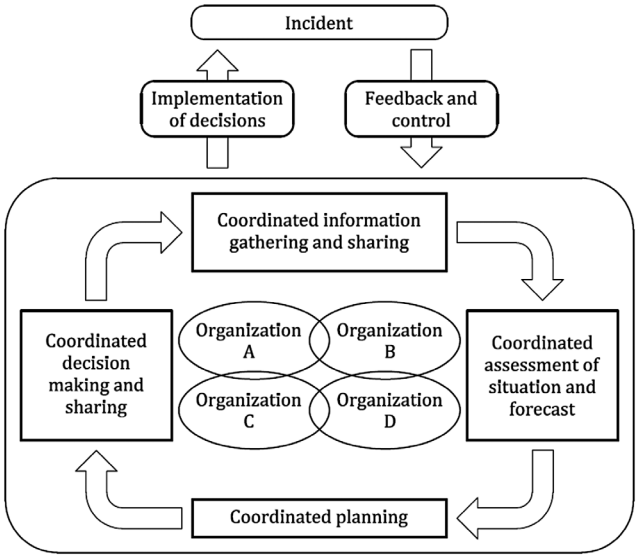

Figure 27: Coordinated incident management process for multiple organizations

A.3.4.2 Search and Rescue – Japan Coast Guard (JCG)

The JCG is responsible for conducting marine search and rescue operations. Under the US-Japan SAR Agreement, Japan is responsible for coordinating search and rescue activities in the expanse of ocean that extends northward from 17 ° North and westward from 165 ° East.

It is important that the JCG be notified of a marine incident as soon as possible. Therefore, if any person encounters a marine accident or emergency or observe a suspicious incident they MUST dial '118' the emergency number. This number can be accessed using private and public telephones, shipboard phones, and mobile phones. The Coast Guard JCG also operates a maritime accident reporting service 24 hours a day by radio based on the Global Maritime Distress and Safety System (GMDSS).

Further information on the JCG including organizational structure, location of offices/stations, contact details, available assets, etc. can be found in the information booklet found at the following link:

http://www.kaiho.mlit.go.jp/e/english.pdf

A.3.5 Japan incident investigation

Although the Japanese government has enacted legislation to encourage the development of new offshore wind projects, vital offshore wind specific occupational health and safety legislation will most likely be incorporated in the existing legal framework such as the Labour Standards Act and the Industrial Safety and Health Act. It is recommended to closely monitor official sources for any future updates.

It would also be beneficial to sign up at the Japan Industrial Safety and Health Association (JISHA) https://www.jisha.or.jp/english/.

For additional information on construction site, training material of JISHA please refer here: 中災防：海外トピックス Links to Construction OSH Multilingual Teaching Material, Safety Site, MHLW (jisha.or.jp)

A.3.6 Pollution control

Response to environment related occurrences should be taken into consideration in emergency response planning. Vessels must comply with the Marine Pollution Control Act. The same requirements are appliable to offshore structures. Note that substations and WTGs are not specifically mentioned in the Marine Pollution Control Act, however in the future these might be assumed to be included in this category.

A.3.7 Severe weather – typhoon, earthquake and tsunami

Response to severe weather occurrences should be taken into consideration in emergency response planning. In Japan there is routine reporting on severe weather events, and they are all recorded by the Japan Meteorological Agency, on their website.
https://www.jma.go.jp/jma/en/menu.html

Typhoons

Typhoons generally occur in the period from mid-July to mid-October, with the greater likelihood being in the middle of this time, but events can occur outside of this period. The track of the typhoon is shown on maps with 12 hour progression of the epicenter, and they can be seen around a week in advance of any potential landfall, or passage by Japan. Typhoons often increase in strength as they approach the island. Their path, and progress-speed can be unpredictable, but in general vessel masters can plan to reach safe-haven and moor-up, in accordance with the port's guidance, with several days before landfall of the weather event. All ports generally have guidance on the mooring arrangements depending on the intensity and direction of the weather, and sometimes require larger vessels to put to sea, if conditions will be safer to remain inshore.

Seismic Events

When recording earthquakes, they are reported by number, on a Magnitude, Local 'ML' scale, with events measuring 5.2 or more being given numbers, and lesser earthquakes just listed

as 'local' events. Immediately after an earthquake is detected, any crane-lifted-load must be lowered to deck-level for safety. Ground conditions often fluidise during seismic events, and the depth to which fluidisation occurs increasing as the seismic event's strength increases. The material mica in the soil leads to increased fluidisation depth, and local experts are preparing advice to reflect this. Before a jack-up vessel can jack-up and lift on the location, the ground must resolidify. Expert guidance will be needed to advise on re-solidification time.

Tsunamis

Japan is a country that regularly experiences tsunamis. Response Planning and particular care should be taken when working in areas where treats of tsunamis exist.

A.3.8 Public health measures and COVID-19

Workplace mitigation strategies regarding public health measures are required to protect the health and well-being of workers. Clear guidelines regarding the mitigation strategies should be communicated to the workforce and strategies should include special consideration for workers that are intended to stay in close proximity for long durations (e.g., offshore).

For example, as the risk of COVID-19 changes, it is recommended that up-to-date COVID-19 Management Plan is maintained and its requirements communicated to the workforce. The latest and official information related to COVID-19 is found at the website for the Japanese Ministry of Health, Labour and Welfare.

Welcome to Ministry of Health, Labour and Welfare (mhlw.go.jp)

A.3.9 List of national organizations and stakeholders

- METI https://www.meti.go.jp/
- MLIT https://www.mlit.go.jp/
- MLHW https://www.mhlw.go.jp/english/
- NEDO https://www.nedo.go.jp/
- Japan Coast Guard https://www.kaiho.mlit.go.jp/e/organization/
- MAFF https://www.maff.go.jp/e/
- Class NK https://www.classnk.com/hp/en/index.html
- JWPA https://jwpa.jp/
- Japan Fisheries Association https://www.suisankai.or.jp/daisui_e/daisui_e.html
- Port authority https://www.mlit.go.jp/kankocho/cruise/list/index.html
- Local Prefecture https://web-japan.org/links/government/local/prefectures.html
- Natural Parks https://www.japan.travel/national-parks/
- Nature Conservation Society of Japan https://www.nacsj.or.jp/archive/files/diary2/images/pdf/mpa_nacsj.pdf
- Japan Construction Occupational Safety and Health Association JCOSHA (kensaibou.or.jp)

A.3.10 Requirements for offshore working in Japan

In order to provide qualified and competent support whilst working on offshore wind farms in Japan, all technicians need to have appropriate, verified health tests and be trained in-accordance with recognized standards.

International Standards apply for offshore-wind specific items, and for completeness, are included in this table.

It is most common that Global Wind Organisation (GWO) training standards are specified but IMO STCW, or BOSIET/FOET are occasionally specified as being more appropriate. Guidance related to this is also included in the MLIT guidelines. PowerPoint プレゼンテーション (mlit.go.jp)

Table 7: GWO training requirements

#	Law/Training	Main Topics
1	Fitness Certificate for Mariners	– General Medical Certificate for Mariners (STCW or local)
2	Global Wind Organization (GWO) Working at Height	– Working at Height Training
3	GWO First Aid	– First Aid Training (Basic)
4	GWO Fire Awareness	– Basic Fire-Protection Training
5	GWO Sea Survival	– Basic Survival Training
6	GWO Manual Handling	– Basic Mechanical Handling Training

The table lists a summary of the requirements for offshore working in Japan.

Table 8: Summary of the requirements for offshore working in Japan

#	Law	Main Regulated Topics
1	Port and Harbour Act Law No. 218	– Port development plan and port administrative procedures per rules and guidelines
2	Marine Collision Prevention Act Law No 6224F[1]	– Basic rules to avoid marine collisions
3	Marine Traffic Safety Act Law No. 115	– Detailed marine traffic rules for the three sea areas (1) Tokyo Bay, (2) Ise Bay and (3) Seto Island Sea
4	Laws and regulations concerning the prevention of marine pollution, etc. and marine disasters Law No. 136	– Disposal of oil, hazardous subsistence and waste to ocean – Exhaust gas from vessel – Prevention of fire on vessel – Mitigation of marine disasters

1 https://jci.go.jp/english/pdf/en_regulations.pdf

Table 8: Summary of the requirements for offshore working in Japan. (continued)

#	Law	Main Regulated Topics
5	Safety Ordinance for Cranes Law No. 34	– Permission, notification and administrative requirements – Standards of strength calculations, Inspection, load test, limitation of overload, limitation of ji angle – Safety procedure, suspension of work in strong wind
6	Ship Act Law No. 46	– Ship nationality – Ship registration requirements – National flag requirements
7	Ship Safety Act Law No. 11	– Stuttering line, communication facility, inspection, qualification for ship building and repair workers, ship marking

A.3.11 Japanese legal system and legislation

A.3.11.1 General background to the Japanese legal system

Japan is a country with a central government and the central legislation that applies to the entire country. There is a hierarchy of laws which is described in the Figure 28.

Figure 28: Japanese hierarchy of laws

There is always a link between specific law, government ordinance/enforcement order and ministerial ordinance/enforcement regulations. While laws set a general principle of a legal requirement, ordinance and regulation placed in the lower levels deal with details of such legal requirement. Prefecture ordinances and municipal ordinances (collectively called 'Local Ordinances' in the diagram) are ranked at the bottom.

A.3.11.2 Key Japanese industrial health and safety legislation

There are no specific laws which directly regulate health and safety aspects of activities related to offshore renewable energy, but small number of conventional laws are designed to handle everything. The following provides references and information related to key Japanese industrial health and safety legislation.

Table 9: Hierarchy and level of details dealt by law/ordinance/orders

#	Law/Ordinance	Main Regulated Topics
1	Industrial Safety and Health Act No. 57 of 1972	– Employers should provide a safe and comfortable work environment for all employees
2	Ordinance on Industrial Safety and Health Act No. 32 of 1972	– HSE officer needs to be appointed for an office of 50 – 200 employees – Medical check for employees is required on start of employment and then annually thereafter – Hazard risk assessment
3	Order for Enforcement of the Industrial Safety and Health Act Cabinet Order No. 318 of 1972	– Assembly of Safety Committee for higher risk industries such as heavy industry/construction – Precautions for specific activities
4	Ordinance on Health Standard in the Office Ordinance No. 43 of 1972	– Requirements on office working conditions – lighting, ventilation, windows, CO/CO2, temperature, dust, etc

Extent of the Industry Safety and Health legislation application

Industrial Safety and Health Act No. 57 and assorted ordinances are applicable to all companies in Japan irrespectively of location, size, or type of activities. The legislation is applicable to any kind of workplace inclusive of office, construction site and operational wind farm.

There is no specific Industry Health and Safety ordinance made for offshore wind projects, however this might be developed in the future if specific countermeasures for offshore environment are identified by the wind energy industry and the government in Japan.

Industry practice

The JISC has been an active member of ISO since 1952. And is a permanent member of the ISO council and Technical Management Board.

ISO 31000 – Risk management has been adopted in as JIS Q31000.

Although it is not specifically a requirement by the Japanese legislation, safety management systems and risk assessment approach based on ISO 45001 – Occupational health and safety management systems, has been widely accepted as industry practice for construction sites and operational onshore and offshore wind farms throughout Japan.

Specific requirements on wind farms (onshore and offshore)

The Electricity Business Act provides a regulatory framework for the generation, transmission, and distribution of electricity, including renewable energy electricity. Electricity Business Act sets the following requirements:

- Safety Manual shall be made for a power plant which has rated capacity of 1,000 kW or larger;
- Qualified Chief Electrical Engineer shall be nominated for a power plant which has rated capacity of 1,000 kW or larger;
- Construction plan shall be submitted to METI for a power plant which has rated capacity of 500 kW or larger, and
- Voluntary completion test shall be made and recorded prior to commercial operation for a power plant which has rated capacity of 500 kW or larger.

The Electric Business Act requires safety specifications to be submitted by the offshore wind developer to METI and MLIT. The minimum required information to be submitted is specified in the Electric Business Act Enforcement Regulations.

Roles and Responsibilities of a Safety Officer and General Health and Safety Manager in Japan19F

The Industrial Safety and Health Act requires that the following positions of General Safety and Health Manager and Safety Officer are appointed. The role of the General Safety and Health Manager is aligned with the responsibilities of the Responsible Individual as defined in the main Body of the GPG.

General Safety and Health Manager

Article 10:

(1) The employer shall, as provided for by the Ordinance of the Ministry of Health, Labour and Welfare, appoint a general safety and health manager for each workplace of the scale defined by Cabinet Order and have the said person direct the work of safety officers, health officers, or persons in charge of management of technical matters pursuant to the provisions of paragraph (2) of Article 25-2, and at the same time exercise overall management of the following matters:
   (i) Matters pertaining to measures for the prevention of the dangers or health impairment of workers
   (ii) Matters pertaining to the provision of education on the safety and health of workers
   (iii) Medical examination and others for maintaining and promoting workers' health
   (iv) Matters pertaining to the investigation of the causes of industrial accidents and the measures for preventing the recurrence of such accidents
   (v) In addition to the matters listed in the preceding each item, services necessary for preventing industrial accidents provided for by the Ordinance of the Ministry of Health, Labour and Welfare.

(2) The position of the general safety and health manager shall be filled with the person who exercises overall management over the execution of the undertaking at the said workplace.

(3) The Director of the Prefectural Labour Bureau may, when he/she finds it necessary in order to prevent industrial accidents, make recommendations to the employer on the performance of the general safety and health manager.

A.3.11.3 Summary of main standards for workplace/environment protection and control measures

Accountable Organizations should take into consideration the requirements of the following standards as applicable in development of operational procedures and related emergency response planning.

Table 10: Summary of main standards for workplace/environment protection and control measures

#	Law	Main Regulated Topics
1	Labour Standards Act No. 49 of 1947	– Principle of Working Conditions – Determining Working Conditions – Equal Treatment – Prohibition of Forced Labour
2	Ordinance for Enforcement of Labour Standard Act No. 23 of 1947	– Hours of work – Method of wage payment – Overtime – Training requirements
4	Fire Service Act No. 186 of 1948	– Provision for fire safety management – Removal of fire hazard – Appointment of fire prevention manager – Preparation of fire emergency plan/ evacuation route
5	Basic Environment Law No. 91 of 1993	– Prevent pollution – Proper disposal of waste – Reduce environmental load – Conservation of the environment
6	Water Pollution Prevention Act No. 138 of 1970	– Water discharge and sewage control
7	Air Pollution Control Act No. 97 of 1968	– Regulates discharge of pollutants into the air from business establishments – Restricts emission limits for automobile
8	Act on Promotion of Global Warming Countermeasures No. 117 of 1998	– Duties of government, business and citizens to reduce release of pollutants which contribute to global warming – Measures to limit greenhouse gas emissions
9	Building Management Law No. 20	– Meeting the requirements of the Building Standard Law to secure health and safety conditions of buildings for workplaces
10	Building Standard Law No. 201	– Set the requirements for the building to secure health and safety conditions of buildings for workplaces against wild weather, earthquakes, and fire

A.4 TAIWAN

A.4.1 Acronyms

The following acronyms as used throughout this Annex:

BOSIET	Basic Offshore Safety Induction and Emergency Training
CDC	Center for Disease Control
CGA	Coast Guard Administration
FOET	Further Offshore Emergency Training
GWO	Global Wind Organisation
IMO	International Maritime Organization
ISO	International Organization for Standardization
MARPOL	The International Convention for the Prevention of Pollution from Ships
MOTC	Ministry of Transportation and Communications
MPB	Maritime and Port Bureau
NRCC	National Rescue Command Center
STCW	Standard for Training, Certification and Watchkeeping

A.4.2 Taiwan statutory authorities

The role of relevant statutory authorities such in emergency response is outlined in Operation Plan of Marine Casualty Prevention and Protection (See Section A.4.3 for further info). Link to the websites for statutory authorities are included in Section A.4.9.

A.4.3 Emergency response overview

In Taiwan, offshore wind is relatively new, but specific policy is rapidly being added to more general legislation and guidance. Under the Disaster Prevention and Protection Act, the Ministry of Transport and communications serves as the central competent authority for disaster prevention and protection operations. It formulated the Operation Plan of Marine Casualty Prevention and Protection which lists the requirements to be adhered to in preparation before disasters, as well as emergency responses to be provided by Individual Agencies after a disaster has occurred. The Plan '*serves as the higher level guidance plan for offshore wind farm disaster prevention and protection. The matters to be undertaken by the relevant operators and agencies (affiliated institutions) as stipulated by the Plan shall be taken into account by the ministry when they establish the plan for marine casualty prevention and protection in terms of measures to be executed by the corresponding offshore wind farm operators and agencies (affiliated institutions), so as to improve the overall prevention and protection mechanism for marine casualties.'*

A copy of the Operation Plan of Marine Casualty Prevention and Protection and can be found on the website for the Maritime and Port Bureau, MOTC, https://en.motcmpb.gov.tw/.

The plan requires that offshore wind farms operators undertake the necessary measures promptly to prevent the spread of disaster and requires that offshore wind farm operators

consider the Plan when developing their emergency prevention and protection plans. Based on this, it is expected that every individual offshore wind farm will have its own individual Emergency Response Plan which considers requirements of the Plan. This will contain procedures in place for responding to emergency events and include systems for contacting the necessary authorities (port authority offices, government agencies, coast guards etc.), and specifies the necessary training required for any emergency event.

A.4.4 Taiwan Incident management

As noted in Section 3.1 of this GPG, before commencing emergency response planning it is advisable to consult international and national guidance to ensure compliance with requirements. In Taiwan, the Operation Plan of Marine Casualty Prevention and Protection provides higher level guidance on role and expectations of government, government agencies and operators (and their affiliated institutions). An Accountable Organization should develop an Emergency Response Plan to react to reasonably foreseeable eventualities within its boundaries, utilizing its own resources and procedures in accordance with a standardized framework. Further the Accountable Organization should fully understand the limitations of its internal capabilities and ensure its organizational structure can interact appropriately with outside support organizations and have a system in place for contacting the necessary authorities (port facility offices, government agencies, coast guards, etc.)

Please refer to Section 2.0 of this GPG for further discussion on key principles of emergency response.

A.4.4.1 ISO 22320

In lieu of national requirements, ISO 22320 Emergency management – Requirements for incident response can be used to provide necessary framework (including roles and responsibilities) for Accountable Organizations to develop their emergency response approach. In general, ISO 22320 can be used by all organizations that are involved in responding to incidents of any type and provides guidance to government, nongovernmental organizations, private sector, and local agencies to provide a systematic process to prevent, protect against, mitigate, respond to, and recover from incidents.

This annex is not intended to duplicate the requirements of ISO 22320, however, Figure 29 and Figure 30 below is provide an overview of the incident management process for a single organization and multiple organizations as defined by ISO 22320.

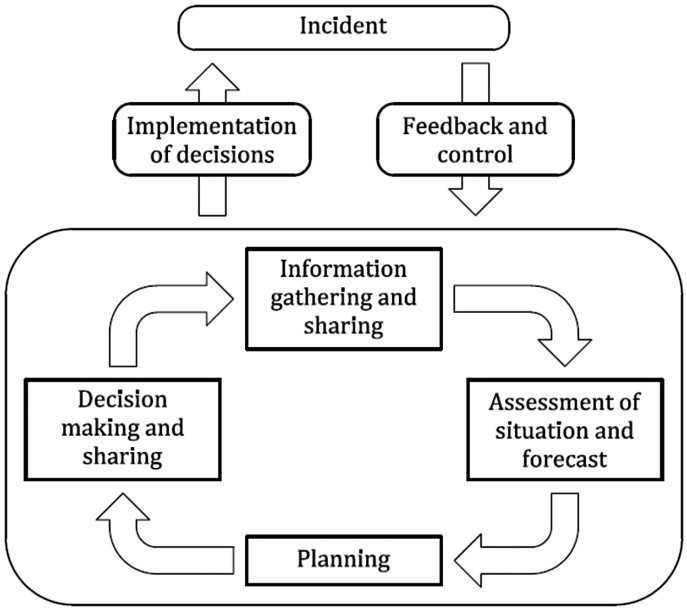

Figure 29: Incident management process

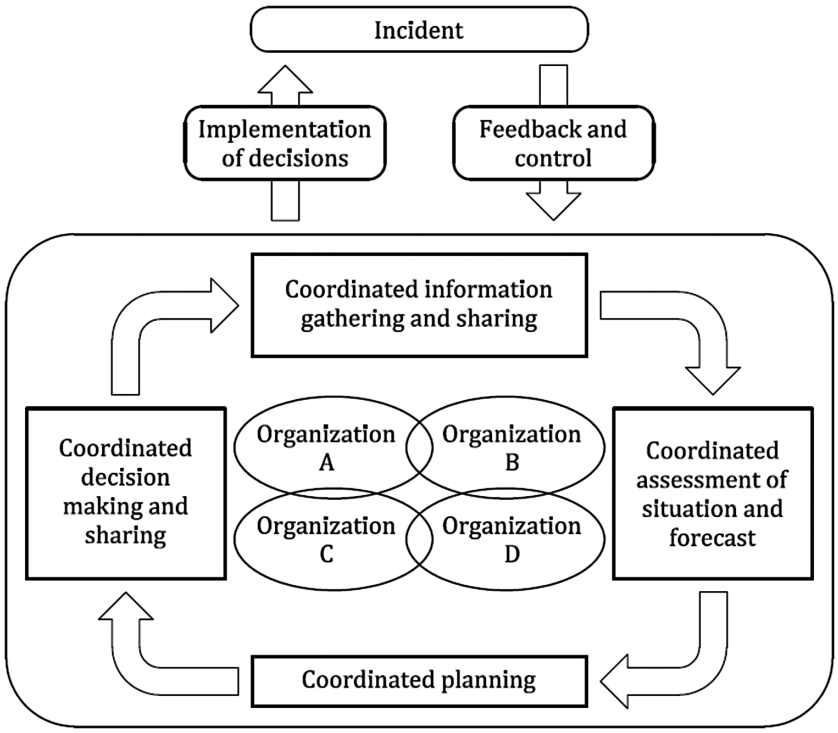

Figure 30: Coordinated incident management process for multiple organizations

A.4.4.2 Search and rescue

The scope of marine casualty search and rescue in Taiwan includes the Taipei Flight Information Region east of the median line of the Taiwan Strait, Kinmen, Dongding, Wuqiu, Matsu, Dongyin, Liang Island, Dongsha, and Nansha.

The notification and coordination of marine search and rescue operations in the surrounding waters of Taiwan is generally conducted by National Rescue Command Center (NRCC), while the Coast Guard Administration(CGA) is responsible for the execution of search and rescue operations. The NRCC receives a distress call, and the CGA and various agencies relative to maritime search and rescue are alerted to take actions in accordance with the standard operation procedures.

Details on search and rescue for marine casualties can be found in the Operation Plan of Marine Casualty Prevention and Protection, including In Appendix 1 – Execution of Search, Rescue, and Aid for Marine Casualties.

A.4.5 Taiwan incident investigation

In Taiwan there is legislation on how authorities investigate transportation incidents. The Transportation Occurrence Investigation Act. Review of past issues will guide future planning and improve the dissemination of lessons learned.

The purpose of the Act is '**to improve transportation safety through independent investigation of transportation occurrences on aviation, railway, marine and highway**'.

Whilst it is not specifically related to offshore wind it will cover the area, so the information will be gathered and reported upon. Incidents can be investigated and the lessons learned, and the information distributed widely, which should allow the improvement of awareness and improve distribution of good-practice.

A.4.6 Pollution control

Response to environment related occurrences should be taken into consideration in emergency response planning. Local pollution monitoring and control is dealt with by the Ocean Affairs Council who oversee the Marine Pollution Control Act. The Environmental Protection Administration are responsible for the Air Pollution Control Act and Noise Control Act, and the Drinking Water Management Act.

Internationally, pollution in ocean environments is regulated by the International Maritime Organization. The legislation governing the incidents is the International Convention for the Prevention of Pollution from Ships, which is abbreviated to 'MARPOL'. The Convention includes regulations aimed at preventing pollution from ships – both accidental pollution and that from routine operations. Administration of this legislation locally is also provided by the Ocean Affairs Council.

A.4.7 Severe weather – typhoon, earthquake and tsunami

Response to severe weather occurrences should be taken into consideration in emergency response planning. In Taiwan there is routine reporting on severe weather events, and they are all recorded by the Central Weather Bureau, on their website. https://www.cwb.gov.tw

Typhoons

Typhoons generally occur in the period from mid-July to mid-October, with the greater likelihood being in the middle of this time, but events can occur outside of this period. The track of the typhoon is shown on maps with 12 hour progression of the epicenter, and they can be seen around a week in advance of any potential landfall, or passage by Taiwan.

Typhoons often increase in strength as they approach the island. Their path, and progress-speed can be unpredictable, but in general vessel Masters can plan to reach safe-haven and moor-up, in accordance with the Port's guidance, with several days before landfall of the weather event. All ports generally have guidance on the mooring arrangements depending on the intensity and direction of the weather, and sometimes require larger vessels to put to sea, if conditions will be safer to remain inshore.

Seismic Events

When recording earthquakes, they are reported by number, on a Magnitude, Local 'ML' scale, with events measuring 5.2 or more being given numbers, and lesser earthquakes just listed as 'local' events. Immediately an earthquake is detected any crane-lifted-load must be lowered to deck-level for safety. Taiwanese ground conditions often fluidise during seismic events, and the depth to which fluidisation occurs increasing as the seismic event's strength increases. The material Mica in the soil leads to increased fluidisation depth, and local experts are preparing advice to reflect this. Before a jack-up vessel can jack-up and lift on the location, the ground must resolidify. Expert guidance will be needed to advise on re-solidification time.

Tsunamis

Taiwan is not generally susceptible to Tsunamis, unlike Japan. However, on occasions, sloping sea-beds collapse downhill causing Tsunami-events. Particular care should be taken when working in areas where sloping sea-beds are a feature.

A.4.8 Center for Disease Control (CDC) and COVID-19

Workplace mitigation strategies regarding public health measures are required to protect the health and well- being of workers. Clear guidelines regarding the mitigation strategies should be communicated to the workforce and strategies should include special consideration for workers that are intended to stay in close proximity for long durations (e.g., offshore).

For example, as the risk of COVID-19 change, it is recommended that up-to-date COVID-19 Management Plan is maintained and its requirements communicated to the workforce. The latest and official information related to COVID 19 is found at the website for the CDC.

https://www.cdc.gov.tw/En

A.4.9 List of national organizations and stakeholders

The following list of agencies have oversight, or involvement with the development of the offshore wind industry.

- Ministry of Economic Affairs
  - Bureau of Energy – https://www.moeaboe.gov.tw/
  - Industrial Development Bureau – https://www.moeaidb.gov.tw
  - Bureau of Foreign Trade – https://www.trade.gov.tw/English
  - Bureau of Standards, Metrology, and Inspection – https://www.bsmi.gov.tw/
- Maritime and Port Bureau – https://en.motcmpb.gov.tw/
- The Coast Guard Administration of the Ocean Affairs Council – https://www.cga.gov.tw/
- Taiwan Central Weather Bureau https://www.cwb.gov.tw/eng
- Taiwanese Civil Aviation Authority – https://www.caa.gov.tw

- Ministry of Labour – Occupational Safety and Health Administration – https://www.osha.gov.tw
- Environmental Protection Administration – https://www.epa.gov.tw/ENG
- National Police Agency/Broadcasting – https://www.npa.gov.tw ; https://pbs.npa.gov.tw/
- National Fire Agency – https://www.nfa.gov.tw/
- Taiwan Centre for Disease Control – Disease Hospitals – https://www.cdc.gov.tw
- Ministry of Foreign Affairs – https://www.mofa.gov.tw
- Ministry of Health and Welfare – https://www.mohw.gov.tw
- Central Weather Bureau – https://www.cwb.gov.tw
- Ministry of Transportation and Communications – https://www.motc.gov.tw/en
- Ocean Affairs Council – https://english.ocac.gov.tw
- Taiwan Transportation Safety Board – https://www.ttsb.gov.tw
- Taiwan Electrical Power Company https://www.taipower.com.tw/en/index.aspx
- Fisheries Agency – Council of Agriculture – https://en.fa.gov.tw/

A.4.10 Other guidance

A.4.10.1 UXO

Historically, one hundred-pound, high explosive bombs were dropped from planes to clear warship-decks of anti-aircraft guns, prior to larger bombing raids. They have steel cases, which are magnetic, but being relatively small, can only be detected by the best magnetometers to approximately seven meter range. With sand-waves, some of which can be of this and greater heights, such explosives can be potentially undetectable. They are therefore classed as outside the range of, 'As Low As Reasonably Practicable' (ALARP). In areas where cable-landfall occurs, and vessels and horizontal directional drilling crews are ground-engaging in shallower waters, awareness needs to be heightened. A magnetometer survey-pattern directly along cable-routes, is advisable to give the best possible chance of detection of this type of UXO.

A.4.10.2 Defining responsibilities

Frequent questions are raised as to who holds the responsibility of the emergency responses between Government agencies and operators. There are generally numerous agencies involved. Emergency Response Planning needs to clarify the confusion, and document where responsibility lies, and any variations which exist between minor, medium, or larger emergency incidents.

A.4.10.3 Helicopters in operations and maintenance and safety

Internationally, helicopters have become an important option in operation and maintenance. Capable of operating more efficiently in high-winds, but incapable of usage in foggy conditions, they offer the perfect complementary option to workboats. Taiwan has issues with concerns of helicopters from Mainland China, so offshore wind will have to operate without this as a maintenance option. This applies to helicopters usage both in Search and Rescue and also as Air Ambulances. This latter factor regularly leads to increased numbers of Medical Facilities aboard larger vessels offshore.

A.4.11 Requirements for offshore working in taiwan

In order to provide qualified and competent support whilst working on offshore wind farms in Taiwan, all technicians need to have appropriate, verified health tests and be trained in-accordance with recognized standards.

International Standards apply for offshore-wind specific items, and for completeness, are included in this table.

It is most common that Global Wind Organisation (GWO) training standards are specified but IMO STCW, or BOSIET/FOET are occasionally specified as being more appropriate.

Table 11: GWO training requirements

#	Training	Main Topics
1	Fitness Certificate for Mariners	– General Medical Certificate for Mariners (STCW or local)
2	Global Wind Organization (GWO) Working at Height	– Working at Height Training
3	GWO First Aid	– First Aid Training (Basic)
4	GWO Fire Awareness	– Basic Fire-Protection Training
5	GWO Sea Survival	– Basic Survival Training
6	GWO Manual Handling	– Basic Mechanical Handling Training

Legal System and Legislation

A.4.11.1 General background to the taiwan legal system

The legal regime in Taiwan is based on the civil law system, and all of the rules are generally codified. There are in total six key aspects which is commonly referred to as the 'Six Codes'.

- the Constitution,
- the Civil Code,
- the Code of Civil Procedure,
- the Criminal Code,
- the Code of Criminal Procedure, and
- the Administrative Laws.

Only the Constitutional Court and the Judicial Yuan have the power to interpret the Constitution or unify interpretations of statute and regulations.

Taiwan has a multi-party democratic political system, with government administration divided into central, provincial, and county levels, each with well-defined roles and powers. Central government power is divided among the Office of the President and five independent '院 Yuans' (i.e., Departments)

- the Executive Yuan,
- the Legislative Yuan,

– the Judicial Yuan,
– the Examination Yuan, and
– the Control Yuan.

Specific regulations for offshore wind farms are limited. In terms of the Environmental Health and Safety legislation and enforcement agencies, specific to offshore wind safety, the following laws and agencies are key.

Table 12: Environmental health and safety legislation and enforcement agencies in Taiwan

#	Law/Ordinance	Main Regulated Topics
1	Occupational Safety and Health Act – Ministry of Labour	– Protect workers' safety and health and to prevent occupational accidents
2	Environmental regulations – Environmental Protection Administration	– Environmental protection, and noise, oil, air pollution and other requirements
3	Fire regulations – Fire Department, Ministry of Interior	– Preventing fire disaster and providing rescue operation and first aid to maintain public safety, and protect life and property
4	Vehicle and Ship regulations – Ministry of Transportation and Communications	– Management of Vehicle, Train, and Taiwan International Ports Corporation
5	Marine Development and Pollution – Ocean Affairs Council, Coast Guard	– Protection of ocean resources, and coordination of marine safety operations.
6	Energy-related laws and regulations – Ministry of Economic Affairs	– Management of Electricity, Factories Companies

A catalogue of all Taiwanese Legislation, listed under each statutory agency, is available from the website, https://law.moj.gov.tw/.

A.4.11.2 Health, Safety, Security and Environment Legislation structures in Taiwan

The Taiwanese legislation in the Table 13 lists some of the major areas in which serious incidents can occur on offshore wind farms.

Table 13: Health, safety, security and environment legislation structures in Taiwan

#	Law/Ordinance	Main Regulated Topics
1	Occupational Safety and Health Act	– Basic and general minimum safety and health standards for working environments, facilities, and equipment
2	Labour Standards Act	– The working conditions minimum standards, including safety
3	Noise Control Act – Environmental Protection Administration	– Assembly of Safety Committee for risky kind of business such as heavy industry/construction – Precautions for specific activities, e.g. piling
4	The Electricity Act	– Specialist Health and Safety is prescribed for Medium and High voltage areas of the site
5	Fire Services Act, Ministry of Interior	– For preventing disasters, and providing rescue and first-aid
6	Air Pollution Control Act – Environmental Protection Administration	– To control air pollution, maintain the living environment and public health and enhance the quality of life
7	Water Pollution Control Act – Environmental Protection Administration	– Maintain ecological systems and the living environment
8	Marine Pollution Control Act	– Provide a framework for the Government to alleviate marine Pollution
9	Environmental Impact Assessment Act	– Prevent and mitigate the adverse impact of development activity on the environment, and achieve environmental protection

The Occupational Safety and Health Act is applicable to all companies and employers, irrelevant of location or size. It controls noise, air pollution, and water pollution amongst others affecting their employees.

The competent authority is the Environmental Protection Administration, within the Executive Yuan at the central government level. Standards have been set for the safe levels in all areas of the Act to protect all employees.

In Taiwan, there isn't a specific requirement for the job-description of individuals holding any particular roles within the safety system. It is a requirement that the roles and responsibilities identified are all allocated to appropriately competent and qualified individuals.

ANNEX B
GLOSSARY

B.1 GLOSSARY OF TERMS

For clarification, the terms below will have the following meaning within the IOER:

Contacts Register:	Documented list of all agreed contact points and methods of communication and where applicable authorisation protocols.
Crisis Management:	The response to resource and support the site including its return to normality.
Duty Holder:	The entity that has the greatest extent of control over the site should be the duty holder and therefore take the responsibility of being the person in control. During construction that could be a principal contractor or asset owner. During operation that could be the lead operator or asset owner. This does not remove any legal duty from any other duty holder to ensure that they cooperate with the organisation with the greatest extent of control.
Emergency:	An emergency of a kind, which can require evacuation, escape or rescue.
Emergency Assistance:	Mutual support or assistance provided to neighbouring sites in the event of an emergency to those affected.
Escape:	The process of leaving the offshore renewable energy installation in an emergency when the evacuation system has failed; it may involve entering the sea directly and is a 'last resort' method of getting persons off the installation.
Evacuation:	Leaving an offshore renewable energy installation and its vicinity, in an emergency, in a systematic manner and without directly entering the sea.
First-aid:	In cases where a person will need help from a medical practitioner or nurse, treatment for the purpose of preserving life and minimising the consequences of injury and illness until such help is obtained, and treatment of minor injuries which would otherwise receive no treatment, or which do not need treatment by a medical practitioner or nurse.
First line:	The first line control arrangements to deal with the immediate response to protect and preserve life.
Medevac:	Any evacuation of a person for medical reasons.
Offshore Renewable Energy Development (ORED):	A generic term to specify an area of leased seabed from The Crown Estate within REZ whose development and operations are the responsibility of one developer (or group of developers under a joint venture).
Offshore Renewable Energy Installations (OREI):	Fixed and floating structures that make up a renewable energy farm; these include but are not limited to offshore transformer stations, met masts, marine current turbines, wave arrays and wind turbine generators. In the US, OREI has the same definition as ORED.
Renewable Energy Zone:	An area of the sea, beyond the United Kingdom's territorial sea, which may be exploited for energy production. The REZ will be coexistent with the area within which the United Kingdom already exercises jurisdiction with respect to marine environmental matters, in accordance with Part XII of the United Nations Convention on the Law of the Sea. Maps can be found at www.ukho.gov.uk.

Resource Register:	Documented list or description of all identified resources available by the parties concerned in order to provide Emergency Assistance.
Risk Register:	Documented record of the identified risks for all affected parties where Emergency Assistance may be required.
Second line:	The coordination of assets and assistance to those undertaking the first line response.
Third line:	Crisis response to an incident.

Note: these terms and definitions should only be used in order to provide a consistent understanding of the scope and application to these guidelines alone. While in many cases based on accepted terms, they do not have any statutory or official status regarding their interpretation or application.

B.2 ABBREVIATIONS AND ACRONYMS

AAIB	Air Accident Investigation Branch
ACO	aircraft coordinator
ACPO	Association of Chief Police Officers
ADC	Association of Diving Contractors
ANSI	American National Standards Institute
ARCC	Aeronautical Rescue Coordination Centre
BOEM	Bureau of Ocean energy Management
BSEE	Bureau of Safety and Environmental Enforcement
BIS	Department for Business Innovation and Skills
BROA	British Rig Owners Association
CAA	Civil Aviation Authority
CCA	Civil Contingencies Act
CCTV	closed circuit television
CDM	Construction (Design and Management) Regulations 2015
CFOA	Chief Fire Officers Association
CGOC	Coastguard Operations Centre
CPD	continuous professional development
CPS	Crown Prosecution Service
CTV	crew transfer vessel
DECC	Department of Energy and Climate Change
DfT	Department for Transport

DP	dynamic positioning
EA	Environment Agency
EBS	emergency breathing systems
EI	Energy Institute
EPIRB	emergency position indicating radio beacon
EPOL	emergency preparedness offshore liaision
EPP	emergency preparedness plan
ERCoP	emergency response cooperation plan
ERP	emergency response plan
FAA	Federal Aviation Administration
FAI	fatal accident inquiry
FG	focal group
GPS	Global Positioning System
GWO	Global Wind Organisation
HCA	Helideck Certification Agency
HEMS	Helicopter Emergency Medical Services
HMC(G)	Her Majesty's Coastguard
HSE	Health and Safety Executive
HSENI	Health and Safety Executive Northern Ireland
HSW(A)	Health and Safety at Work etc. Act 1974
IALA	International Association of Lighthouse Authorities
IAMSAR	International Aeronautical and Maritime Search and Rescue Manual
ICAO	International Civil Aviation Organization
IERP	Integrated Emergency Response Plan
IHO	International Hydrographical Organization
IJUBOA	International Jack-up Barge Operators Association
ILO	International Labour Organisation
IMCA	International Marine Contractors Association
IMO	International Maritime Organization
IOER	Integrated Offshore Emergency Response – Renewables Guidance

ISM	International Safety Management Code
JESIP	Joint Emergency Services Interoperability Programme
KIS-ORCA	Kingfisher Information Service – Offshore Renewable Cable Awareness
LGD	lead government departments
LRF	local resilience forum(s)
LRP	local resilience partnership(s)
MAIB	Marine Accident Investigation Branch
MARPOL	Marine Pollution (MARPOL 73/78 International Convention)
MCA	Maritime and Coastguard Agency
MHSWR	Management of Health and Safety at Work Regulations 1999
MMO	Marine Management Organisation
MOB	man overboard
MSG	Mutual Support Guide
NCP	National Contingency Plan
NFFO	National Federation of Fishermen's Organisations
NMOC	National Maritime Operations Centre
NOGEPA	Netherlands Oil and Gas Exploration and Production Association
NOK	next of kin
NWA	National Workboat Association
O&M	operations and maintenance
OC	operational controller
OD	overdose
OELO	offshore energy liaison officer
OFTO	offshore transmission owner
OGP	Oil and Gas Producers
OEUK	Offshore Energy UK
OMCE	Operation and Maintenance Centre of Excellence
OPEP	oil pollution emergency plan
OPITO	Offshore Petroleum Industry Training Organization
ORED	Offshore Renewable Energy Development(s)

OREEF	Offshore Renewable Energy Emergency Forum
OREI	Offshore Renewable Energy Installation
OSC	on-scene coordinator
OSP	offshore support platforms
OSS	offshore substations
OTM	offshore transformer module
PLB	personal location beacon
PLO	police liaison officer
PPE	personal protective equipment
RCC	rescue coordination centre
REEF	renewable energy emergency forum
REZ	renewable energy zone
RMA	radio medical advice
RNLI	Royal National Lifeboat Institution
RUK	Renewable UK
RYA	Royal Yachting Association
SAR	search and rescue
SCG	strategic coordinating group
SEPA	Scottish Environment Protection Agency
SGRE	Siemens Gamesa Renewable Energy
SIMOPS	simultaneous operations
SITREPS	situation reports
SMC	search and rescue mission coordinator
SMS	safety management system
SOLAS	(International Convention for the) Safety of Life at Sea
SOSREP	Secretary of State's Representative
SSR	search and rescue region
STCW	(International Convention for the) Standards of Training, Certification and Watchkeeping
SUT	Society for Underwater Technology
TCE	The Crown Estate

TEZ	temporary exclusion zone
TMAS	Telemedical Assistance Service
UKHO	UK Hydrographic Office
UKPOEG	United Kingdom Police Offshore Energy Group
USFWS	Fish and Wildlife Service
UXO	unexploded ordnance
VHF	very high frequency
VOIP	voice over internet protocol
WTG	wind turbine generator

ANNEX C
REFERENCES

International Maritime Organization (IMO) (www.imo.org)

IAMSAR Manual

International Convention on Maritime Search and Rescue (SAR)

International convention for the Prevention of Pollution from Ships (MARPOL)

Other

SOLAS Guidance on Chapter V – Safety of Navigation, www.imo.org/en/OurWork/facilitation/documents/solas%20v%20on%20safety%20of%20navigation.pdf

Convention on International Civil Aviation, Annex 12, www.airsafety.aero/getattachment/9bc6857a-0468-4b0e-824d-5ee9f2df586e/Regulation-of-Annex-12-Search-and-Rescue-(SAR).aspx

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