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# Vessel Safety Guide

## Guidance for Offshore Renewable Energy Developers

**April 2012**

# Contents



**Sponsors and Consultants**
RenewableUK would like to express our thanks and appreciation to the Crown Estate for acting as the lead partner, and their generosity in sponsoring the development of these guidelines.

This document was prepared for RenewableUK and The Crown Estate by Det Norske Veritas (DNV).

# Foreword

RenewableUK (RUK) and The Crown Estate are working in partnership (in Health and Safety) to facilitate the sharing of lessons and the development of good practice in the offshore renewable industry to ensure the safe and successful delivery of renewable energy projects for the UK.

This document is the first part of a series of health & safety guidelines developed for the offshore renewable industry, aiming at assisting developers throughout all phases of offshore renewable projects within the United Kingdom Renewable Energy Zone (UK REZ). The guide gives information and insight on health and safety aspects related to the selection of vessels. This will assist duty holders in the selection of vessels and equipment for operations in the UK REZ including transit to and from the zone, that are both safe and Fit for Purpose.

Fit for purpose in the context of this guide means:

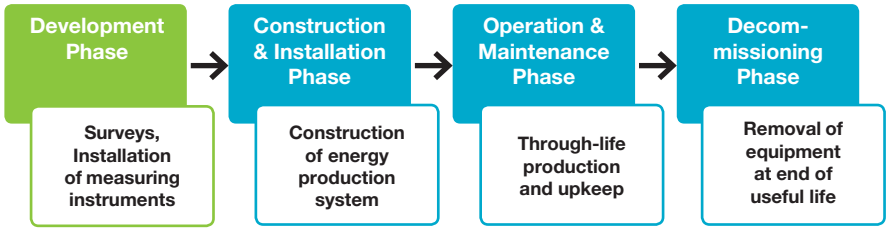
*"A vessel with the appropriate capability, equipment and crewing levels to carry out planned activities at a specific site for a defined duration, taking due consideration of the activity, site location, conditions and any changes to plans or incidents which may reasonably be foreseen."*

It should be noted that the Health & Safety at Work etc. Act 1974 (Application outside Great Britain) (Variation) Order 2009 (and 2011 variation order) extend the prescribed provisions of the HSW Act to work activities beyond the territorial sea and to other specified areas designated by order under section 1(7) of the Continental Shelf Act 1964. It extends the HSW Act to work activities such as the construction, repair and operation of energy structures and related structures within a renewable energy zone (REZ). A new Order is expected to come into effect in April 2013

**Purpose of the guidance**

Offshore wind, wave and tidal projects are introducing new and unique risks by moving further offshore into deeper waters and more hostile environments. The selection and management of appropriate vessels is critical to ensure the safe and successful execution of projects.

**Figure 1: Lifecycle Stages of an Offshore Energy Project**
(areas covered by this issue of the guide are highlighted in green)




The Crown Estate is therefore developing a series of safety guidance documents in collaboration with RUK that address the significant health and safety aspects of marine operations during the lifecycle of offshore projects which comprises the broad stages shown in Figure 1. Whilst each area will have differing marine characteristics and a wide range of vessels will be utilised in the various operations, this document is intended to provide guidance in the process of selection and management of vessels and interface of equipment to ensure all are Fit for Purpose and operated within a robust Health & Safety management system.

**Guide Target Audience & Applicability**

The guide is aimed at developers and those new to the offshore renewable sector that may not be familiar with the operation of vessels or are considering using vessels in deeper water or further from shore.

The guide covers most vessel types commonly used. The principle of ensuring vessels are Fit for Purpose also applies where innovative solutions or alternative vessel types are used.

The guide assumes that a tender assessment which considered due diligence (defined as a competent and reasonable effort to ensure the supplier can meet their obligations in a safe manner) has been carried out to determine the competence of the vessel supplier/owner.

It should be noted that the guide takes account of applicable regulations, guidance and good practice as currently seen to apply to vessel safety for the development phase of offshore renewable energy projects. It is expected that as regulations, standards and industry good practice develop further revisions will be made to the guidance.

**Development (and Consenting) Phase**

The development phase for the purposes of this guide is taken to mean the period of activity leading up to the point where construction is ready to commence following the award of consent and includes but is not limited to:

- Bird, fish & mammal surveys;
- Vessel traffic surveys;
- Geotechnical & Geophysical surveys;
- Installation of meteorological equipment (e.g. Masts/ Buoys);
- Crew transfer and service vessel use (to maintain meteorological equipment).

**Construction and Installation Phase**

The phase during which construction of the energy development is undertaken with the installation of foundations, erection of the support structures and installation of the turbines, cables or other equipment as appropriate to the type of energy production system.

**Operations and Maintenance Phase**

On completion of construction, the day to day operation and production of power for delivery to the grid and the on-going maintenance of the structures, balance of plant and infrastructure.

**Decommissioning Phase**

Removal of equipment at the end of the items useful life in accordance with extant environmental and regulatory requirements at the time of removal. Phase could include repowering which would involve activities set out in the phases outlined in Figure 1.

**Guide Layout**

This guide gives an overview of vessel safety issues which should be considered and are applicable to any activity or vessel. Appendix I provides specific additional information, either to general requirements common to all activities and vessels, or directly related to a specific activity. Appendix II gives a list of relevant legislation and existing guidelines which may assist the reader.

# 1. EFFECTIVE VESSEL SELECTION AND OPERATION

## 1.1 Vessel Selection

The selection of a Fit for Purpose vessel to operate in the UK REZ has to take into account a wide range of factors including:

- The activity it will be carrying out;
- The conditions likely to be encountered at the site of the activity and during transit to/from the site;
- The duration of the work.

Selection should also consider:

- Competence, experience and training of marine and project crews;
- Procedural and individual company requirements;
- Management systems ensuring safe working;
- Compliance with the appropriate maritime rules and regulations;
- Equipment and facilities required to carry out the activity.

The majority of activities can broadly be subdivided into the following steps:

- **Pre operation** – Including selection of the vessel, mobilisation of equipment and personnel to the vessel. This may include installation of equipment onto and/or modification of the vessel;
- **During operations** – Carrying out the activity e.g. surveys, installation of meteorological monitoring equipment and masts, transits, emergency support;
- **Post operation** – De-mobilisation of equipment and personnel including returning the vessel to its pre-hire configuration.

All of the above should take into account the hazards associated with each step and the potential impact on the people and vessel, hence robust risk assessment, using recognised techniques and mitigation of hazards is required. A level of proportionality needs to be applied in relation to the degree of complexity required for the risk assessment technique chosen (Reference ISO 31000 and IEC/ISO 31010).

## 1.2 Safety Management

Health and safety is fundamental to the successful completion of the activities. Each activity must be driven by risk assessment to ensure the vessel selection process addresses all risks as far as reasonably practicable.

The party (company or individual) with responsibility for the vessel should:

- Operate a Safety Management System (SMS) which complies with the International Safety Management (ISM) Code requirements of the International Maritime Organisation, if over 500 Gross Tonnage (GT); **or,**
- Be managed in accordance with Maritime and Coastguard Agency (MCA) requirements; **or,**
- Have a Safety Management System approved by its flag state which has been recognised by the MCA and meets UK port state requirements if the vessel is operating in UK territorial waters; **or,**
- Jack-ups should have a documented procedure that includes all the key requirements of the ISM code if not ISM compliant.

Developers and their contractors who have responsibilities for the project and/or defined activity being carried out should:

- Have in place an established and maintained health and safety management system. This should take account the general duties set out under the Health and Safety at Work etc. Act 1974 and applicable delegated legislation (e.g. Management of Health and Safety at Work Regulations 1999, Construction (Design and Management) Regulations 2007 etc.).

It is good practice for a bridging document to be produced for the vessel which:

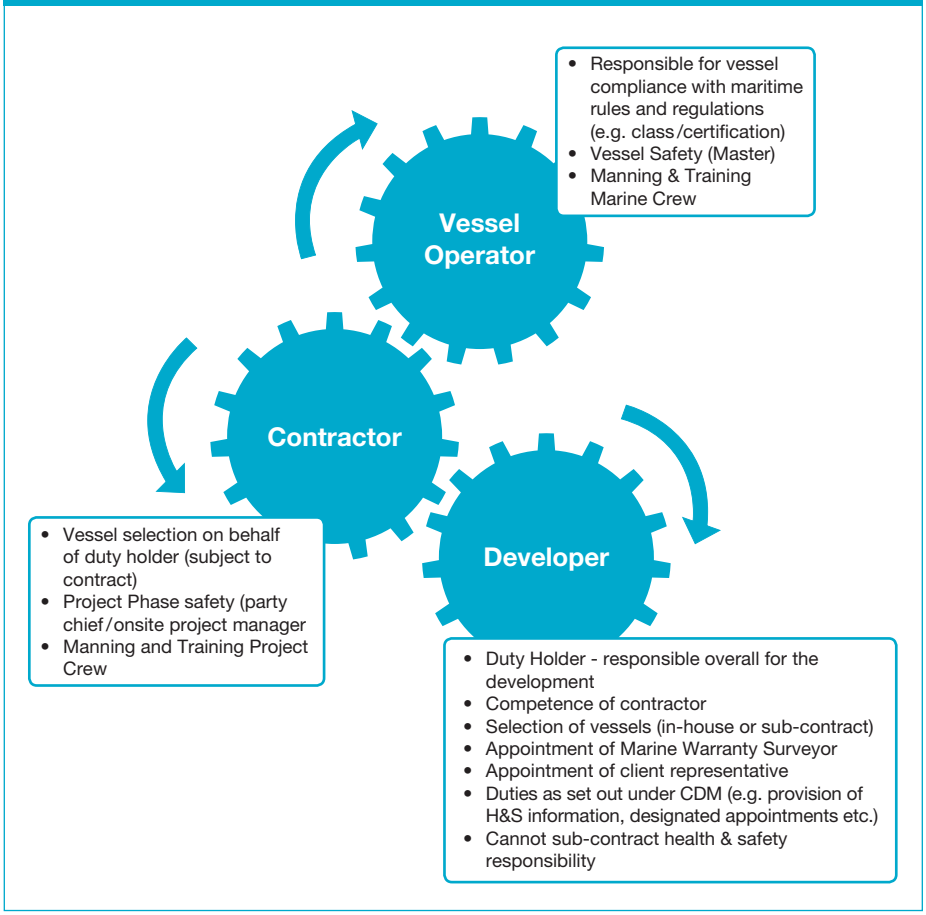
- Should bridge between the contractor's (project) and charterer's (vessel) systems;
- Ensures safe practices are implemented, understood by project and marine crews and are auditable;
- Clearly identifies Emergency Response actions and procedures;
- Clearly identifies incident reporting and recording processes;
- Aligns the systems to a level appropriate to the activity;
- Identifies and resolves areas of confusion;
- Ensures project and marine crew's roles and responsibilities, particularly in the event of an accident, are fully understood;
- Is to a level of detail appropriate to the vessel and the activity.

## 1.3 Role and Responsibilities - Vessel

Ultimately the Master of the vessel is responsible for the safety of the vessel, its crew, and all other personnel on the vessel and will always have overriding authority. However the Master will need to liaise closely with the project leader on the vessel to gain full understanding of the activity and any constraints on the vessel.

- Roles and responsibilities should be clearly defined in the Safety Management System;
- Any person involved in the activity or seeing an unsafe situation should be able to request the operation is immediately stopped if they consider it is unsafe to continue.
- Management should support calls to stop the activity on grounds of safety.

**Figure 2: High Level Summary of Responsibilities –** Those involved in ensuring the selection of a *fit for purpose* vessel whilst acknowledging there may be overlaps.




## 1.4 Roles and Responsibilities - Organisational

The responsibilities of the various organisations involved are potentially complex and vary between developers and their various contractors. A general overview of typical areas of responsibility is summarised in Figure 2.

## 1.5 Training and Competence

On the selected vessel two groups of people need to be considered:

- Marine Crew – The normal vessel crew who as seafarers will have certification to prove their competencies in line with the appropriate maritime rules and regulations.
- Project Crew – Personnel on the vessel to conduct specific tasks related to the activities being undertaken to develop, construct, operate or maintain the energy development. Their areas of expertise will be related to their work and they are considered to have minimal direct maritime experience unless they have fulfilled the required role previously. Project crew may be considered passengers or special personnel as described in MGN 390(M).
- Marine and Project crew competencies should be identified and confirmed appropriate to the type of vessel selected and the activity to be carried out.

### 1.5.1 Marine Crew

Dependent on the type of vessel and other factors, such as distance from safe haven / shore and crew manning requirements for extended operations, the marine crew should be trained to meet the requirements of either:

- International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW); **or,**
- RYA certificates with commercial endorsement appropriate to the vessel type (may have limitations which need to be considered); **or,**
- Equivalent approved by UK Flag authority (MCA).

**Figure 3: Summary of training requirements Masters/Skippers for various vessel types**

| Jack-ups (non-self propelled) | Vessels <24m on load line length | Vessels >24m on load line length <500gt | Vessels >500gt |
|---|---|---|---|
| - No formal training recognised<br>- International Jack-up Barge Owners Association advises on qualifications and competence – Green & Red log books | - RYA Skipper + commercial endorsement<br>- STCW<br>- Demonstration for both is certification and log books | - STCW<br>- Demonstration is by certification and log books | - STCW<br>- Demonstration of compliance by log books |

### 1.5.2 Project Crew

Project Crew training should be based on risk assessment of the activity to be carried out, company policy and any project specific requirements. The following is an indicative summary:

- Specialist training in their particular areas of expertise appropriate to the activity.
- Marine safety training either:
  - RenewableUK - Marine Safety Training (MST); **or,**
  - STCW Personal Survival Techniques (PST); **or,**
  - Basic Offshore Safety Induction and Emergency Training (BOSIET).
- Safety Induction Training on joining the vessel covering the requirements of MCA - Marine Guidance Notes MGN 390 (M) or 120(M) which broadly covers:
  - Being able to communicate with other persons on board on elementary safety matters and understand safety information symbols, signs and alarms.
  - Actions to take in emergencies (e.g. man overboard, fire, raising alarms and reaction to alarms sounding, donning life jackets, accidents or medical emergencies operation of safety equipment).
- Regular refresher training to maintain awareness and standards.
- Project crews to participate in vessel musters and drills to demonstrate their understanding of emergency duties, alarm systems and all lifesaving and fire fighting equipment and their roles is appropriate.

(Note: The suitability of the marine training should be checked against the scope of the applicable standard/course and the requirements for the project/ activity being performed.)

### 1.5.3 Common Training

Additional specialist training should be provided for either the marine or project crew depending on the activities being undertaken and who is responsible for operating the equipment such as:

- Manual handling;
- Lifting;
- Crane or winch control;
- Working at height and rescue training.

The training requirements should be based on risk assessment and a Training Needs Analysis as appropriate to carry out the activity.

## 1.6 Medical Training

In the event of an emergency when operating further from shore where it can take a long time to return to harbour or to receive medical assistance from other sources, suitably trained persons should be available. The following are examples of appropriate medical training:

- Masters of Workboats coded to operate in Area category 0, or those vessels over 500gt should have the MCA Proficiency in Medical Care (MGN 96(M)) (formerly Captain's Medical) and a copy of "The Ships Captain's Medical Guide"; **or,**
- Masters of most other coded vessels should have the Proficiency in Medical First Aid certificate (formerly the First Aid at Sea certificate); **or,**
- RYA skippers should have Advanced First Aider training.

In addition to the above risk assessment, the number of persons and the risk profile may indicate additional persons should be trained in the following:

- Proficiency in Medical First Aid (Formally First Aid at sea); or,
- Offshore First Aider level training (Offshore First –Aid Certificate); or,
- Offshore Medic level training (Offshore Medic Certificate).

## 1.7 Medical Certification

- Marine crew should already hold certification appropriate to the type of vessel to meet MCA and/or STCW requirements such as:
- ENG 1 Seafarer Medical Certificate – legally required by Master of small commercial vessels certified for Area Category 1 or 0 (more than 60 miles from a safe haven); **or,**

- ML5 Medical Report and Certificate - legally required by Master of small commercial vessels certified for Area Category 2 to 6 (no more than 60 miles from a safe haven) and crew members whose normal place of work is on board a vessel which goes to sea; (Note: ML5 may not be considered sufficient for work further offshore); **or,**
- Seafarer Medical Certificates accepted by the MCA MSN 1815 (M) list of countries whose certificates as equivalent to ENG1.

Project crew should have medical certificates to confirm fitness to work offshore either:

- Medicals carried out in accordance with The RenewableUK Medical Fitness to Work Guidelines for near offshore and land based renewable energy projects; **or,**
- Oil & Gas UK (OGUK) offshore medical (formerly United Kingdom Offshore Operators Association (UKOOA) medical certificate); **or,**
- Certificates accepted as part of the North Sea mutual recognition agreement with OGUK as being equivalent; **or,**
- Other medical certificates accepted as part of the North Sea mutual recognition agreement with OGUK.

## 1.8 Simultaneous Operations (SIMOPS)

Several activities may be underway depending on the phase of the developments lifecycle e.g. bird and mammal surveys continue after the development phase to monitor the effects in the longer term.

The potential exists for conflicting activity requirements and the possibility of many vessels operating in close proximity. This gives rise to the potential for accidents to occur and the need for this to be reduced by hazard identification (HAZID), risk assessment and careful management.

A marine coordinator should be appointed to manage vessel traffic and emergency response activities in the event of an incident. A marine coordinator is a requirement of an Emergency Response Co-operation Plan (ERCoP) which is a requirement of the operation phases of a development but may also be required during the development phase if other activities are being carried out concurrently as appropriate and agreed with the MCA (MGN 371). IMCA M 203 gives further guidance on SIMOPS.

## 1.9 Sea State / Weather Factors

Consideration of prevalent weather, sea conditions and other metocean data are essential in order to carry out activities in a safe manner therefore:

- The weather limitations of the activity need to be determined taking into account the site and duration of the work;
- The selected vessel must be capable of operations within the expected prevalent conditions with a safety margin to allow for changes in environmental conditions;
- The assessment of weather conditions should include the time to transit to/ from the site and distance from a safe haven;
- A common understanding of the limitations of the vessel between all parties is essential;
- Site specific and up to date weather forecasts need to be reviewed to allow planning of the operation;
- Local weather, wind, tide and sea state characteristics and other applicable metocean data must be taken into account at the time of carrying out the activity;
- Local conditions should dictate when operations are safe to continue;
- The environmental conditions should be below the limits set within the risk assessment and procedures for the activity.

## 1.10 Health and Safety

A detailed consideration of occupational health and safety risks are outside the main scope of these guidelines. However these must be taken into account as part of the wider health and safety management systems and arrangements operated by the developer, contactors and others where applicable. Primary reference should be made to the relevant legislation and guidance (e.g. HSE, MCA) as they relate to the foreseeable health and safety risks for the project or activity being undertaken. Occupational health and safety risks that are likely to be of particular relevance to the selection and operation of vessels would include but are not limited to:

- Working at height
- Confined and restricted working spaces
- Electrical & mechanical risks
- Manual handling
- Lifting
- Health & well-being (e.g. fatigue, comfort)
- Noise
- Vibration (e.g. whole body vibration (WBV)

In every situation suitable and sufficient risk assessments will need to be performed and effective controls put into place that reduce risks to as low a level as reasonably practicable. Further details are set out the in the reference documents below as well as via the HSE (http://www.hse.gov.uk/) or the MCA (http://www.dft.gov.uk/mca/). It should be emphasised that the risk assessments should not only take account of the direct risk of injury or harm of the associated activity/task but also the foreseeable consequential risks. For example marine and project crew on small vessels could be exposed to the risk of injury arising from whole body vibration or severe shock as a result of impacts (See MGN 436 (M+F)). In addition the consequential risks associated with vibration may cause fatigue, discomfort (e.g. sea sickness) which may impact on capability and safety.

# 2. VESSEL SELECTION – REGULATORY ASPECTS

## 2.1 Regulatory Bodies

Responsibility for health and safety regulation of the offshore renewables industry in the UK resides predominantly between the Maritime and Coastguard Agency (MCA) and the Health and Safety Executives of Britain (HSE) (Includes Northern Ireland (HSENI)).

As a "rule of thumb", if it floats it is regulated by the MCA, if it is fixed to the seabed (on the UK continental shelf) it is regulated by the HSE. A Memorandum of Understanding (MoU) has been agreed between the MCA/HSE/Marine Accident Investigation Branch (MAIB) to help ensure effective co-ordination between the organisations. The table summarises the key regulatory bodies' responsibilities.

Accident reporting should be carried out in accordance with Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) and may involve the MAIB if related to marine operations and/or HSE if project related or where there is conflicting interests when a joint HSE/MAIB approach may be appropriate.

| | |
|---|---|
| MCA | The MCA is responsible for enforcing all merchant shipping regulations in respect of occupational health and safety, the safety of vessels, safe navigation and operation (including manning levels and crew competency). Merchant shipping health and safety regulations extend to all those working on the ship, and all shipboard activities carried out by the crew under the control of the ship's Master. |
| HSE | Statutory body whose main function is to make arrangements to secure the health, safety and welfare of people at work and to protect the public from dangers arising from work activities. The HSE's statutory powers and responsibilities are derived from the Health and Safety at Work etc. Act 1974 (HSWA) and associated relevant statutory provisions including the Docks Regulations 1988 and other related legislation. |
| IMO | Primary purpose of the International Maritime Organisation (IMO) is to develop and maintain a comprehensive regulatory framework for shipping which includes safety, environmental concerns, legal matters, technical co-operation, maritime security and the efficiency of shipping. Examples include but are not limited to:<br>• International Convention for the Safety of Life at Sea (SOLAS).<br>• International Regulations for Preventing Collisions at Sea (COLREG)<br>• International Convention for the Prevention of Pollution from Ships (MARPOL). |
| Flag States | Implement treaties including those of the IMO to which they subscribe into National legislation. In the UK this role is carried out by the MCA |
| Port States | Port State Control (PSC) is the inspection of foreign ships in national ports to verify that the condition of the ship and its equipment comply with the requirements of international regulations and that the ship is manned and operated in compliance with these rules. |

## 2.2 Certification

Selection of a suitable vessel that is safe and Fit for Purpose for its intended activity needs to take into account the regulations to which the vessel is built, maintained and operated. Regulatory requirements cover a number of aspects including:

- Flag and classification society requirements;
- The number of marine and non-marine crew on-board;
- Level of crew training and competence.

The table (right) summarises key factors for various regulatory regimes.

| Regulatory Regime | Critical Factors |
|---|---|
| Either "SVC Code MGN 280(M) or one of the existing Codes of Practice, (e.g. Work-boat & Pilot Boat Code) | ≤ 12 passengers<br>< 24m Load Line Length<br>Service Restrictions Apply |
| High Speed Code | >12 Passengers<br>Service Restrictions Apply |
| UK MCA Passenger Ship Regulations and EU Directive 98/18/EC Safety rules and standards for passenger ships (EU Pass) | >12 Passengers<br>Service Restrictions Apply |
| SOLAS / SPS (International Conventions) | > 500 GT<br>Does not account for ferrying operations |

* See MCA Operational Advice Note 411 for detailed interpretation of regulations for <24m vessels.

It should be noted that some vessel types such as Jack-ups which are not powered and fishing vessels may come under different regulations. In the case of Jack-ups, those listed right are applicable, however the list is not exhaustive:

The vessel selected should meet the following broad regulatory factors:

- Vessels above convention size (>500GT) require classification and flag state certification; **or,**
- Vessels below convention size, may not have class certificates, and should be built to UK national standards such as the MCA's Codes of Practice for Small Commercial Vessels (SCV); **or,**
- Non – UK flagged vessels built to standards acceptable to the MCA for operation in UK waters.

Jack-up vessels should comply with the applicable rules dependent on their configuration.

| Regulatory Regime | Critical Factors |
|---|---|
| SOLAS (International Conventions)<br>MODU Code<br>Classification Society rules | Permanently manned* jack–ups with certified accommodation* |
| SOLAS (International Conventions)<br>Classification Society rules | Permanently manned* jack–ups over 24m |
| SCV Code (MGN 280); or,<br>Equivalent Flag state rules; or,<br>Classification Society rules | Unmanned jack-up, not fitted with certified accommodation* and < 24m Load Line Length |
| SOLAS / SPS (International Conventions) | > 500 GT<br>Does not account for ferrying operations |

* Terms as defined in *BWEA Guidelines for the Selection and Operation of Jack-ups in the Marine Renewable Energy Industry*

## 2.3 Vessel Selection

A vessel that is deemed Fit for Purpose for offshore renewable projects will be influenced by a number of operational factors including but not limited to:

- Type, frequency, scale and complexity of the activity;
- Equipment and personnel required to be carried;
- Station keeping requirements;
- Area of operation;
- Number of project crew;
- Vessel endurance / time offshore;
- Crew comfort factors e.g. fatigue, vibration, and other occupational health aspects.
- Transit times;
- Sea, tide and wind operational limits.

The above information is often provided in a method statement detailing the schedule of work required. This can also be used during a vessel audit including a Marine Warranty Survey to ensure the vessel selected can achieve the requirements of the activity.

Figure 4 outlines an example that demonstrates some of the considerations required for selecting a type of vessel for the activity based on legislative requirements. It should be noted that this is not exhaustive and other regulations and codes may be appropriate for other vessel types e.g. use of fishing vessels, workboats and jack-ups.

## 2.4 Audit

Once a vessel type and operational parameters are known, it is important to ensure potential vessels and the vessel operators are audited to confirm:

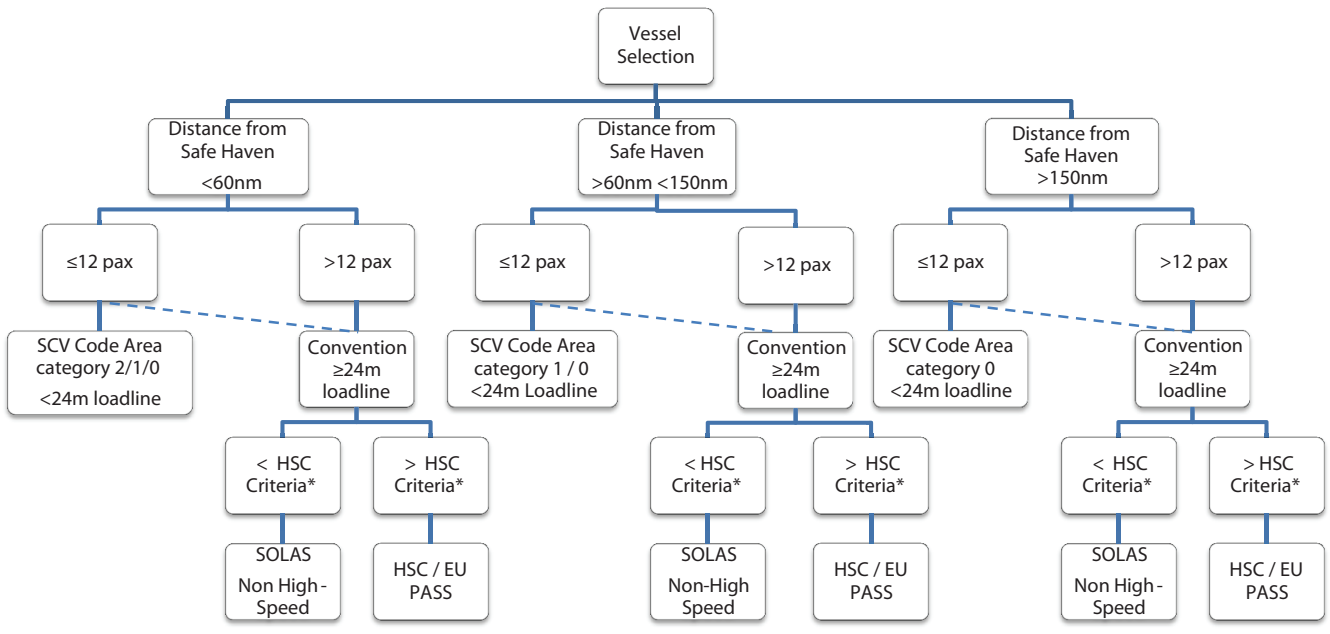
- They are Fit for Purpose;
- Meet all the necessary legislative requirements and any additional requirements of the developers or vessel operators to enhance safety;
- Class and flag certification is in place and current, including for installed equipment;
- Equipment has been installed correctly to accepted standards and is Fit for Purpose;
- Safety Management Systems/plans comply with legislative requirements;
- Vessel and office practices are consistent.

This should be through established competent organisations or persons within the developer's (or their contractors) own organisation with suitable marine experience e.g. trained marine surveyors and warranty surveyors.

Examples of audit standards which may be appropriate include:

- International Marine contractors Association's (IMCA) Common Marine Inspection Document (CMID);
- Oil Companies International Marine Forum's (OCIMF) Offshore Vessel Inspection Database (OVID) and associated Questionnaire (OVIQ).

**Figure 4: Consideration when determining the appropriate certification for a vessel**




* HSC Criteria
"High-speed craft" is a craft capable of maximum speed, in metres per second (m/s), equal to or exceeding: $3.7\ \nabla^{0.1667}$ (m/s) (expressed in knots = $7.192\ \nabla^{0.1667}$ (kts) Where $\nabla$ = displacement corresponding to the design waterline ($m^3$).

Note: Dotted lines indicate where alternative options can be taken.

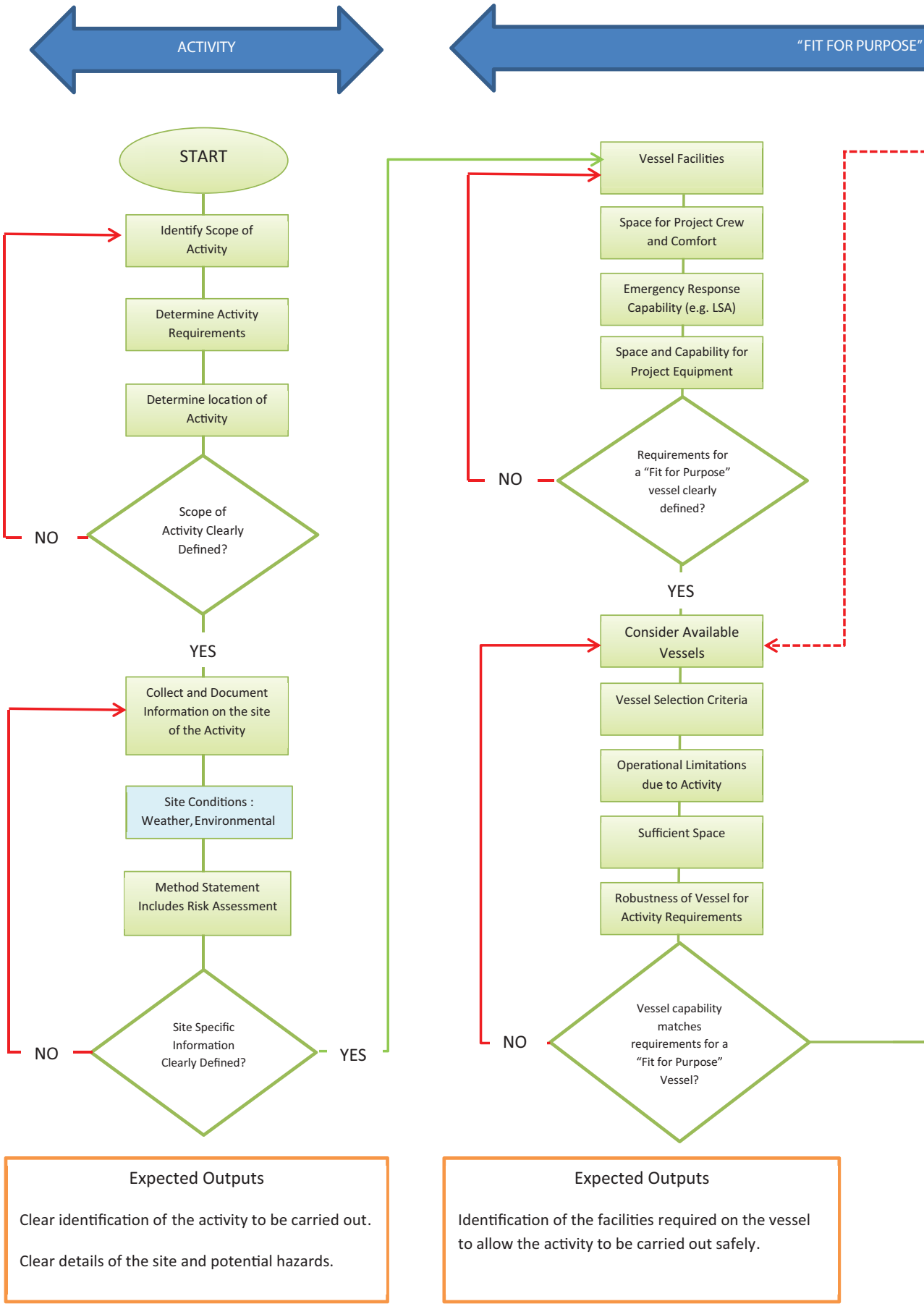
# 3. SUITABILITY ASSESSMENT WHEN SELECTING A VESSEL

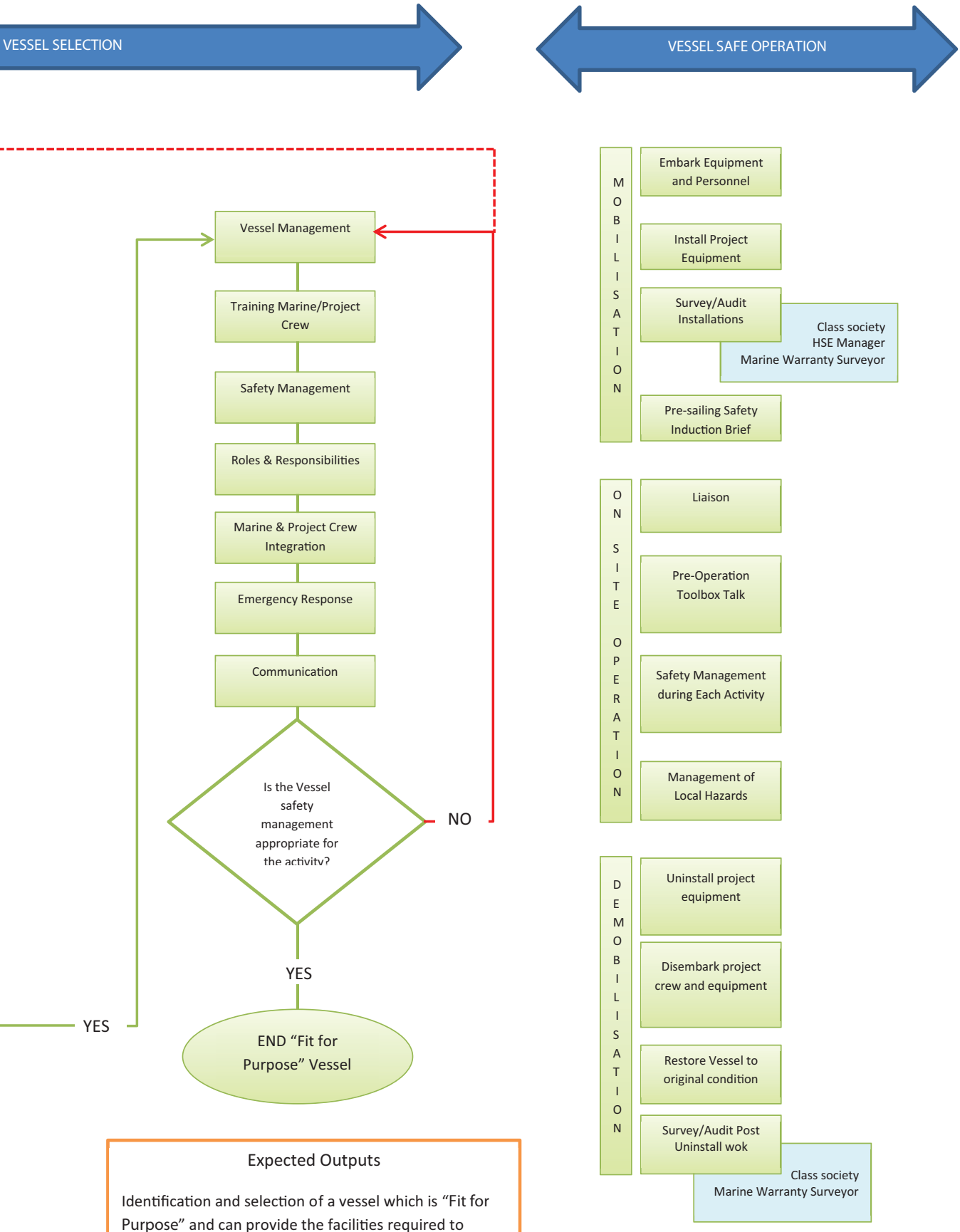
There are a number of significant factors which should to be considered when selecting a vessel which is safe and Fit for Purpose. These factors have been grouped into six key areas which should be considered in order to determine if a vessel can be considered Fit for Purpose and are as follows:

- **Activity to be carried out** –The starting point in selecting a safe and Fit for Purpose vessel is to identify and clearly understand the activity the vessel is required to carry out.
- **Site information** – The area where the activity will be carried out needs to be identified and information provided proportionate to the activity being performed and the foreseeable conditions and risks both to assist vessel selection and also to advise vessel audit/survey teams (e.g. warranty surveyor) to ensure they can take this into account to help ensure the selected vessel is Fit for Purpose.
- **Vessel facilities** – These will be required to meet the needs of the marine and project crew and to provide the operating platform for the equipment required for the activity and the vessels suitability to deal with possible emergency situations. Not all are directly safety related, but they will all have some impact. For example, poor accommodation affects personnel by increasing fatigue and whole body vibration and causes discomfort (e.g. sea sickness) which impacts on capability and safety.
- **Vessel selection criteria** – Factors which may affect or impinge on the vessel capability should be managed to ensure the vessel selected remains Fit for Purpose in any conditions it can reasonably be expected to encounter whilst carrying out the activity.
- **Vessel Management** – Management of the vessel and the personnel who live and work aboard are key safety drivers to ensure the continued safety and the capability to remain on task. Good communication is vital for the marine and project crew to ensure they have a common understanding and productive working relationship.
- **Mobilisation and Demobilisation** – Addresses the installation and removal of equipment needed to carry out the activity on the selected vessel which has a significant potential safety impact on the vessel and the installation/removal personnel.

A process flowchart is provided on pages 12 & 13 which gives an overview of the complete selection process whilst further details on the factors which should be considered at each stage are provided on pages 14 & 15. The information provided is not exhaustive, therefore developers and their contractors must ensure a risk assessment is carried out for each activity and an appropriate vessel(s) selected.

**Figure 5: "Fit for Purpose" Vessel Selection Process**

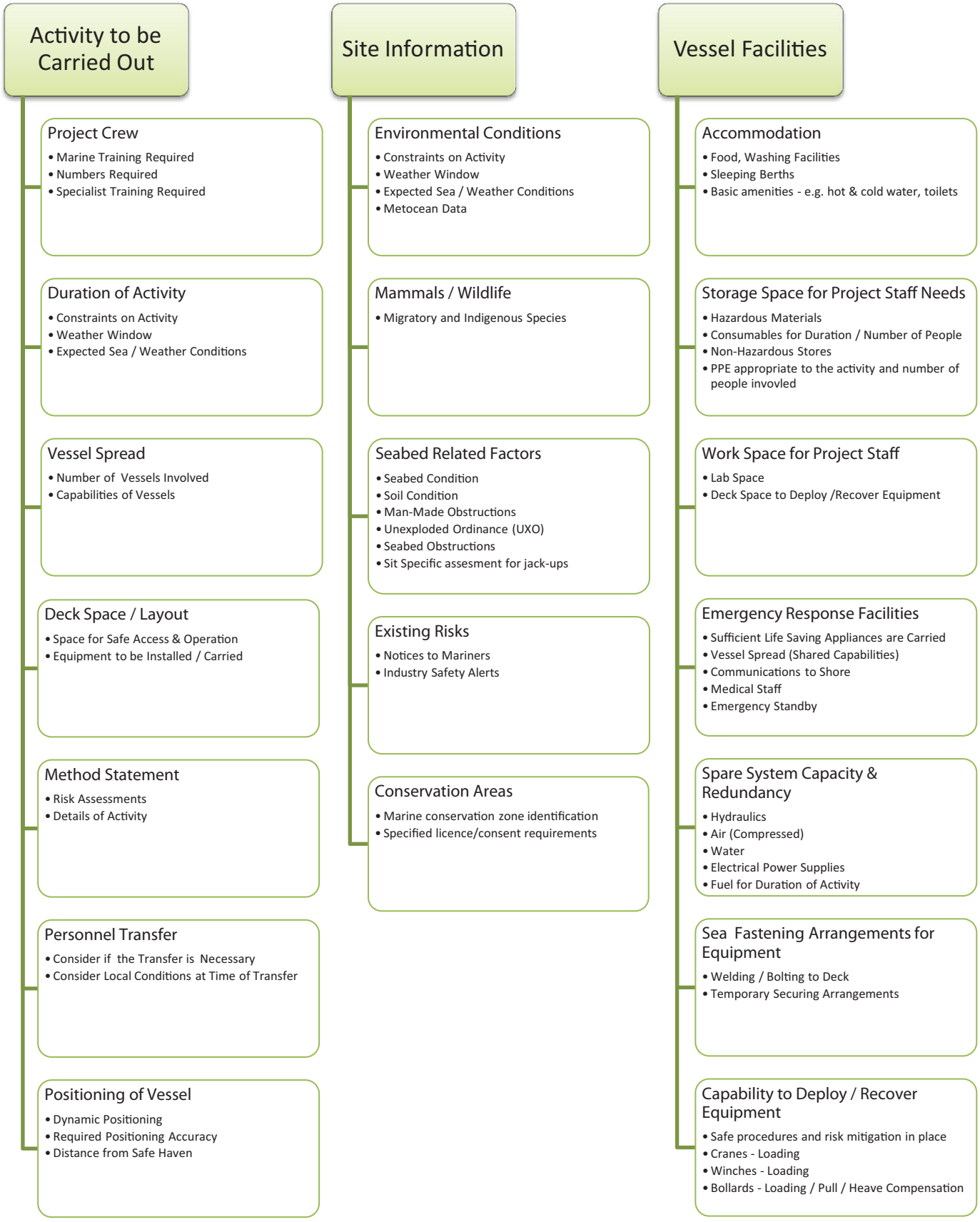





**Expected Outputs**

Identification and selection of a vessel which is "Fit for Purpose" and can provide the facilities required to ensure the activity can be carried out in a safe manner.

**Figure 6: Vessel Selection Factors to Consider**



## Vessel Selection Criteria

### Stability
- Effect of Additional Equipment Installation
- Effect of Installed Equipment Operation

### Operational Limitations due to Activity
- Capacity for Fuel to Stay on Station
- Interface Issues - Vessel to Project Equipment
- Interface Issues - Vessel to Activity
- Ability to Hold Position and/or Track

### Sea Keeping Ability
- Station Keeping Capability
- Prevelant Weather / Sea Conditions

### Structural Strength
- Effect on Structure of Operation of Installed Equipment
- Deck Strength for Installation of Equipment
- Prevalant Weather / Sea Conditions

### Spatial Constraints
- Facilities
- Exclusion Zones
- Access
- Deck Space

### Environmental Impact
- Emissions
- Accidental Pollution

### Noise / Vibration Levels
- Comply with the Regulations
- Potential Impact on Wildlife

## Vessel Management

### Training
- Marine Crew Training
- Induction Brief on Activity for Marine Crew
- Project Staff Marine Training
- Induction Brief for Project Staff on Joining Vessel

### Communication
- Good Communication Between the Marine and Project Crews is Essential
- Clear Communication Between Vessel and Shore Authorities

### Vessel Safety Management System / Plan
- ISM / SOLAS
- Risk assessment
- Safe procedures
- Emergency procedures
- Mitigation

### Project Health & Safety Plan
- HSE / CDM
- Risk assessment
- Safe Procedures
- Emergency procedures /ERCoP
- Mitigation

### SMS Bridging Document
- Should Clarify Differences Between Vessel SMS and Project H&S Plan
- Clarify when ISM / CDM applies
- Ensure Clear Understanding Between Marine Crew & Project Staff
- Emergency Response for Own Vessel and for Other Vessels

### Clear Roles & Responsibilities
- Identification of who Operates Equipment Marine and/or Project Crew
- Master & Project Staff Lead

### Project Staff Integration
- Liaison Between Master and Project Staff Lead / Company Representative

## Mobilisation & mobDisation

### Access
- To/From Quayside for Personnel, Ease and Method (e.g. Ladders)
- Around Equipment When Installed

### Conditions
- Weather
- Tide

### Installation or Removal
- Welding
- Bolting
- Sea Fastenings
- Hot Working (Fire Hazard)
- Lifting

### Crew Concerns
- Fatigue (Early / Late Arrival Departure Particularly at End of Activity)

### Space
- Sufficient Deck Space for Required Equipment Layout & Safe Access to Operate

# 4. END OF CONTRACT / PROJECT REVIEW

Following demobilisation it is good practice for all parties concerned to take the opportunity to review and share relevant experiences and lessons learned arising from the project or activities undertaken. These could cover but are not limited to:

- Feedback on any incidents/near misses;
- Unexpected/unforeseen conditions or events;
- Adequacy of:
  - Pre-contract information and project scope
- Activity/site/vessel
  - Training
  - Supervision
  - Communications
  - Vessel management
  - Procedures
- Suitability of vessel & facilities for project activities actually carried out;
- Suitability of equipment for project activities actually carried out;
- Any recommended actions to consider for future projects.

Conclusions and actions arising out of the review should be shared and communicated between the relevant parties concerned. It is also encouraged that good practice and “lessons learned” experiences that may be identified are shared more widely via relevant industry working groups, reporting schemes and other forums.

# 5. ABBREVIATIONS/GLOSSARY

| | |
|---|---|
| **BOSIET** | Basic Offshore Safety Induction and Emergency Training |
| **CDM** | Construction (Design and Management) Regulations |
| **CDMC** | Construction (Design and Management) Regulations Coordinator |
| **Class / Classification** | Classification Society verification that technical standards for the design, construction and operation of vessels are met and maintained. |
| **CMID** | Common Marine Inspection Document |
| **COWRIE** | Collaborative Offshore Wind Research into The Environment |
| **DP** | Dynamic Positioning |
| **EC** | European Commission |
| **EU** | European Union |
| **ERCoP** | Emergency Response Co-operation Plan |
| **HSC** | High Speed Craft |
| **HSE** | Health and Safety Executive |
| **HSENI** | Health and Safety Executive Northern Ireland |
| **IJUBOA** | International Jack-up Barge Owners Association |
| **IMCA** | The International Marine Contractors Association |
| **IMO** | International Maritime Organization |
| **ISM** | International Safety Management |
| **LOLER** | Lifting Operations and Lifting Equipment Regulations |
| **MAIB** | Marine Accident Investigation Branch |
| **MCA** | Maritime and Coastguard Agency |
| **MGN** | Marine Guidance Notices |
| **MIN** | Marine Information Notices |
| **MSN** | Merchant Shipping Notices |
| **MST** | Marine Safety Training |
| **OCIMF** | Oil Companies International Marine Forum |
| **OVID** | Offshore Vessel Inspection Database |
| **OVIQ** | Offshore Vessel Inspection Questionnaire |
| **Port State** | In the UK this is the MCA |
| **PST** | Personal Survival Training |
| **PUWER** | Provision and Use of Work Equipment Regulations |
| **REZ** | Renewable Energy Zone |
| **RIDDOR** | Reporting of Injuries, Diseases and Dangerous Occurrences Regulations |
| **RUK** | RenewableUK |
| **SCV** | Small Commercial Vessels |
| **SIMOPS** | Simultaneous Operations |
| **SMS** | Safety Management System |
| **SOLAS** | Safety of Life at Sea |
| **SPS** | Special Purpose Ship |
| **STCW** | Standards of Training, Certification and Watchkeeping |
| **UKOG** | Oil & Gas UK |
| **UKOOA** | United Kingdom Offshore Operators Association (now UKOG) |
| **UXO** | Unexploded Ordinance |
| **WBV** | Whole Body Vibration – The effects upon the body of prolonged vibration and/or impacts |

# APPENDIX I: ACTIVITY SPECIFIC FACTORS

This appendix discusses general factors associated with specific activities which may impact on vessel safety. The examples provided are not exhaustive. These factors, which all relate to either the capability of the vessel or specific hazards, should be considered when selecting vessels to ensure that as far as reasonably practicable the vessel is safe and Fit for Purpose. These activities are not an exhaustive list and risk assessment should be carried out to determine any specific requirements prior to commencing the activity.

**Onsite Operations**

This relates to all activities carried out by the marine and project crews to achieve the aims of the activity for which the vessel has been selected in a safe manner.

- Deployment of equipment including lifting activities must be risk assessed and appropriate mitigations instigated;
- Vessel manoeuvrability may be compromised during equipment deployment, recovery or operation. If towing is required, the Master must take this into account and discuss with the project crew leader;
- Other vessels may be operating in the same area therefore marine coordination between vessels must be undertaken to an appropriate level;
- All marine and project crew must be made aware of any access restrictions whilst operations are underway;
- The installed equipment will add occupational hazards which are additional to the normal hazards found on the vessel. Marine and project crew must be made aware of any issues;
- To operate equipment, lifting and movement of equipment may be required. These must be managed effectively and carried out by suitably qualified and experienced personnel;
- The installed equipment and the activities being carried out may impact on the vessel operation. Therefore, the Master and the project crew leader must liaise closely to mitigate any hazards. These should be identified at an early stage and be addressed in the safety documentation;
- Toolbox talks should be carried out prior to any operation to ensure all those involved are aware of what is being carried out and what the hazards are particularly taking into account local conditions.

**Bird, Fish and Mammal Survey Specific**

These monitor the trends in populations in order to establish the risks and assess the potential impacts an offshore development will have on the marine population at the site.

- Survey requires working at minimum working eye height of 5m therefore safe access to/from the survey position must be provided;
- Safe and secure seating for seabird surveys to avoid the need to stand and attempt to hold binoculars and other equipment for long periods;
- Survey positions should be located so that there are no radiation effects from the vessels transmitters (e.g. Radars);
- Protection from adverse weather conditions must be provided (e.g. heat/cold/wind/spray);
- Vessel manoeuvrability may be constrained when trawls/towed equipment are deployed.

**Benthic Survey Specific**

This involves an investigation of the seabed environment by visual exploration and sampling to establish the existence and quantity of any sensitive and important benthic species.

- Hazardous (toxic) material may be recovered by grabs or required for sampling (including radioactive) therefore appropriate precautions should be implemented;
- Toxic substances are used to preserve samples (e.g. formaldehyde) or to clean equipment hence risk assessment should be carried out to ensure sufficient ventilation in the work area and PPE is provided;
- Site assessment should consider the potential presence of Unexploded Ordinance (UXO) which may be caught in trawls/grabs and precautions instigated;
- Vessel manoeuvrability may be constrained when trawls/towed equipment are deployed.

**Vessel Traffic Survey Specific**

The Vessel Traffic Survey is required to monitor the vessel traffic and routing in the area of interest.

- Equipment installed to carry out the vessel traffic survey must not affect the operation of the existing vessel's navigational safety requirements (e.g. loading on signal line, mutual interference, electromagnetic capability (EMC).
- Manoeuvring may be limited during survey, but should be managed by the vessel's Master in consultation with the project/survey crew leader.

**Geophysical Survey Specific**

The survey purpose is to establish sea floor bathymetry, sea bed features, water depth as well as identifying hazardous areas on the seafloor to give a good understanding of the seabed and any subsea features.

- During operations vessel manoeuvrability will be limited due to towed equipment and will require appropriate precautions to be implemented by the vessel's Master to avert collisions and/or close quarter situations;
- If crew transfers are required appropriate precautions should be taken (see Crew transfer activity);
- Installed equipment must be actively managed and both the vessel and project crew made aware of constraints and hazards associated with its location, operation, access restrictions and operational limitations imposed on the vessel.

**Geotechnical Survey Specific**

This survey obtains information on the physical properties of soil and rock underlying (and sometimes adjacent to) a site where a foundation is proposed to be built. It includes surface and subsurface exploration of a site and usually involves in-situ testing, subsurface sampling and laboratory testing.

- Notices to Mariners should be posted prior to commencement of operations;

- During operations vessel manoeuvrability will be limited due to requirement to remain stationary. Appropriate precautions need to be implemented to avert collisions and/or close quarter situations;
- Vessel stability must be assessed and approved prior to carrying out the operation due to use of drilling equipment via a moon pool, or cantilever arrangement over the side;
- Provision should be made for the collection (planned or accidental), management & storage of hazardous materials;
- Site assessment should consider the potential for encountering shallow gas and mitigation measures implemented where necessary;
- Site assessment must consider the seabed composition (prevention of jack-up leg “punch through”) and potential presence of navigational hazards and obstacles (e.g. cables, outcrops, pipelines and wrecks);
- Site assessment should consider the potential presence of Unexploded Ordinance (UXO) which may be caught in towed equipment or struck during drilling and precautions instigated.

**Installation of Meteorological and Oceanographic Equipment Specific**

This activity is to monitor and analyse meteorological and oceanographic conditions at the site which is vital in the development of any offshore energy project.

- Vessel specific risk assessment and procedures need to be developed for deployment and recovery of equipment;
- Lifting arrangements on the buoys shall be assessed especially for recovery when the buoy has been exposed to seawater for a long time;
- Recovery of equipment is hazardous to the vessel as wires/ropes may become entangled with the propeller;
- Hazards associated with the deployment and recovery of equipment relates to deck space to operate equipment safely and potential limitations on vessel traffic in the area;
- Vessel stability must be assessed and approved prior to carrying out the operation when deploying/recovering equipment over the side.

**Crew transfers and service vessels**

It is considered good practice to avoid any ship to ship transfer of personnel whilst at sea. Ideally transfers should be carried out with the vessel berthed alongside.

- When ship to ship transfers are unavoidable, these should be undertaken following a risk assessment and in accordance with MCA guidance MGN 432 (M+F) - Safety during Transfers of Persons to and from Ships. This also refers to SOLAS - Chapter V Safety of Navigation, Regulation 23 Pilot transfer arrangements;
- Clear briefings must be given before the activity and these should be based on a current risk assessment and take into account the local conditions at the time of transfer;
- Transfers must only be carried out using “man-riding” approved and certified equipment.

# APPENDIX II: REFERENCE DOCUMENTS

**Health and Safety**

- Health and Safety at Work etc. Act 1974 (HSWA), HSE, 2006
- Management of Health and Safety at Work Regulations 1999
- The Construction (Design and Management) Regulations 2007 (CDM), HSE, 2007
- Lifting Operations and Lifting Equipment Regulations (LOLER), HSE,1998
- Manual Handling Operations Regulations 1992 (as amended)
- Merchant Shipping and Fishing Vessels (Health And Safety At Work) Regulations 1997
- Merchant Shipping and Fishing Vessel (Manual Handling Operations) Regulations 1998
- Merchant Shipping and Fishing Vessel (Lifting Operations & Lifting Equipment) Regulations 2006 to 2008
- The Merchant Shipping and Fishing Vessels (Control of Vibration at Work) Regulations 2007
- The Merchant Shipping and Fishing Vessel (Control of Noise at Work) Regulations 2007
- Control of Substances Hazardous to Health Regulations (COSHH), HSE, 2002 (as amended)
- Provision and Use of Work Equipment Regulations (PUWER), HSE, 1998
- The Work at Height Regulations, HSE, 2005
- Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR ), HSE, 1995
- Diving at Work Regulations, HSE, 1997

- BS 7121-11: 1998 Code of Practice for Safe use of Cranes. Offshore Cranes
- HSE - Technical guidance on the safe use of lifting equipment offshore - HSG221
- HSE - Guidance on Procedures for the Transfer of Personnel by Carriers

- MGN 20 (M+F) Implementation of EC Directive 89/391 – Merchant Shipping and Fishing Vessels (Health And Safety At Work) Regulations
- MGN 436 (M+F) Guidance on Mitigating Against the Effects of Shocks and Impacts on Small Vessels.
- MIN 436(M + F) Code of Practice for Controlling Risks due to Whole-body Vibration on ships
- Guidelines for Onshore and Offshore Wind Farms, Health & Safety in the Wind Energy Industry Sector, RenewableUK, 2010
- Guidelines for Health and Safety in the Marine Energy Industry, British Wind Energy Association (BWEA), 2008
- RenewableUK Working at Height & Rescue Training- Wind Turbines (WAHR)

- The International Jack up Barge Owners Association (IJUBOA) Code of Practice, 2011
- IMCA M 187 Guidelines for lifting operations
- DNV “Rules for Planning and Execution of Marine Operations”
- ISO 31000 Risk Management Principles and Guidelines
- ISO / IEC 31010 Risk management - Risk assessment techniques

**Marine Training for Project and Marine Crew**

- Standards of Training, Certification and Watchkeeping for Seafarers (STCW), IMO
- Personal Survival Training (PST), STCW

- MGN 120(M) - Safety Training for Concessionaires Working on Passenger Ships, MCA
- MGN 280/MIN173 - RYA Certificates of Competence
- Basic Offshore Safety Induction and Emergency Training (BOSIET)
- RenewableUK Marine Safety Training (MST)

- IMCA S&L 003 - The Initial and refresher Familiarisation of Vessel Crews
- IMCA SEL 007 - Basic Safety Training and Vessel Induction for Non-Marine Personnel Working Offshore
- Best Practice Guide for Offshore Energy Service Vessel Crews, (Draft), National Workboat Association
- IJUBOA - Official Barge Training Log Book – the “Red Book”
- IJUBOA - Specific & Practical Skills for a Jack-up Barge Master - TO6
- IJUBOA - Barge Master Training Disciplines - T06
- IJUBOA - Minimum Existing Qualification for a Barge Master - T09

**Vessel Selection and Vessel Operation**

- International Safety Management (ISM) Code, IMO, 2002
- Safety of Life at Sea (SOLAS ), IMO, 1974
- The International Regulations for Preventing Collisions at Sea (COLREGS), IMO, 1972
- Labour Standards, International Labour Organisation (ILO) Convention No. 147, 1976
- International Convention on Load Lines, IMO, 1966
- International Convention for the Prevention of Pollution From Ships (MARPOL 1973/78), IMO, 1973
- Prevention of Marine Pollution by Dumping of Wastes and Other Matter, IMO, 1972
- Incidents by Hazardous and Noxious Substances (HNS Protocol), IMO, 2000
- Control of Harmful Anti-fouling Systems on Ships (AFS), IMO, 2001

**Classification Society Rules and Regulations**

- Codes of Practice for Small Commercial Vessels (SCV), MCA, 2004
- The Code of Practice for the Safety of Small Workboats and Pilot Boats – MCA
- MGN 71(M) Musters, Drills, on-board training and instructions, and Decision Support Systems
- MGN 280 (M) - Small Vessels in Commercial Use for Sport or Pleasure, Workboats and Pilot Boats – Alternative Construction Standards
- MGN 371 (M+F) Offshore Renewable Energy Installations Guidance on UK Navigational Practice, Safety and Emergency Response Issues
- Guidelines for the Selection and Operation of Jack-ups in the Marine Renewable Energy Industry (version 1), British Wind Energy Association (BWEA), 2008

- IMCA M149– Common Marine Inspection Document
- IMCA M189 - Marine Inspection Checklist for Small Workboats
- IMCA SEL 025 – Guidance on the Transfer of Personnel to and from Offshore Vessels
- IMCA S 016- Mobilisation Checklist for Offshore Survey Operations (Survey equipment focus)
- IMCA SEL 003 - Guidance for The Initial and Refresher Familiarisation of Vessel Crews (Crew focus but has good areas to cover for any persons on board)
- IMCA SEL 007- Guidance on Basic Safety Training and Vessel Induction for Non-Marine Personnel Working Offshore
- IMCA M 203 - Simultaneous Operations, 2010
- IJUBOA - Site Checklist - T03
- SNAME TR5-5A “Guidelines for Site Specific Assessment of Mobile Jack-Up Units”.

**Medical**

- The Offshore Installations and Pipeline Works (First-Aid) Regulations. 1989 (OFAR)
- The Ships Captain’s Medical Guide, MCA, 1995
- RenewableUK Medical Fitness to Work Guidelines for near offshore and land based renewable energy projects

- Oil & Gas UK (OGUK) offshore medical (formerly United Kingdom Offshore Operators Association (UKOOA) medical certificate).
- IMCA C 012 - Medical Guidelines for Non-Marine Crew working in the Offshore Environment: A Guide for Examining Physicians

**Bird and Mammal Survey Operations**

- Offshore Marine Conservation (Natural Habitats, &c.) Regulations, Parliamentary Under Secretary of State - Department for Environment, Food and Rural Affairs, 2010
- Approaches to Marine Mammal monitoring at Marine Renewable Energy Developments, Sea Mammal Research Unit, 2010
- JNCC guidelines for minimising the risk of injury and disturbance to marine mammals from seismic surveys
- Towards Standardised Seabirds at Sea Census Techniques in Connection with Environmental Impact Assessments for Offshore Windfarms in the UK, Collaborative Offshore Wind Research into the Environment (COWRIE), 2005
- Approved Training Courses and Guidelines for Mammal Surveys, Joint Nature Conservation Committee (JNCC)
- Approved Training courses and Guidelines for Mammal Surveys, European Seabirds at Sea (ESAS)

**Geotechnical and Geophysical Survey Operations**

- Guidance Notes on Site Investigations for Offshore Renewable Energy Projects, Offshore Site Investigation and Geotechnics Group (OSIG) of the Society for Underwater Technology (SUT), 2005
- Geotechnical & Geophysical Investigations for Offshore and Near Shore Developments, International Society for Soil Mechanics and Geotechnical Engineering, 2005
- Marine Soil Investigations, NORSOK Standard, 2004
- Guidelines for the conduct of offshore drilling hazard site surveys, International Association of Oil & Gas Producers, 2011
- IMCA S 003Guidelines for the use of multi-beam echo sounders for offshore surveys

**Crew transfer Operations**

- MGN 390 (M) - Construction Standards for Offshore Support Vessels and Other Special Ship Types, MCA, 2009
- MGN 432 (M+F) - Safety during Transfers of Persons to and from Ships, MCA, 2011
- IMCA SEL 025 / M 202 - Transfer of Personnel to and from Offshore Vessels

Please note: The reference documents listed here are not exhaustive.

**Acknowledgements**

The Crown Estate and RenewableUK would like to express their grateful acknowledgement to the following people and organisations for their commitment and contribution to this guideline.

**Working Group**

The Crown Estate
RenewableUK
Maritime and Coastguard Agency
Health and Safety Executive
International Marine Contractors Association

**The Crown Estate and RenewableUK wish to thank the following companies for their participation in compiling this guide.**

| | |
|---|---|
| A2SEA | Mainstream Renewable Power |
| ABPmer | Maritime Craft Services (Clyde) Ltd |
| Automasjon og Data A.S | Meygen |
| BMO Offshore | Montrose Marine Services Ltd |
| BMT Group | NFFO Services |
| Centrica | OpenHydro |
| Centrica Renewable Energy Ltd | Petrofac |
| Coastline Surveys Limited | Photosynergy |
| EDP Renewables | PMSS |
| EGS International Ltd | RPS Energy |
| EMU Limited | RWE Npower- Renewables |
| Eon | Saipem |
| Ess Ecology | Scottish Power Renewables |
| FLUOR LIMITED | Sea Energy renewables |
| Forewind | SeaRoc |
| FRC | SFF |
| Fugro Renewables | SgurrEnergy Ltd |
| Gardline Environmental | Siemens Energy Service Renewables |
| Gardline Geosurvey | Siemens Plc. |
| Gardline Marine Sciences | SSE Renewables |
| Geotechnical Engineering and Marine Surveys Limited | Statoil ASA |
| Geotechnics for RPS Energy | Subsea 7 |
| Houlder Limited | Swire Blue Ocean |
| IMarEST | Tidal-Transit |
| Lloyds register | Turbine Transfers |
| London Array | Warsash Maritime Academy |
| London Offshore Consultants Limited | Windcat Workboat Ltd |

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Acting as a central point of information and a united, representative voice for our membership, we conduct research; find solutions; organise events, facilitate business development, lobby and promote wind and marine renewables to government, industry, the media and the public.