Good practice guidelines for safe helicopter operations in support of the global offshore wind industry

Section B

G+ Global Offshore Wind
Health & Safety
Organisation

In partnership with

energy institute

GOOD PRACTICE GUIDELINES FOR SAFE HELICOPTER OPERATIONS IN SUPPORT OF THE GLOBAL OFFSHORE WIND INDUSTRY

Section B

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Ørsted
EDF
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However, it should be noted that the above organisations have not all been directly involved in the development of this publication, nor do they necessarily endorse its content.

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FOREWORD

In these guidelines, G+ recommendations for what an offshore wind company (OWC) needs to do (as distinct from information provided to help OWCs understand the issues and options) are highlighted in **bold**.

To ensure that the guidelines remain up-to-date and relevant, G+ welcomes any feedback. This should be sent to gplus@energyinst.org.

VERBAL FORMS

May indicates an action whose suitability depends on circumstances. It is also used to describe different possible cases that need to be considered – for example in 'technicians may be taken out to the wind farm by one helicopter operator and returned by another'.

Must/shall. G+ does not claim legal authority to mandate requirements, so terms such as 'must' and 'shall' are not used, except when citing legal requirements or standards mandated by law.

Should. Consistent with other G+ Guidelines, this document uses 'should' as the default term for presenting good practices. This allows for flexibility in the means of achieving the safety aims but does not mean that the practice is merely optional. Rather, G+ expects its members to either:

– follow the guidelines, or
– do something else at least equally safe, or
– risk assess, justify and document the acceptance of any exemption.

G+ recommends other OWCs to do the same.

G+ expects its members to refer to these guidelines as mandatory in situations where they have that ability to do so: for example, when placing a contract with a service provider. Alternatives agreed between contracting parties should be justified and documented.

ACKNOWLEDGEMENTS

G+ acknowledges the time, effort, experience and expertise of all who contributed to this document.

G+ member companies formed a Working Group to steer the development of these guidelines, providing oversight as well as contributing to the content. At the time of publication, G+ members and associates are as follows:

Members:
– EdF
– Ocean Winds
– Equinor
– Iberdrola
– RWE
– Ørsted
– Siemens Gamesa Renewable Energy
– SSE Renewables
– Vattenfall

Associate members:
– CIP
– ESB
– GE
– Macquarie
– Maple Power
– Mitsubishi Vestas
– Shell
– Transmission Investment
– Van Oord

A draft of the guidelines was made available to the wider G+ membership and other interested parties for a consultation period in Sep–Oct 2020. EI and G+ gratefully acknowledge the contribution of the following additional organisations in providing comments:
– Aerossurance
– Bristow
– Flight Safety Foundation – BARS Program
– Helicopter Association International
– Helideck Certification Agency
– HM Coastguard (UK)
– HSAC
– M Prior Consulting Ltd
– UK Civil Aviation Authority
– UK Health and Safety Executive
– WIKING Helikopter Service GmbH

The work to develop these guidelines, facilitating the gathering of information, collating, analysing it and presenting it, was managed by the EI and carried out by Orano Projects Ltd and Extensity Consulting Ltd.

Particular thanks are due to companies who, in addition to their role on the WG, contributed specific material. The Strategic Overview (Part A) is based on text developed by Vattenfall. SGRE provided the link into the development of the *HeliOffshore Recommended Practices* (HeliOffshore WinReP (Ref)), which form a sister document to these guidelines. Ørsted, SGRE and others provided example materials. RenewableUK provided the Offshore Renewables Aviation Guidance (ORAG) documentation.

Project coordination and final editing and presentation was undertaken by the EI.

Photo credit: thanks to Vattenfall for the cover image

SUMMARY

THE NEED FOR GUIDELINES

Helicopter applications in the offshore wind industry include site surveys, transfer of personnel and cargo to helidecks or hoist platforms, monitoring and inspection, maintenance support, medical evacuation and search and rescue (SAR). Their higher speed and ability to operate in different environmental conditions make them complementary to vessels.

The harmonisation and sharing of experience and good practice that these guidelines aim to promote should lead to health and safety benefits, and also to cost savings from improvements in interoperability and efficiency.

Wind industry users of helicopter services cannot 'contract out' their overall responsibility for the safety of their employees and others who may be affected by their activities, and so need to assure themselves of the safety of any helicopter services they procure. This will require a sound understanding of constraints on helicopter operation, hazards and risk control measures. These guidelines aim to provide or signpost such understanding.

OBJECTIVES

The overall purpose of these guidelines is to support continuous improvement in managing health and safety risks to and from helicopter operations, enabling safe development of the global offshore wind industry. They aim to help the industry integrate helicopter operations safely into projects, taking an approach appropriate and proportionate to the operational context and its risk profile.

AUDIENCE

These guidelines are most relevant to:

– Organisations with a responsibility for the overall safety of the offshore wind energy project that use, or are considering using, helicopters to support the project. These can include the client/customer, developer or lead contractor, owner or operator, or their agents.

They are also relevant to:

– other supply chain organisations that contract helicopter services, such as maintenance providers.
– organisations that are not the helicopter contract owner, but nevertheless have their employees transported by helicopter.
– organisations that do not intend to use helicopters in their normal activities, but who may require helicopter assistance in emergencies or to meet a 'one-off' requirement, and so need to facilitate this through appropriate planning, design and operation.

All of these are referred to as offshore wind companies (OWCs) in these guidelines. The relevance of any particular guideline to a specific OWC will depend on their role and responsibilities on the project.

Attention is drawn to the HeliOffshore Windfarm Recommended Practices (the WinReP)[1]. The WinReP is a 'sister document' to these guidelines. The key differences in audience, purpose and scope are outlined as follows.

Document	Primary audience	Summary purpose and scope
G+ Guidelines (this document)	OWCs using helicopter services	To help OWCs integrate helicopter operations safely into their projects
HeliOffshore WinReP	Helicopter operators providing services to OWCs and OWCs using helicopter services	Identifies recommended practices to enable helicopter operations in support of offshore wind farms in a way that provides a safety benefit

The two documents have been developed over a similar timeframe and G+ has liaised with HeliOffshore throughout to ensure that they are complementary.

SCOPE

The guidelines focus on topics specific to helicopter operations in offshore wind, rather than generic good safety management practices. The guidelines cover all stages in the life-cycle of an offshore wind farm

The geographical scope is world-wide. OWCs are reminded that, given the regional and national variations in aviation regulation, they have a responsibility to ensure they are, as a minimum, compliant with the relevant regulatory approach

The guidelines do not cover:
– Wind turbine generator (WTG) design standards.
– interactions between the wind industry and aviation in general, such as radar interference, or WTGs as physical obstacles, except to the extent that such interactions may affect helicopter operations supporting the wind farm themselves.

CONTENT

Part A of the document is a Strategic Overview. It presents, in a non-technical, narrative form, a summary of experience and learning to date, as a foundation for good practice in the future.

Part B contains the more detailed, formal guidelines, covering (section numbers in brackets):
– health and safety responsibilities of OWCs (2);
– understanding and defining the system and its hazards (3);
– planning and design (4);
– contracting helicopter services (5);
– normal operations (6);
– later lifecycle stages, such as repowering and change of ownership (7);
– abnormal conditions and emergencies (8, 9);
– continuous improvement (10).

The Annexes provide additional detail and example materials.

1 HeliOffshore. *Wind Farm Recommended Practices* (WinReP)

USING THE GUIDELINES

OWCs can adopt and implement these guidelines in one or more of the following ways:
– incorporation into company standards;
– incorporation into contract specifications, and
– use as prompts in audits and reviews.

In whatever way the guidelines are used, it is important to integrate the approach to helicopter safety into the OWC's overall health and safety management system.

While the overall aim is to promote harmonisation and share good practice, it has not been possible (nor is it necessarily desirable) to develop prescriptive guidelines on all topics. Differences in national regulations and project-specific factors mean that each situation must be considered on its own merits.

Where examples are given, they are not intended as ready-made models or templates that can be copied or filled in without thorough consideration. Rather, they provide structures, tools, prompts and signposts to help OWCs identify and manage risk effectively.

G+ encourages OWC management to delegate competent personnel to consider the guidelines in more detail, and use them as appropriate to develop approaches, systems and tools suitable to the OWC's organisation, its project(s) and their operational context.

As helicopter operations involve complex and specialist topics, a key consideration for management will be ensuring that the organisation has access to competent aviation expertise.

PART B: GUIDELINES

1 INTRODUCTION

1.1 BACKGROUND

Helicopters are increasingly being used in the offshore wind industry. Applications include site surveys, the transfer of personnel and cargo to and from helidecks or by helicopter hoisting, monitoring and inspection, maintenance support, medical evacuation and search and rescue. Their operational capability is well suited to the offshore environment and complements the use of surface vessels.

However, offshore helicopter operations are subject to the inherent hazards of working in a remote, often hostile environment, with – in many cases and especially further offshore – limited availability of air traffic management and emergency services compared to onshore.

The use of helicopter services, especially for personnel transfer offshore, is very different from taking a scheduled commercial passenger flight. Wind industry users of helicopter services need to be aware of the hazards and resulting constraints on helicopter operations. Importantly, they cannot 'contract out' their overall responsibility for the safety of their employees and others who may be affected by their activities, and so need to assure themselves of the safety of any helicopter services that they procure or use.

Compared to offshore oil and gas, which has been a major industry for longer, the offshore wind sector still shows considerable variation in aspects such as training and competence standards, in regulatory approaches and in commercial context and pressures.

The development of regulations may lag behind advances in technology and practice, and cannot cover all situations, so compliance alone does not guarantee safety, and the industry itself has a responsibility to share experience and good practice. The G+ Global Offshore Wind Health and Safety Organisation (G+) therefore established a Working Group to lead the development of the present document, as an overarching, globally-relevant resource providing or signposting appropriate health and safety guidelines for the offshore wind industry.

The harmonisation of good practice that these guidelines aim to promote should lead to cost savings from improvements in interoperability and efficiency as well as to health and safety benefits.

1.2 OBJECTIVES

The overall purpose of these guidelines is to support the global offshore wind industry in managing health and safety risks related to helicopter operations.

More specifically, the guidelines aim to help offshore wind organisations integrate helicopter operations safely into projects, taking an approach appropriate and proportionate to their operational context and its risk profile.

1.3 AUDIENCE: OFFSHORE WIND COMPANIES

These guidelines are most relevant to organisations with a responsibility for the overall safety of the offshore wind energy project that use, or are considering using, helicopters to support the project. Even where such organisations do not require helicopter support in their own activities, they will need to facilitate emergency operations through appropriate planning, design and operation of the wind farm. For example, the layout of the farm will affect the ability to conduct helicopter SAR operations within it.

The organisations most likely to have such responsibility during the planning, design and construction phases, and during upgrade, repowering or decommissioning are the client/ customer, developer or lead contractor. During operations and maintenance they are most likely to be the wind farm owner or operator (or their agents).

The guidelines are also relevant to:

– Other organisations that contract helicopter services, such as a WTG manufacturer carrying out commissioning prior to handover, or (see Section 5.4.1) a maintenance provider.
– Organisations that are not the helicopter contract owner, but nevertheless have their employees transported by helicopter.
– Organisations that do not intend to use helicopters in routine activities but may have 'one-off' requirements.

Throughout this document, we use the term offshore wind company (OWC) for all such organisations. The relevance of any particular guideline to a specific OWC will depend on their role and responsibilities on the project.

Other parties, such as the helicopter operator, or vessel operators, will also have health and safety duties and responsibilities in relation to their own activities.

The guidelines are **not** intended as a primary resource for organisations whose main business is the design, manufacture, certification, supply or operation of assets or equipment such as:

– Helicopters: such organisations should consult regulations, standards and guidelines specific to the helicopter sector, and in particular the HeliOffshore WinReP (Ref) (see 1.7).
– WTGs and other infrastructure and equipment: the guidelines cover helicopter hoist platform and helideck design from a helicopter operational point of view (4.5.5 and 4.5.6) but do not give details of, for example, WTG control systems or the structural design of helidecks.

1.4 USING THE GUIDELINES

Consistent with other G+ Guidelines, this document uses 'should' as the default term for presenting good practices. This allows for flexibility in the means of achieving the safety aims but does not mean that the practice is merely optional. Rather, G+ expects its members to either:

– follow the guidelines, or
– do something else at least equally safe, or
– risk assess, justify and document the acceptance of any exemption.

G+ recommends other OWCs to do the same.

OWCs can adopt and implement these guidelines in one or more of the following ways:

– Incorporation into company standards.
– Incorporation into contract specifications. G+ expects its members to refer to these guidelines as mandatory in situations where they have that ability to do so – for example when placing a contract with a service provider.
– Use as prompts in audits and reviews.

However the guidelines are used, it will be important to integrate the approach to helicopter safety into the OWC's overall health and safety management system.

While the guidelines aim to promote harmonisation and share good practice, it has not been possible (nor is it necessarily desirable) to develop prescriptive guidelines on all topics. Differences in national regulations and project-specific factors mean that each situation must be considered on its own merits.

Where example materials are provided (such as in Annexes E, F and H) they are not intended to provide 'ready-made' models or templates that can be copied or filled in without thorough consideration. Rather, they provide structures, tools, prompts and signposts to help OWCs identify and manage risk effectively.

OWC management should delegate competent personnel to consider these guidelines in more detail, and use them as appropriate to develop approaches, systems and tools suitable for the organisation and its projects.

1.5 SCOPE

1.5.1 Focus on helicopter-specific matters

It is assumed that the OWC already has an appropriate overarching SMS in place, including:

– familiarity with generic health and safety legislation in the states in which they operate;
– competence in using generic tools and techniques of safety management, such as risk assessment, and
– the commercial, financial and legal systems, processes and competences to select and set up contracts with service providers.

These guidelines highlight areas in which specialist aviation input will be needed to complement these generic abilities.

1.5.2 'Offshore wind industry' – definition and boundaries

The 'offshore wind industry' is taken to include organisations involved at any stage in the life cycle of an offshore wind development. Such developments include:

– fixed and floating infrastructure (WTGs, accommodation platforms and power converter/substations, cables …);
– mobile assets (helicopters, fixed wing aircraft, vessels …);
– helidecks and hoist platforms on infrastructure or vessels, and

– onshore construction and maintenance bases and heliports (in so far as they support the offshore operations).

The guidelines do not cover the use of unmanned helicopters, except in so far as they, or other unmanned aircraft systems (UAS[2]), may interact with manned helicopter operations.

While focused on the offshore industry, some of the guidelines may also be relevant to onshore wind developments.

1.5.3 Types of risk

The guidelines cover the risks to and from helicopters in operational use, in support of the offshore wind industry.

They exclude consideration of more general interactions between wind energy and aviation, such as WTG interference with radar and surveillance systems, and the assessment, notification, charting, lighting and marking of WTGs as physical obstacles, except in so far as these interactions may affect the helicopter operations supporting the wind project itself.

The guidelines are primarily concerned with health and safety risks. Other risks that OWCs will need to address, such as:

– risks or impacts to the environment;
– operational, quality, commercial and financial risks, or
– security/border control risks.

are considered only to the extent that these can interact with health and safety. Examples of such interactions include:

– the effect of contractual structures on cooperation and coordination in safety matters, and
– how operational effectiveness, with clearly defined roles and responsibilities, and effective communications, contributes to a safe operating environment.

The guidelines identify some situations in which interactions with other risks particularly need consideration, but it should not be inferred that this document therefore provides a comprehensive resource for dealing with such risks.

1.5.4 Life cycle stages

The guidelines cover all phases of the wind project life cycle:

– planning, consenting, development and design of wind farms;
– construction, installation and commissioning;
– operations and maintenance, and
– life extension, repowering, change of ownership, decommissioning.

1.5.5 Helicopter applications

The guidelines cover the use of helicopters in normal operations (e.g. crew transfers) and

2 The RenewableUK document *Renewables and Unmanned Aircraft Systems – Guidelines for Operations (RUGO)* (Ref) provides interim guidance on UAS use from a UK perspective. Another reference is the FSF BAR Standard for Remotely Piloted Aircraft Systems (RPAS) (Ref).

in abnormal and emergency situations, such as medical evacuations. Further details of applications are given in Section 3.1.

1.5.6 Geographical scope

The guidelines are intended to be applicable world-wide. The content mainly reflects, however, material from those areas where there is most experience of offshore wind, i.e. Europe, North America and the Asia Pacific and from international organisations.

It would not be practical to identify and compare legislation, regulation and practices in each state. **OWCs should consider, and as a minimum comply with, all applicable local compliance requirements and expectations.**

1.6 RELATIONSHIP BETWEEN THESE GUIDELINES AND LEGISLATION

These guidelines are intended to supplement, not replace or supersede, legal requirements or regulatory instructions from appropriate authorities. These guidelines should be used in conjunction with the most up-to-date, relevant legislation, regulatory material, standards and other sources of relevant good practice. Due to rapid industry and technological change, it is not possible for a document such as this to be fully comprehensive or future-proof.

1.7 RELATIONSHIP TO OTHER INDUSTRY GUIDELINES

Documents that complement the present guidelines are referenced at various points throughout these Guidelines and are listed in Annex L.

Particular attention is drawn to the HeliOffshore WinReP (Ref). The WinReP is a 'sister document' to these guidelines. The key differences in audience, purpose and scope are outlined as follows:

Document	Primary audience	Summary purpose and scope
G+ Guidelines (this document)	OWCs using helicopter services	To help OWCs integrate helicopter operations safely into their projects
HeliOffshore WinReP	Helicopter operators providing services to OWCs	To help helicopter operations support offshore wind projects safely

The two documents have been developed over a similar timeframe and G+ has liaised with HeliOffshore throughout to ensure that they are consistent and complementary.

Another key document is the G+ *Integrated Offshore Emergency Response (IOER)* – Good practice guidelines for offshore renewable energy developments. The present guidelines do not provide additional material on emergency response, but instead point to the IOER, with a summary of its content and implications, in Section 9. The planning and design of wind farms to facilitate emergency response is, however, covered in 4.5.2

Other documents that may provide additional material include:

– The Aviation Management Guidelines, IOGP 590 (Ref), published by the International Association of Oil and Gas Producers (IOGP). This an industry standard for offshore

helicopter operations in the oil and gas sector. Aspects of it also have relevance to offshore wind.

– IOGP 690 Offshore Helicopter Recommended Practices (Ref). This is a partial update to IOGP 590, issued in 2020. It covers only commercial air transport (CAT) flights to helidecks, whereas IOGP 590 also covers hoisting, SAR, medical and other missions. However, IOGP has yet to be amended to remove what is now in IOGP 690. It is important, therefore, to ensure that the most up-to-date material is identified when using either of IOGP 590 or 690.
– Flight Safety Foundation (FSF) BAR Standard for Offshore Helicopter Operations (BARSOHO) (Ref). This presents safety performance goals in the form of generic bow-tie diagrams (controls and defences for various potential accident threats). The supporting Implementation Guidelines (Ref) give additional detail of means of compliance, with further references.

It is important to note, however, that these IOGP and FSF documents are for offshore helicopter operations in general and are not specific to the offshore wind industry. Care is needed, therefore, when using them.

1.8 GUIDELINE DEVELOPMENT APPROACH

The development of these guidelines was led by a Working Group of wind industry representatives from G+ member companies. Further information on the development process is provided in Annex A.

1.9 STRUCTURE OF THE GUIDELINES

Section 2 describes the health and safety obligations of a wind industry OWC, including the legislative and regulatory framework under which these obligations arise.

Section 3 provides a framework to help OWCs develop an understanding of the helicopter services they require, the environmental and operational context in which they will operate, and the supporting systems. These are a prerequisite to identifying and managing the associated risks.

Sections 4 to 10 then present the main topic-specific safety guidelines, organised broadly by life cycle stages[3].

Section 4 gives guidelines on ensuring that the planning and design of a project enable safe operation, i.e. that the system is 'safe by design'.

Section 5 covers the selection and management of helicopter operators and aircraft.

Section 6 covers safety management during the day-to-day planning and execution of normal operations.

Section 7 covers later life cycle stages: life extension, repowering, change of ownership and decommissioning.

3 This lifecycle model is an idealised, simplistic one, adopted to provide a manageable framework for the document. In reality there will often be iteration between stages, and different aspects of a project will progress at different rates. Annex A explains the thinking behind the document structure in more detail.

Sections 8 and **9** cover abnormal and emergency situations respectively.

Section 10 covers continuous improvement: learning from experience, monitoring, audits inspections and reviews. These processes apply across all life cycle stages and topics.

Each section is broken down into more detailed hazard-related or activity-related topics.

Figure 1 shows how these sections relate to the safety management stages that an OWC will typically need to undertake.

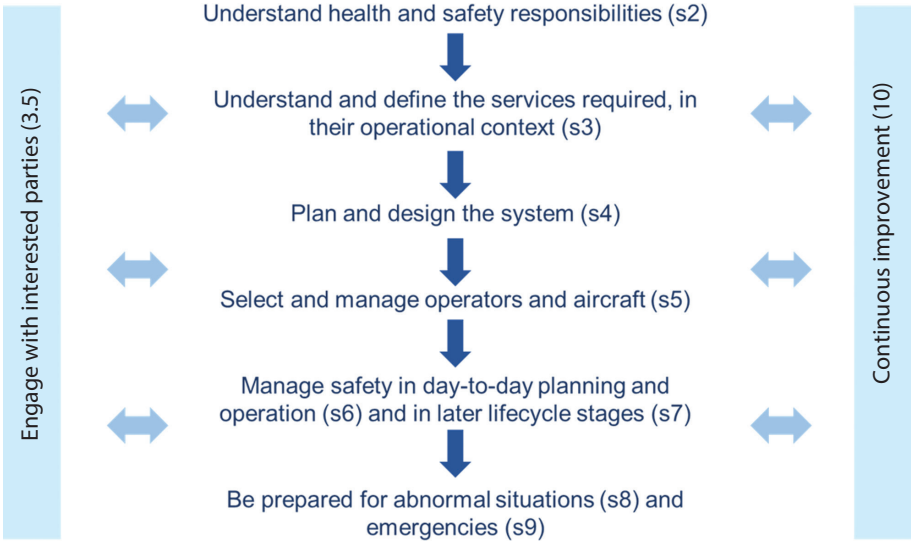

Figure 1: Safety management stages and related sections of these guidelines

In these guidelines, things that an OWC needs to *do* (as distinct from information provided to help the OWC understand the issues and options) are highlighted in **bold font**. Annex B collates of all these recommendations in the form of a checklist.

Other annexes present more detailed guidelines, example materials and the references.

2 OWC OBLIGATIONS

This section outlines the health and safety responsibilities of an OWC in relation to helicopters (Section 2.1) and the legislative and regulatory frameworks under which these responsibilities arise (Section 2.2).

2.1 OWC RESPONSIBILITIES

2.1.1 Overall responsibilities

All parties need to understand their role in ensuring safety and cooperate to achieve it. Good communication and cooperation at all stages, from initial planning to day-to-day operations, are fundamental.

Another general principle of good risk management (embodied in law in some jurisdictions) is that the organisation at the top of the contractual structure remains responsible for health and safety on all aspects of their project. This ultimate responsibility cannot be avoided by attempting to contract it out.

This does not prevent an OWC delegating appropriate tasks and responsibilities to a competent contractor. OWCs do not need to be experts in everything themselves or to micromanage their contractors. This is very much the case for helicopter operations, since many aspects of aviation are complex operational, technical and safety matters that require specific skills and experience to understand in depth and are subject to detailed approval and authorisation processes.

Nevertheless, OWCs cannot take it for granted that a contractor is competent or has an appropriate SMS in place. In particular, the fact that a helicopter operator has the relevant certification, licences or approvals from the aviation regulator is a necessary, but by no means sufficient ,assurance of safety.

OWCs should act as 'intelligent customers', undertaking appropriate and proportionate checks and risk assessments to assure themselves that contractors and their activities are, and remain, suitable.

OWCs should not assume that the helicopter contractor is aware of all the hazards on the site, even if they seem obvious to the OWC. **OWCs should provide helicopter operators with information about hazards on the site and any other safety-relevant information.**

Although the helicopter operator (and more specifically the aircraft captain, on the day) is responsible for safe flight operations, safety also depends on the actions of the OWC. **OWCs should provide a safe operational and environmental context in which helicopters can operate**. For example, OWCs should properly undertake their responsibilities in areas such as the provision of a safe helideck, and the control and isolation of WTGs in readiness for a helicopter to approach.

2.1.2 Responsibilities at strategic, planning and operational levels

It may be helpful to consider a breakdown of responsibilities as follows:

– At the strategic level, **OWCs should consider whether, and how, helicopters are to be used and set up SMSs appropriate to this.**

– At the level of day-to-day planning, tasking and control, **the OWC should minimise, in liaison with the helicopter operator and others, the likelihood of exposing helicopters to adverse conditions such as inclement weather or conflicts with other air traffic.** The OWC should not attempt to micromanage when and how helicopters operate since, for example, they may well not have the competence to recognise adverse conditions. However, OWCs should work with their helicopter operators to ensure that OWC decisions, for example around tasking requests and control of SIMOPS, do not set up conditions in which safety is likely to be degraded.
– Operational control of the aircraft is vested in the aircraft captain, with other crew members, as well as air traffic services where available, playing their role.

2.1.3 Safety responsibilities of and for helicopter passengers

While wind industry personnel are being carried on a commercial air transport flight, or hoisted to or from a hoist area, they are not part of the crew complement but are considered as passengers for regulatory purposes. This does not, however, prevent them from being involved in helicopter-related 'ground' activities – i.e. at heliports, on vessels, helidecks or hoist platforms. Such activities may include:

– ensuring that passengers board and alight the aircraft safely (e.g. ensuring they keep clear of the tail rotor, checking PPE …);
– weighing, packing, loading and unloading of cargo e.g. maintenance tools and equipment;
– storage and stowage of materials and equipment on board;
– making arrangements for the carriage of dangerous goods (see 2.1.4);
– fixing of hoisting/lifting equipment and attachments such as lifting bags, nets and hooks or slinging of underslung loads, and
– preparation of the helideck or hoist platform – e.g. activating lighting, clearing debris.

If the personnel play an active role in the conduct of the flight, however, they are 'technical crew members' (in EASA terminology at least). So, for example, a helicopter hoist operator is a technical crew member.

The training requirements for technical crew members are more onerous – for example under EASA regulation they must have Crew Resource Management training with flight crew. Further information on training is given in 4.2.1, 4.2.2 and 4.2.3 for passengers, helicopter hoist passengers and technical crew members respectively.

OWCs should cooperate with the helicopter operator to seek a safe and effective distribution of tasks between flight crew and wind industry personnel, with clearly defined and distinguished roles and responsibilities, and operating procedures that reflect these. An overly legalistic or contract-driven approach should be avoided.

Key areas requiring agreement include who will provide:

– passenger and helideck team training and PPE (and to what standards);
– access and departure arrangements (e.g. ID requirements, personnel tracking);
– stowage of cargo and lifting bags, including impacts on aircraft weight and balance;
– packaging and administrative duties relating to carriage of dangerous goods;
– helideck/hoist platform clearance (e.g. removal of debris or contamination), and
– services to aircraft – e.g. meteorological and traffic information and flight watch.

2.1.4 Dangerous goods

The carriage of items that may endanger the aircraft or its passengers may be either forbidden or restricted.

Helicopter passengers, aircraft crew and heliport/helideck operators all have a role in ensuring that dangerous goods, where allowed, are only carried in accordance with applicable requirements, including that they are correctly identified, packaged, marked, documented, stored, handled, and stowed on board the aircraft. There have been instances of dangerous goods being dropped into bags and not obvious to the aircrew, for example.

OWCs should have effective measures on the ground to control any dangerous goods that may be provided to the helicopter for transportation.

Dangerous goods that may commonly be encountered in the offshore wind industry include batteries, gas cylinders, oil, paint and flammable materials such as fuels, oils paints and solvents. Further detail is provided in the HeliOffshore WinReP (Ref).

2.1.5 Responsibilities for and in emergencies

A summary of the responsibilities of OWCs in relation to emergency planning and response is given in Section 9. Further detail can be found in the G+ Integrated Offshore Emergency Response guidelines (IOER) (Ref).

2.2 LEGAL AND REGULATORY FRAMEWORK

This section focusses on aviation-specific legislation. It is assumed that the OWC is already familiar with generic health and safety legislation in the state(s) in which they operate, and with any generic product safety legislation that is relevant (for example in relation to the purchase of WTGs or PPE).

In these guidelines, we use 'legislation' to mean any law that places an obligation on an OWC, and 'regulation' to mean the systems and organisations for checking that OWCs are complying with legal requirements. The terms are however often confused – see the Glossary, Annex J, for further explanation. OWCs may have legal duties even where there is no requirement to obtain prior authorisation from a regulator, nor any proactive regulatory audit/inspection regime. **OWCs must take steps to identify and comply with all relevant legal duties.**

To help OWCs understand the framework within which helicopter operations take place, we outline below the structure of aviation legislation and regulation.

2.2.1 Aviation legislation and regulation

Aviation legislation exists at international, regional (e.g. European) and national levels.

At the global level, ICAO sets the international standards and recommended practices (SARPs) intended to achieve a safe and interoperable aeronautical environment.

Individual states are responsible for establishing their own regulatory framework in accordance with ICAO standards, implemented by the NAA. A list of NAAs, with links to their websites, is available on the ICAO website at https://www.icao.int/Pages/Links.aspx.

States may file differences from ICAO when justified by national circumstances.

Within the EU, EASA is the responsible authority for safety across the member states together with Norway and Switzerland[4]. EU states have a responsibility to comply with EASA regulation, but are also responsible for ICAO compliance. Although this has a risk of conflicting requirements, close coordination between EASA, ICAO and the member states prevents this. That said, some significant national differences exist between EU states.

The legislation and regulatory arrangements that apply to any specific helicopter application will vary, depending on factors such as whether passengers are carried and the size of the aircraft. So, for example, there are different requirements for:

- carriage of passengers;
- helicopter hoisting;
- carriage of underslung loads;
- carriage of dangerous goods: the IATA Dangerous Goods Regulations (DGR) manual (Ref) is the global reference (which may be implemented in state legislation) for carrying dangerous goods by air;
- aircraft maintenance;
- emergencies e.g. medical evacuations, helicopter emergency medical services, and
- search and rescue (SAR).

Further information on the key regulatory bodies is contained in Annex C.

2.2.2 Engaging with regulators and other authorities

So far as aviation-specific regulation is concerned, OWCs will primarily need to engage with the NAA(s) of the states(s) in which they operate. However, NAAs sometimes delegate certain tasks to other bodies – this is particularly common for the approval of helidecks and hoist platforms.

Engagement may also be required with other authorities – for example, those who are consultees for planning applications, or who license radio operations, and with other interested parties (See 3.5). A list of potential interested parties, including regulators and authorities, is provided in Annex D.

OWCs should identify, and engage as appropriate with, all relevant regulators and other authorities

Offshore wind is an international industry, and it is common for OWCs to operate in, and obtain services from, more than one state.

Article 11 of the International Convention on Civil Aviation (Ref) requires that any aircraft, regardless of its nationality (i.e. the state of registration), shall obey the regulations and operational procedures of the state in which it is flying. Additionally, a state's Rules of the Air are applicable to all aircraft registered by that state wherever they are operating globally.

4 Having left the EU, the UK has also withdrawn from EASA and is returning to a national aviation regulatory approach. The UK CAA has stated (in CAP 1714 (Ref)) that: 'Though the existing EASA regulatory framework will cease to apply, all current substantive EU requirements will be retained in UK domestic regulation. All EASA certificates, approvals and licences in effect on 31 December 2020 for use in the UK aviation system and on UK-registered aircraft will be recognised by the CAA for up to two years. This will provide stability for passengers and businesses while ensuring UK aviation remains as safe as ever.' OWCs operating in the UK, or using UK-based aviation services, will need to monitor this situation as more information becomes available.

If a helicopter operator under the jurisdiction of one NAA is to operate in the territories of other NAAs, they must comply with the requirements of all NAAs. For example, if a German helicopter operator is operating in Danish airspace, they must comply with the Danish regulations and also abide by the German Rules of the Air. This particular responsibility lies with the helicopter operator, but OWCs need to satisfy themselves that the operator is aware of, and has addressed, this aspect of the operation.

A further complexity in international matters arises in relation to SAR. The delineation of SAR regions is based on technical and operational considerations, not (only) on boundaries between states. (In Europe, SAR regions are coincident with renewable energy zones.) OWCs may therefore need to liaise with more than one national SAR provider, even if the wind farm and routes to it lie entirely within one state's waters.

States have a responsibility to provide SAR within their respective SAR regions, in accordance with International Civil Aviation Organization (ICAO) Annex 12 (Ref). However, there are limits on what each state will provide, and OWCs may need to put in place additional arrangements, as well meeting certain requirements. Some key limitations are that:

– Shore-based vessels are constrained by speed. The time taken to reach far offshore wind farms may be several hours.
– Lifeboats are unlikely to be optimised for WTG access (i.e. to have the fender construction and geometry required to enable marine transfer to the transition piece).
– Although shore-based SAR helicopters are able to respond more quickly, it may still take over 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, a 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 higher priority tasks.

OWCs who operate in, or obtain services from, more than one state should ensure that they have identified all relevant national requirements and understand how to comply with them.

OWCs should liaise with all relevant national SAR providers (noting that SAR regions are not necessarily the same as state boundaries) in order to understand their requirements and any additional arrangements that may need to be put in place.

OWCs should ensure that the implications of any differences between the requirements of different regulators or other authorities can be satisfactorily resolved.

3 UNDERSTANDING AND DEFINING THE SYSTEM

To be able to identify, assess and manage helicopter-related risks, **OWCs should develop a clear and comprehensive understanding of what helicopter services they require, and of the context in which the services will operate.** This will enable them to select an appropriate helicopter operator and aircraft at project planning stage, to understand the constraints on helicopter use during real-time operations, and to put in place appropriate safety measures.

This section therefore provides a framework for defining the helicopter applications required (3.1), the helicopter system and its supporting infrastructure and services (3.2), and the interactions with other systems: environmental, operational and organisational (3.3, 3.4 and 3.5 respectively).

3.1 HELICOPTER APPLICATIONS

OWCs should decide how, where and when helicopters are to be used, as this will have a significant effect on the nature and magnitude of the risks.

Even where there is no current need for helicopter services, **OWCs may wish to allow flexibility by making provision for future helicopter operations in the planning and design of the system.** This will also assist in allowing one-off requirements for helicopter services should the need arise.

Also, **OWCs should ensure that wind farm planning, design and operation facilitate SAR, even if they do not intend to use helicopters themselves**

3.1.1 Helicopters as part of the logistic solution

When considering whether, and for what purposes, to use helicopters, **OWCs should identify the hazards and consider the relative risks of each potential logistic solution for each task,** assessing whether helicopter or vessel would be safer for each task and situation, together with other decision factors: environmental, operational, commercial etc. Environmental considerations, for example, include:

– fuel utilisation or CO_2 equivalent emissions per passenger, and
– the potential for use of battery, biofuel or alternative means of propulsion.

This may not be a simple either/or decision – helicopters and vessels can complement each other as part of an integrated solution, since they each have their advantages and disadvantages. For example, vessels are generally able to carry heavier loads, but slower than helicopters, while low wind conditions are ideal for vessels, but may reduce the payload for helicopters.

The health and safety hazards associated with helicopters and/or vessels/other solutions include:

– helicopter or vessel accidents (collision, ditching, foundering etc);
– exposure to noise, vibration, motion sickness;
– slips, trips and falls e.g. due to vessel movement;

- stress and fatigue (see for example the UK HSE's *Helicopter Safety Offshore* (Ref)) resulting from, for example, long journey times to far-offshore sites, or a large number of hoist cycles per trip;
- falls or drowning during transfer to and from the helicopter or vessel;
- static electric shock on contact with a hoist platform or when touching a hoist cable, and
- limitations and delays in responding to personnel injury/illness and other emergencies.

3.1.2 Potential applications

Current applications of helicopters in support of the offshore wind industry can be summarised as follows:

Routine support

- Movement of personnel and equipment between sites, installations and vessels, including:
  - to or from helidecks;
  - helicopter hoisting operations (HHO), using a hoist fitted to the side of the aircraft, operated by trained technical crew members;
  - Helicopter External Sling Load Operations (HESLO), also known as underslung loads.
- Surveys, monitoring, inspection, surveillance, photography and film.

Medical transfer and emergency response

- Medical transfer services (also sometimes referred to as air ambulance, medical evacuation or medevac) for ill or injured personnel. If the person is mobile and able to wear normal offshore PPE, and if the transit is from a recognised transfer site (a helideck or hoist area) routine logistics support helicopters can be used, operating under commercial air transport rules.
- If the casualty is immobile or requires medical assistance during transit, specialist helicopter emergency medical service (HEMS) or SAR helicopters are typically used.
- SAR. SAR helicopters are able to operate away from designated and approved areas, including rescues from life rafts or the sea surface, and to undertake more demanding roles, in worse environmental conditions and in darkness.

Clinical or humanitarian needs – medical severity and urgency, whether the casualty is mobile, what care they may need during the flight etc. – are the overriding criteria in deciding how to carry out a transfer. For example, transit may be allowed without the normal offshore passenger's PPE, where time is critical and life is at risk, or if the casualty is unable to wear it due to injury or incapacitation. Other examples in which the balance of risk will need to be considered include the carriage of a person who may be unable to escape the helicopter unaided, or the use of a helicopter not designed for contamination by body fluids or infection. In such cases, the applicable legislation, medical advice, the operator's policies and what is within the scope of the captain's discretion will all need to be taken into account.

Terms such as medical transfer, air ambulance, medical evacuation/medevac, HEMS and SAR are not used consistently worldwide. There are variations in the definitions of what operations are covered by each term, in the regulatory approvals and certifications required, and in the operational limitations and the situations in which they can be waived.

3.2 HELICOPTER SYSTEM ELEMENTS

In identifying, assessing and managing risk, **OWCs should consider the full system – the people, procedures, infrastructure and equipment – and not just (for example) the aircraft itself**. This 'whole system' view can be broken down into, for example:

- aircraft equipment fit, operating capabilities, airworthiness and limitations;
- assets served by, or providing infrastructure for, helicopters include WTGs (fixed or floating), substations/converter stations, accommodation and fuelling platforms vessels;
- landing/hoisting infrastructure (helideck, hoist platform etc);
- facilities and equipment on infrastructure (e.g. fuelling and fire-fighting capabilities);
- air traffic management (ATM) systems and communication, navigation and surveillance (CNS) systems;
- ATC service provision (type of, frequency/hours needed);
- training, competence and complement of flight crew and helicopter hoist operators;
- training and competence of passengers;
- operating procedures, and
- emergency systems and procedures, e.g. PPE for evacuation, medical/first aid provision, fire-fighting.

Onshore infrastructure and system, such as at heliports or airfields, also need to be considered, including factors such as:

- crew and passenger embarking and disembarking;
- hangarage and maintenance requirements;
- fire cover;
- cargo handling arrangements;
- fuelling;
- storage, handling and carriage of Dangerous Air Cargo and other hazardous materials, and
- flight planning and meteorological information services.

Further information on this is provided in the HeliOffshore WinReP (Ref).

3.3 ENVIRONMENTAL CONTEXT

In planning for the use of helicopters, OWCs need to be aware of the balance to be achieved between the costs and benefits of providing for operations in more demanding environmental conditions. On the one hand, there are operational benefits in terms of flexibility and continuity of service from having a larger window of operating conditions. On the other, there will in general be greater costs associated with putting in place the more robust safety measures required.

OWCs should identify and assess risks related to environmental factors

The key factors are:

- Wind speed and direction: these affect helicopter performance.
- Air density: this affects engine and aerodynamic performance.

- Sea state/significant wave height: these affect whether a ditched helicopter will remain upright, and the ability to rescue a person from the water.
- Sea and air temperature: these affect survival in the water.
- Lighting levels and visibility.
- Visual cues: The visual cues when flying over water are less reliable than over land. With low sea states, it is difficult to assess aircraft height visually. This can lead to aircrew disorientation or loss of situation awareness and has been a factor in a number of offshore accidents.
- Inclement weather, such as icing or thunderstorms, can present a direct hazard to aircraft or require operational changes or limitations.

Further detail of the effects of these factors, and an outline of means of controlling the associated risks, are given in Section 6.1.1.

The more accurate the meteorological and sea state information (current and forecast, for the helicopter route and the hoisting/landing site) the more accurate the flight planning can be, increasing safety, and in some cases payloads.

3.4 OPERATIONAL CONTEXT

OWCs should identify and assess risks related to aviation operational context factors. These include:

- other aircraft traffic: fixed wing and helicopters, military and civil;
- UAVs: particular challenges can be posed by UAV operators without the necessary competence and understanding of airspace integration – see the RenewableUK RUGO (Ref);
- SIMOPs in and around the site – for example by vessels, cranes and jack-up barges;
- ATM systems;
- ATC service provision (type, hours of availability etc);
- CNS systems;
- CNS services available and their spatial coverage. Offshore communication arrangements are often far from ideal, due to:
  - Poor radio coverage: at low altitude, it is likely that the only effective voice communication the helicopter may have is via the OWC's on-site radio.
  - Poor radar coverage – and this exacerbates radio coverage problems, since without radar there will be an increased need for voice communication.
  - Different radio systems and/or frequencies being used by the various aircraft and vessel operators. This requires pilots to monitor several channels and to make many frequency changes, adding to their workload and increasing the chance of missed or unclear communication.
  - Untrained users, with poor radio discipline: not following correct protocols and phraseology.
- airspace classifications and restrictions;
- electromagnetic environment, potentially affecting helicopter avionics and CNS systems, and
- SAR service coverage of the wind farm and routes to and from it.

3.5 INTERESTED PARTIES

Good communication with interested parties is essential at all stages, from initial planning to day-to-day operations. As well as regulators and other authorities as noted in 2.2.2, interested parties include other aircraft and vessel operators, air navigation service providers (ANSPs) and regulators.

Annex D provides a more detailed list of potential interested parties, their roles, and how OWCs may need to engage with them or otherwise be aware of their needs and expectations.

OWCs should identify all interested parties and understand their needs and expectations.

4 PLANNING AND DESIGN

This section outlines what an OWC needs to do during the planning and design stages of a project to enable safe helicopter operations, ensuring that the system is safe by design.

As already mentioned in 3.5, a key element in ensuring safety by design is identifying the interested parties, ensuring that their needs and expectations are appropriately incorporated into design requirements, and how these parties can in turn support helicopter operations. From the outset of the planning and design phases, therefore, **OWCs should make, and implement, a plan for engaging with interested parties**.

4.1 PREPARING TO PROVIDE A SAFE SYSTEM

As noted in 1.5.1, it is assumed that the OWC already has an appropriate SMS, is familiar with generic health and safety legislation in the states in which they operate, and has the generic ability to contract service providers. However, some key aspects specific to contracting helicopter services are as follows:

4.1.1 Establishing an aviation policy

OWCs should record their overall aims and commitments regarding safe integration of helicopter operations, and the high-level means by which they intend to achieve them.

This should be captured in an Aviation Policy[5].

Key elements of such a Policy should include statements regarding:

– Overall health and safety aims (e.g. zero harm, beyond compliance, reducing risk to as low as reasonably practicable (ALARP) and risk tolerability criteria. It is difficult to define meaningful quantitative criteria, and to assess whether any particular activity meets them. Most often, tolerability is defined qualitatively, in terms of a hierarchy of aviation activities: those that will be routinely carried out, those that can only be carried out under specific conditions (e.g. within certain weather limits, or in an emergency) and those that are considered too high risk to undertake in any circumstances.

– Commitment to applying the same safety assurance, management approach, requirements and minimum standards to all aviation operations irrespective of geographical location. As a high-level document, the Policy should be applicable across the OWC organisation, but it should also outline the governance and criteria for deciding on differences at the implementation level, where these may be appropriate – for example in response to site-specific factors.

5 While a specific aviation policy provides clarity, it is not essential to have a stand-alone document entitled 'Aviation Policy'. The relevant content could instead, for example, be integrated with the organisation's overall Health and Safety Policy. Where and how best to document the aviation policy is a decision for the OWC, and will depend on factors such as the existing SMS documentation structure, and how safety responsibilities are allocated in the organisation (e.g. who owns the Policy and signs it off). The level of detail in the Policy, as against what is in supporting documents, is also a decision for the OWC. However the Policy is presented, the key points listed here should be covered. All such documentation is referred to as the 'Aviation Policy' in these guidelines.

- How decisions to use helicopters will be made – e.g. weighed against other forms of transport, taking full account of safety, operational, environmental and economic factors.
- Generic means for achieving aims, such as through leadership, governance, training and competence, monitoring and auditing, learning from experience, audits and review.
- Top management responsibilities: including ensuring that helicopter operations are considered from the outset of a project and throughout the life cycle, that informed decisions are made on the basis of risk assessment, and that adequate resources are made available.
- Ownership of risk, accountability and responsibilities regarding aviation management.
- Oversight of helicopter operations: ensuring the safe and correct delivery of services and infrastructure provided, in-house and by others.
- Selection, induction and monitoring of personnel.
- Provision of appropriate awareness, training and support to all those who may own, influence, or be exposed to, aviation risk. This should include advice from aviation specialists[6] where required.
- Requirements for approval of helicopter operators and aircraft types.
- Taking account of project- or location-specific factors.
- More specific, subsidiary policies relating to specific hazards or situations. For example, there should be some form of policy for working in adverse weather.

The Aviation Policy may also be a convenient place to cover matters such as:

- the notification, charting, lighting and marking of WTGs, cranes and other tall project structures that may present aviation obstacles;
- engagement with other airspace users and other interested parties, and
- insurance requirements.

These elements need to be covered somehow, even where the OWC decides not to use helicopters themselves. As noted in 1.5.3, however, these topics are outside the scope of the present guidelines.

OWCs should ensure that the Aviation Policy (or equivalent) is disseminated and understood internally and, as appropriate, by external parties.

In particular, it is important that the Aviation Policy (and hence their SMSs) of the OWC and their aviation provider should be aligned. **This can be done by, for example, developing an interface document.**

OWCs should ensure that their Aviation Policy and that of their aviation provider are aligned.

4.1.2 Internal functions, processes and roles

OWCs should ensure that their organisation has the appropriate internal functions, role definitions and documented processes in place. In particular, a management team member should have leadership responsibility for aviation, including owning the Aviation Policy and ensuring that it is implemented.

6 Referred to as 'Aviation Advisors' in some other documents, such as IOGP 590 (Ref).

In view of the complex nature of aviation, **OWCs should ensure that they have access to suitably qualified and experienced aviation specialist(s).** This is especially important if helicopters are used to transport personnel offshore, whether by a directly contracted helicopter operator or through another party

The aviation specialist(s)' role would typically include technical, operational, safety, performance and compliance matters such as:

- advising on, or creating, the Aviation Policy;
- identifying and assessing risks;
- developing and implementing and reviewing procedures;
- making business cases;
- selection of contractors and aircraft;
- technical authority roles – for example on design compatibility with regulatory and operational requirements, or on requirements for, and provision of, CNS infrastructure;
- aviation contract management and operational supervision;
- oversight and monitoring of helicopter operations: ensuring the safe and correct delivery of services and infrastructure provided, in-house and by others, and
- facilitating continuous learning across aviation operations.

Depending on the nature, volume and complexity of helicopter operations, a **supervisor/ coordinator** role may also be required for day-to day management of helicopter activity. Tasks would typically include, for example:

i. planning and managing helicopter operations, schedules and tasking, coordinating (via any marine coordinator) with Crew Transfer Vessel (CTV) and other vessel activities and with SIMOPs;
ii. general liaison with helicopter operators: contractual, operational etc;
iii. live management of helicopter activities and movements, including (non Air Traffic Control) communications with helicopters, …. ;
iv. ensuring that only personnel with the required training and competence are booked to travel;
v. raising manifests for passengers, dangerous goods and freight;
vi. ensuring that the correct PPE is provided, correctly used, and inspected and maintained;
vii. ensuring that the correct lifting bags are provided, correctly used, and inspected and maintained;
viii. maintaining records of flights, including e.g. sectors flown, flying hours, numbers of passengers, hoist transfers, landings, aircraft availability (delays and causes), incidents and accidents;
ix. tracking the status of infrastructure such as weather instruments and fuel systems and ensuring that required maintenance is carried out, and
x. regular reporting to management on performance, ongoing work, any issues and lessons learned.

As part of this role, or as an additional one, more specific tasks relating to **operational communications** may include:

xi. arranging for provision of communication systems (infrastructure, equipment and technologies, …) between the various parties and assets, as appropriate to the operational and environmental context (e.g. class of airspace);

xii. developing and implementing communications protocols and procedures, for coordination and control etc., and

xiii. ensuring that regulatory requirements, e.g. for frequency allocation and radio operator qualifications and licensing, are met.

OWCs should ensure that responsibilities for aircraft coordination and control in and around the site are clearly defined.

The allocation and details of roles and responsibilities will depend on the OWC's organisational structure. It may be that, with suitable assurance of competence, some of these roles could be carried out by, for example, operations, logistics or maintenance managers, in conjunction with their other responsibilities. Nonetheless, roles and responsibilities must be clearly defined.

4.2 TRAINING AND COMPETENCE

The focus of this section is on the design of training and competence schemes for passengers and ground personnel, i.e. those for whom the OWC is likely to be directly responsible.

However, **OWCs should also assure themselves that their helicopter operator has an effective training system for flight crew (and others in the direct control of the helicopter operator).** Guidance on this can be found in the HeliOffshore WinReP (Ref).

There is no industry-wide method for checking passenger training at present (e.g. whether it is done using a software tool, by issue of a physical 'passport' card, or by manual 'back office' checks when booking flights). While there would be interoperability advantages if the industry could adopt a common approach, these guidelines have not attempted to recommend any specific method, as this is in part a commercial decision, influenced by what tools are on the market and how well they fit with each company's overall IT and training systems.

OWCs should ensure that records are maintained of their employees' training and experience as passengers, and monitored to ensure currency.

4.2.1 Helicopter passengers

In addition to the minimum training for all those working in the offshore wind industry (typically, Global Wind Organisation (GWO) Basic Safety Training (BST)), helicopter passengers should have the following:

- Sea survival training, such as the sea survival module of the GWO BST or equivalent. Requirements on sea survivability vary between states, for example in terms of required survival time as compared to rescue time. **OWCs should ensure that, as a minimum, training relating to sea survival complies with the local regulations.**
- Helicopter underwater escape[7] training (HUET).
- Use of compressed air emergency breathing systems (CA-EBS) (this is already mandatory in some states).
- Suitable medical/first aid training for any passengers who may be required to accompany ill or injured personnel in a medical evacuation.
- Local site induction.

7 Referred to as 'egress' in the USA

– Passenger safety briefings from the helicopter operator.
– Additional training for any 'ground crew' tasks that they may be required to undertake (see 2.1.3).

Further information is provided in the HeliOffshore WinReP (Ref). **OWCs should follow the HeliOffshore WinReP on training of passengers.**

4.2.2 Helicopter hoist operations passengers (HHOPs)

Those who are to be transferred by means of a helicopter hoist (helicopter hoist operations passengers – HHOPs), require additional, specialised training. This training will generally be provided or arranged by the helicopter operator. Different operators have different training packages. Although the substantive differences are relatively minor, operators tend to require their own training, reflecting aircraft-specific differences such as cabin layout, as well as company-specific factors.

The HeliOffshore WinRep (Ref) define a process and content for HHOP training.

Training should also be appropriate to the specific aircraft, and any project- or site-specific conditions. For example, hoisting to the relatively small platform on top of a WTG is more demanding than to a flat site on land or on a helideck.

OWCs should assure themselves that their employees who will be HHOPs receive hoist training in accordance with the HeliOffshore WinRep (Ref).

4.2.3 Technical crew members

Helicopter hoist operators and other technical crew will require specific training. Responsibility for this training normally falls to the helicopter operator.

OWCs should ensure that helicopter operators follow the HeliOffshore WinRep on training of technical crew.

4.2.4 Helideck personnel

The duties may include, for example, fuelling, keeping the helideck or hoist platform clear and checking lighting. Commonly used role titles include

– Helicopter Landing Officer (HLO)
– Helideck Assistant (HDA)
– Helideck Emergency Response Team Leader (HERTL)
– Helideck Emergency Response Team Member (HERTM)

There is as yet no one, internationally agreed, training standard specific to wind industry HLOs and HDAs in the wind industry. However, sources of guidance include CAP 437 (Ref) IOGP AMG 590-C (Ref), IOGP 690 (Ref), HSAC Recommended Practice 163 (Ref) and OPITO Standard 7040 (Ref).

OPITO has, however, recently produced standards for the further and initial training of HLOs on NUIs in the renewables sector (OPITO Standards 7048 (Ref) and 7049 (Ref)).

HERTL and HERTM are emergency roles on normally attended platforms. If required, there are also more specific training standards in (OPITO Standards 7041 (Ref), 7042 (Ref), 7541 (Ref), 7542 (Ref)).

The training topics that these documents (variously) cover can be summarised as:

- Helideck regulations and guidelines (e.g. for physical characteristics, obstacle-free requirements).
- Roles and responsibilities of the offshore HLO and HDA.
- Helicopter and helideck hazards, danger areas.
- Preparation for helicopter landing, including checking equipment and systems.
- Passenger and freight handling.
- Dangerous goods/hazardous materials It is an international requirement that anyone acting as part of the helideck deck team or passenger check-in staff must have completed a Dangerous Goods by Air training course in accordance with Part 1, Chapter 4 of the ICAO Technical Instructions and sub sections 1.5 of the IATA Dangerous Goods Regulations, Category 7, 8 or 9, or other state-approved dangerous goods awareness training.
- Preparations for helicopter departure.
- Helicopter refuelling: preparation, refuelling, shutdown.
- Meteorological observations and helicopter limitations in adverse weather.
- Communications: radio protocols and phraseology, hand signals.
- Fire-fighting.
- Response to emergencies.

It should be noted, however, that these documents focus on the needs of the oil and gas industry, for example with regard to the emphasis on fire-fighting. Given the different hazard profile of wind industry helidecks, **OWCs should carefully review the suitability for wind industry use of helideck personnel training guidance, as much of the material currently available is focused on the needs of the oil and gas industry.**

4.2.5 Aviation specialists

The competence and experience of aviation specialists should include both general aviation knowledge and specific experience with civil offshore helicopter operations.

Further information is provided in HeliOffshore WinReP (Ref). **OWCs should follow the WinReP on competence of aviation specialists.**

4.2.6 Air operations supervisors/coordinators and other ground support roles

This group covers those who, unlike helideck personnel, are not physically present on the deck but who supervise or coordinate flights, or have other roles in the air-ground interface, such as radio operators, and those providing supporting information such as meteorological data.

These personnel will need a good overall understanding of wind farm activities and helicopter operations, as well as competence in the specific skills for their role, such as radio communication protocols.

Those who use radio to communicate with aircraft are likely to require some form of licensing, in accordance with the regulatory requirements for the area(s) of operation – see 4.5.8.

An example training plan for helicopter coordinators is provided as Annex E.

4.2.7 Emergency preparedness and response

The G+ IOER (Ref) provides guidelines on training for emergencies.

OWCs should ensure they have all the competences to identify and prepare for potential emergencies and to respond to them.

4.3 MEDICAL AND ERGONOMIC FACTORS

As well as meeting the OWCs' generic requirements for fitness-to-work offshore, helicopter passengers need to be able to escape through emergency exits – typically the push-out windows – in the event of ditching or other emergency preventing use of the normal exits.

OWCs should ensure, in liaison with the helicopter operator, that only individuals whose body size (taking account of the bulk of the PPE worn), mobility and health are commensurate with helicopter escape are permitted to travel.

Helicopter operators may assign passengers to seats in relation to their body size if the airframe allows that. For example, a taller passenger with broader shoulders can be seated at a larger push-out window. A key body size parameter is the bi-deltoid (across shoulder) measurement, as this affects ability to exit through push-out windows. **OWCs should ensure that all passengers have their bi-deltoid (across shoulder) measurements taken before helicopter flight, and that these records are available to the helicopter operator on request.**

Note that some regulations (Ref) relating to exit types are based on shoulder width measured without PPE, but the practicalities of exit with PPE still need to be considered.

4.4 CONSENTING

Consenting is the process by which any necessary permissions are obtained, from a regulator or other authority, for the development or operation of a wind farm, or of associated activities.

Various terms are used to describe these permissions: consents, licences, approvals, permissions, permits or authorisations etc, depending on the regulatory regime(s) involved. For brevity, these guidelines use the term 'consent' for all such permissions.

OWCs should ensure that any necessary consents relating to aviation have been obtained and that agreements with the relevant authorities are in place.

In the planning phase, the consents and agreements required may include:

– Land use/seabed development planning: planning permission may be required for helicopter operations and supporting infrastructure and facilities (e.g. heliport, fuel facilities ….), lighting and marking of structures. These issues need to be considered as part of the planning application and environmental assessment process.
– Air traffic matters: agreement with the NAA, ANSPs and other aviation stakeholders about matters such as airspace restrictions, and the level of air traffic and CNS service provision.
– Telecommunications: frequency allocation and licensing of radio operators – see 4.5.9.

– Environmental and safety consents for fuel storage and delivery systems, storage of dangerous goods and other hazardous materials (if not already covered under the land use planning/environmental impact assessment process).

Additional consents may need to be obtained, or verified, in later life cycle phases (design, development and operation) including for heliport/helideck design and certification – see 4.5.5.

The helicopter operator will also need to obtain consents, such as for licensing of flight crew, cabin crew and HHOs, operational approvals and certificates of continuing airworthiness for aircraft. While it is not the OWC's responsibility to obtain such consents, **OWCs should assure themselves, through contractor selection and monitoring processes, that the helicopter operator has the necessary consents in place**.

4.5 PLANNING AND DESIGN OF WIND FARM LAYOUTS AND INSTALLATIONS

It is essential to ensure 'safety by design', considering safety from the outset of the planning and design of the wind farm. The planning and design stage is also the best opportunity to optimise performance in environmental and other terms. For example, optimising the layout to maximise power generation from a given wind farm area and number of WTGs will optimise both the environmental impact of each windfarm and reduce its costs.

4.5.1 Helideck provision

Where practical, a helicopter should always land rather than hoist so, on platforms and vessels, the preference is to provide a helideck rather than simply a hoist area. If a helideck is not provided, then this should be justified at the design stage. While it is acknowledged that there are some inherently greater risks associated with construction and maintenance of a helideck, as compared to those associated with the lesser requirements for hoist areas or platforms, helidecks have key safety advantages:

– time spent hovering is reduced;
– passenger transfers to deck are inherently less hazardous than by hoisting;
– a helideck provides an emergency landing site for aircraft in distress, and
– a helideck provides a waiting area and refuge (and refuelling point if available) for SAR aircraft on mission.

Landing on a helideck is quicker and increases the range of helicopter choice, enabling better optimisation to the role. Hoisting requires extra safety measures that limit the selection of aircraft to small utility hoist-fitted types with limited load-carrying capacity.

Helidecks should therefore be seen as integral to aviation safety and emergency response.

OWCs should provide at least one helideck on a fixed installation within, or in the vicinity of, every far offshore wind farm, unless omission is justified by detailed analysis and with the establishment of other risk control measures.

The term 'in the vicinity of' here means that the fixed helideck need not be within the perimeter of the farm. Provided the operational needs can be safely met, it could be shared with an adjacent wind farm, even one operated by a different OWC.

When considering whether a wind farm is 'far offshore' for the purpose of following this recommendation, the distance to be considered is not simply the straight-line distance to the nearest coast. Rather, a risk-based decision has to be made in each case, taking account of the distance between all the various assets to or from which access will be required: WTGs and other wind farm structures, normal, alternate and emergency landing and refuelling sites both on- and offshore, and the distance from SAR stations.

The risks associated with construction and maintenance of the helideck, as compared to those of hoist platform(s), are examples of the factors that could be taken into account in such analysis.

Helidecks can also be provided on SOVs and other large vessels, and indeed G+ recommends that SOVs should be fitted with helidecks – see 6.7. However, a vessel-mounted helideck does not provide the same guarantee of a safe landing place as a fixed one: the vessel may not be present at the farm at all times and will be unavailable for use when sea state or wind leads to helideck movements outside the limits for landing or stability when parked (6.7.3).

4.5.2 Wind farm layout – general safety effects

As well as providing landing or hoisting sites, there are several other ways in which wind farm structures and their layout can affect safety, such as:

- by affecting logistical efficiency: for example, the location of a helideck within the farm will affect the total number of trips and distance that need to be flown for routine maintenance, and hence the risk exposure (time-at-risk and number of landings/hoists);
- by presenting aviation obstacles (see Section 4.5.3);
- by obstructing lines of sight;
- by affecting CNS coverage;
- by generating wake turbulence;
- by affecting SAR operations (see 4.5.4).

OWCs should consider the layout of the farm, including all existing and planned structures around helicopter routes and destinations that could impact on safety.

Given this wide variety of ways in which wind farm layout, and the interdependencies between the factors, early engagement with interested parties is essential. For example, any foreseen need for night operations should be discussed with the appropriate national authorities before the layout of the wind farms WTs is finalised.

OWCs should engage as early as possible with the NAA, aviation specialists, helicopter operator(s) and SAR provider regarding wind farm layout.

Effects on adjacent wind farms, and cumulative effects, also need to be considered. For example, where – as is often the case – the periphery WTGs have smaller spacings than in the internal array, or where a substation is positioned at the edge of the farm, this can affect layout decisions for any future, adjacent extension.

OWCs should consider the effects of layout on wind farm neighbours, and potential cumulative effects, as well as those for the proposed wind farm itself.

4.5.3 Wind farm layout – aviation obstacles

Obstacles need to be considered as a specific layout factor in planning and design. Key points to note are that:

- The areas surrounding a helicopter hoist platform or helideck should be free of obstacles out to certain ranges, in order to protect helicopters on approach, missed approach or departure, including in the event of an engine failure limiting the aircraft's performance.
- The very shallow climb performance in engine-out conditions (see CAP 764: the climb gradient may be only 1 or 2 degrees) may be the most restrictive factor when considering climbing from a lower elevation site, such as an OCP or SOV, amongst a field of tall WTGs. For this reason, helidecks are often positioned on the perimeter of the wind farm, such that there is a sector of obstacle-free space available – at least for use in certain wind directions.
- Obstacles below the helideck or hoist platform need to be considered as well as obstacles above it, since in the event of engine failure the helicopter may need to descend below deck/platform level in order to gain sufficient speed to safely fly away, or to land on the water.
- The spacing between WTGs or other structures should be sufficient to allow safe helicopter transit of, or manoeuvring within, the farm.
- The applicable obstacle criteria differ according to the type of flight being undertaken, being more restrictive for night and/or low visibility/IFR operations than for daytime/VFR.
- Wherever possible, obstacles should be frangible, subject to the need to withstand wind, wave and helicopter downwash forces and other structural considerations. Frangibility is especially important for obstacles that necessarily infringe obstacle criteria, as in the case of flame detectors on NUI helidecks.
- Obstacles should be lit and marked in accordance with NAA requirements.

It cannot be assumed that helicopters will approach and depart on simple straight-line paths. Further details can be found in the HeliOffshore Approach Path Management Guidelines (Ref). While this document is primarily aimed at helicopter operators, it is a useful and digestible reference for OWCs who want a better appreciation of the safety and operational factors that helicopter operators have to take into account.

OWCs should consider how obstacle location, height and size will be notified to helicopter operators and recorded on charts and databases, and what lighting, marking or other mitigations will be required.

The primary international reference providing guidance on the assessment and treatment of aviation obstacles – by lighting, marking, charting or operational limitations etc – is ICAO Annex 14 (Ref). This covers obstacles from the perspective of aviation in general (which is outside the scope of the present guidelines), but aspects of it are also relevant to the wind farm's own air traffic.

Guidance more specifically relevant to obstacles affecting helicopters in the offshore wind context can be found in UK CAA CAP 437 *Standards for Offshore Helicopter Landing Areas* (Ref) and CAP 764 *Policy and Guidelines on Wind Turbines* (Ref). Note that both of these documents are currently under review.

However, these references do not fully cover all the questions that may arise. The assessment and management of obstacles is a complex topic, in which requirements will depend on many factors related to the aircraft and its performance, to environmental and meteorological conditions, and to the type of activity and flight procedures being carried out.

OWCs should engage with the NAA, aviation specialists, the helicopter operator(s) and SAR provider to ensure that obstacle considerations have been properly taken into account and risks minimised.

4.5.4 Wind farm layout – effects on SAR

In order to maximise WTG array efficiency, to take account of geotechnical variations, and for operational reasons, wind farm developers would like to be able to position WTGs freely. Some regulators, however, prefer a gridded layout with lines of orientation, as this helps SAR pilots maintain situational awareness and enhances the probability of detecting vessels or personnel in the water.

For large wind farms, SAR helicopter refuge areas may have to be incorporated, providing a defined area of airspace in which a helicopter can safely manoeuvre or turn within the farm.

Each state has its own planning process and the relevant coastguard or other SAR stakeholders should always be engaged in the layout design phase, to ensure optimum layout for rescue aligned with aviation, environmental and other considerations. Example references on these topics include the UK MCA's MGN 543 (Ref) but note that MGN 543 is currently under review, following a consultation in spring 2020, and that there are differing opinions.

Where offshore installations and/or vessels have the capacity to provide refuge or refuelling for SAR aircraft, this will be useful information to pass to the SAR authorities and providers.

4.5.5 Onshore helicopter facilities

Onshore facilities that will be required include heliports and aircraft maintenance and operational bases. In many cases, OWCs (or their helicopter operators) will use existing facilities, rather than developing new infrastructure specifically for the wind farm.

OWCs should make provision for the onshore support infrastructure necessary to maintain helicopter operations.

OWCs should engage with the helicopter operator and the appropriate authorities to determine onshore infrastructure requirements.

OWCs making onshore facilities available to helicopter operators should ensure their suitability for aviation-specific aspects (e.g. aircraft handling and fuelling facilities, fire cover, lighting, approach guidance) and for the general working environment and welfare.

Where one organisation provides the building shell, and another the maintenance service, there needs to be a clear agreement as to who will provide heating, lighting and welfare facilities. A poor working environment is a health and safety issue in its own right and can also impact the safety and quality of work on aircraft.

Compliance with regulatory minimum requirements will not be sufficient to ensure a safe working environment in onshore facilities. This is particularly true for fire-fighting provision (and security). The acceptable lighting and noise levels, space etc. can all vary depending on the regulator, helicopter and operational specifics.

The helicopter operator and hence, potentially, the state of operation, are unlikely to have been selected at facility design phase. The national regulatory requirements may therefore not yet be known, so careful foresight and management are required to avoid potential problems.

The HeliOffshore WinReP (Ref) gives further information on what onshore facilities are required and the associated safety considerations.

OWCs should follow the HeliOffshore WinRep (Ref) for the design of heliports and onshore aircraft maintenance and operational bases.

4.5.6 Helideck and hoist platform design

In designing helidecks and hoist platforms, **OWCs should take into account factors including:**

- Dimensions of the landing/hoist area, appropriate to the aircraft types to be accommodated.
- Structural design to support the weight of the aircraft (allowing for hard landings).
- The ability of structures and attachments to resist forces from rotor downwash (as well as other dead and live loads).
- Safety railings for personnel, and netting to prevent dropped loads.
- Design and detailing of railings etc to avoid snagging of hoist hooks and wires, or of PPE (a harness may catch on the end of a guard rail, for example).
- Deck/platform surface: friction, slope and drainage, *****suitability for hoist wire earthing (careful design and material selection is needed to ensure effective discharge, whilst also meeting requirements for protective, coloured, non-slip surfaces that are resistant to pin-prick damage where the electrical contact occurs).
- Obstacle considerations – clearance, lighting and marking, frangibility (see Section 4.5.2).
- Turbulence from neighbouring structures affecting helicopter operations.
- Visual aids and indicators to pilots: marking and lighting. *****It is important for pilots to be able to identify individual WTG numbers from typical approach angles: WTG identification numbers on top of the nacelle can be masked by platform rails etc until almost directly overhead.
- Fuelling facilities.
- Rescue and fire-fighting provisions.
- Helideck/platform movement on vessels or floating WTGs. See Section 4.5.10.
- *Interfaces between hoist platform status indications and the control system for positioning and locking of the WTG.
- Meteorological factors.
- Access, egress and evacuation routes (e.g. in terms of adequacy for personnel and cargo handling, and slip, trip and fall risks).
- Certification requirements: in some jurisdictions, helidecks and hoist platforms must be certified by the NAA or an external agency prior to use.

The specification of helidecks and hoist platforms is decided nationally and so differs between states. National guidance for example can be found in Danish Civil Aviation Administration document BL3-5 (Ref) and UK Civil Aviation Authority document CAP 437 (Ref). For hoist platforms, UK, Danish and German requirements are all slightly different; for example, for

helidecks each state incorporates the ICAO SARPS in Annex 14 (Ref) Volume II into national requirements.

A key reference for the design of helidecks (both fixed and on vessels) and helicopter hoist platforms, giving detailed guidance on many of these points, is CAP 437 (Ref). Although this is a UK document, it is widely used internationally and is referenced in other guidelines, such as IOGP 590 (Ref) and IOGP 690 (Ref). Points preceded by an asterisk ***** in the list above are not covered in CAP 437.

Some national requirements may be more stringent than CAP 437. For example, CAP 437, following the ICAO SARPs of Annex 14 Volume II, requires the helideck to be sufficiently large to contain a circle of diameter D equal to the largest dimension of the helicopter when the rotors are turning. However the Norwegian CAA (Regulations relating to helicopter operations – use of offshore helidecks (Ref)), requires a minimum helideck size of 1.25 D. Vessels on helidecks may also need to be larger due to Pitch Roll and Heave (PRH) considerations – see for example FSF BARSOHO (Ref).

Other references on helideck design include HSAC Recommended Practice 161 (Ref) (which references CAP 437) and HSAC Recommended Practice 164 (Ref).

4.5.7 Load-carrying limits

When planning for and managing load-carrying applications of helicopters, it is important for OWCs to recognise that weight and size limits will be determined by the most restrictive of:

- the safe working load (SWL) of the lifting equipment;
- the aircraft payload;
- the ability of operators to handle the load and stow it safely, noting that this may be in a restricted space such as inside the aircraft cabin or WTG nacelle, and
- floor load limits on the areas where the load is to be placed.

4.5.8 Airspace, ATM and CNS

The location and design of offshore wind farms raises a number of significant airspace, ATM and CNS considerations. These can impact on helicopter operations in support of the wind farm (as well as on other airspace users, though that is outside the scope of these guidelines).

The nature and importance of these issues will depend on the location and design of the wind farm, and there are complex interdependencies between them. The related constraints and requirements will vary from state to state. Consequently, it is not possible to give specific guidance to cover all possible scenarios. Instead, this guidance identifies a range of key points that should be considered.

Because these issues are complex, and can have consequential effects on wind farm design and the ability to integrate helicopter support and emergency response into the development, it is essential that engagement with the relevant aviation authorities and stakeholders is initiated very early on in the planning stages. Failure to do this creates a significant risk of increased complexity and costs during later stages of a project.

OWCs should engage with the relevant NAA(s), ANSP(s), defence organisations, SAR authorities, and potential helicopter operator(s) at the earliest opportunity, to ensure that all relevant issues are understood and addressed in the planning, consenting, construction and operation phases.

OWCs may also wish to liaise with these parties in order to ascertain the suitability of the existing airspace and CNS arrangements, and discuss potential improvements. Topics that are likely to need to be covered in early engagement include the following:

a. airspace characteristics, including airspace classification in the vicinity of the proposed development and affecting support operations;
b. airspace policy and planning guidance;
c. consultation zones in relation to airspace and offshore developments;
d. SAR airspace and CNS requirements, including for operations within a wind farm;
e. Air Navigation Service Providers (ANSP) and offshore ATC services;
f. CNS infrastructure, including GNSS;
g. responsibilities for aircraft coordination and control in and around the site;
h helicopter operational topics, including flight conditions, obstacle clearance, approach, missed approach and departure procedures, and transit routes (taking account of the locations of onshore facilities, refuelling points, tasking itineraries etc);
i. adjacent air activity e.g. helicopter support to other wind farms or oil and gas installations;
j. military activity and training areas, and other restricted areas;
k. related UAS issues, and
l. the NAA's perspective on OWC responsibilities.

This is not an exhaustive list and the issues that need to covered for any particular wind farm development will be dependent on the specific circumstances. In addition, OWCs should be aware that in dealing with different national administrations there is the potential for significant variations, notwithstanding the international principles described in Annex C

Many of these aspects will not be the direct responsibility of the OWC to resolve; but they will have implications across all aspects of wind farm development and should be addressed appropriately. For example, ATS provision for helicopters in transit to and from the site falls under the auspices of the relevant ANSP service provider(s), but the OWC still has a duty of care to its employees and others whilst they are in transit.

Although outside the scope of these guidelines, it may be convenient for this engagement process also to include the potential effects of the wind farm on airspace use and CNS services for other users, as these topics will usually also be dealt with, initially, in the consenting process.

4.5.9 Voice and data communications

Voice and data communication arrangements offshore are often far from ideal. The main problems are:

– poor radio coverage;
– the use of multiple, sometimes incompatible, radio systems by the various parties involved (vessel operators, construction teams, maintenance technicians etc);
– untrained users with poor radio discipline.

OWCs should ensure that communication systems and competences are in place to enable, as a minimum, provision of a flight watch service.

OWCs should engage with wind farm operational parties to minimise the number of different radio systems and frequencies

OWCs should ensure that all personnel who may use radio are properly trained.

OWCs should ensure that the necessary consents for operation, including for frequency allocation and licensing of radio stations and personnel, have been obtained from the relevant authorities.

The requirements for consent will depend on the jurisdiction. In the UK, for example, the Civil Aviation Authority is responsible for frequency allocation and for licensing of operators, while the telecommunications regulator, Ofcom, issues licences for aircraft and ground stations. Where there is cross-border operation, and for sites close to a national airspace or other boundary, it may be necessary to ensure that the appropriate international coordination has taken place. Advice should be sought from the relevant national authority depending on the circumstances. Some NAAs (e.g. Taiwan) will not allow non-aviation companies to hold an aviation frequency licence. This is due to the relationship between aviation approvals and aeronautical frequency assignments.

OWCs should consider holding communication exercises (covering normal, abnormal and emergency situations) before operations begin.

4.5.10 Hoist platforms on floating WTGs – special design considerations

For floating WTGs, a potential issue is whether the movement at the top of the WTG could present difficulties for helicopter hoisting. Some wind industry organisations have carried out simulations or measurements to assess the movements, but it is unclear at present how the movement of a floating WTG compares to that of a fixed one.

It is also unclear what criteria can be applied to decide whether the movement is acceptable or not. There is guidance on pitch, heave and roll limits for helicopters using helidecks on vessels (see 6.7) but this cannot simply be applied to helicopter hoisting. Firstly, the factors affecting the safety of hoisting a person to and from a platform are different from those for landing a helicopter. Secondly, the movement at the top of a WTG is likely to be very different in nature from that of a vessel: lateral movement due to tower sway may be more significant than roll, pitch or heave. The movements may vary greatly according to, for example, how the WTG is anchored, resonance of the structure, sea state and wind.

OWCs should liaise with WTG OEMs and helicopter operators to establish likely movements for the specific WTG type, under different sea state and wind conditions, and assess how these may affect hoisting operations.

It is possible that in some jurisdictions, floating WTGs, will be categorised as vessels for some legal and regulatory purposes. If so, it will be necessary to comply with health and safety legislation for vessels rather than, or as well as, those for fixed structures.

OWCs should ascertain whether floating WTGs are categorised as vessels or fixed structures for the purposes of health and safety legislation in the relevant jurisdictions, and ensure compliance with all relevant requirements.

Categorisation considerations, and ambiguities in these, must not be exploited in order to achieve compliance more easily. Decisions should be based on good safety management principles and through risk assessment, not on compliance alone. In general, the starting point should be to aim for compliance with whichever is the more stringent.

4.5.11 Personal protective equipment (PPE)

PPE requirements for travel by vessel, travel by helicopter, and work tasks are different. Examples of potential incompatibilities include:

– The auto-inflation function on lifejackets designed for use on vessels or working around water would hinder escape in the event of helicopter ditching.

– Hi-viz vests, worn over a harness and life jacket by HLOs in order to identify them, can be a problem as they would be in the way when under hoist and so must be taken off, potentially creating a free lightweight object that could be ingested by the engine. An alternative is to provide different coloured helmets to identify the various roles.

OWCs should identify the needs for, and arrange for provision of, appropriate PPE, resolving any compatibility issues.

4.6 MODELLING, SIMULATIONS AND TRIALS

Before beginning live operations to helidecks or hoist platforms, or transits in the vicinity of WTGs, **OWCs should assure themselves that the wind farm design and helicopter operational concept are safely compatible.** Key areas to consider include:

– aerodynamics: how WTGs and other structures may affect air flows in their vicinity;

– visual aspects: adequacy of visual cues, lighting and marking, and

– the 'flyability' of approach, departure and transit paths – in normal, abnormal (e.g. engine-out) and emergency/SAR conditions.

WTG OEMs should already have considered the first two of these topics as part of the WTG design process (which is outside the scope of these guidelines), but some aspects will depend on the specifics of the wind farm: its layout, how and when helicopters are intended to be used, and the helicopter types to be accommodated.

To eliminate the safety risks associated with trials, **OWCs should use mathematical modelling (e.g. computational fluid dynamics) and simulation in preference to live trials.** In addition to the safety considerations, it would be impracticable to carry out live trials covering all possible combinations of parameters (wind speed, direction, helicopter type, WTG orientation, blade configuration etc).

3-dimensional visualisation and virtual reality techniques may be helpful in assessing visual aspects. From the SAR point of view, proposed layouts can be assessed, and confidence in them developed, by modelling them in the SAR helicopter flight-simulator database and conducting simulated flight trials.

OWCs should also make use of relevant published information and guidance. For example (CAP 764) summarises some results of research into wake turbulence.

Trials may nevertheless still be required to gather professional input from pilots and hoist operators. Initially, these should be without passengers on board.

Whenever a new WTG is introduced to a helicopter operator, they should carry out, assess and keep a log of flight trials[8], showing key parameters such as the wind speed and relative orientation of the WTG during approach and hover.

The design, conduct and evaluation of modelling and trials are specialist subjects. It is therefore recommended that **OWCs should in the first instance liaise with the WTG OEM – who may already have appropriate data – and with the helicopter operator, to establish what further work may be needed**.

Although these activities of modelling, simulation and trials have been described here at the end of the 'Design' section of the guidelines, it is not intended that they should only be conducted at the end of the design process, as a 'final check'. Rather, they should be integrated into the design process, informing it iteratively, and thus helping to ensure safety by design.

8 In these guidelines, an important distinction is made between 'trial' and 'test' flights. A trial is used to gather data and professional feedback, for the purpose of evaluating and potentially improving a system. A risk assessment should be carried out and specific controls (e.g. conducting the flight without passengers on board) put in place where the assessment shows them to be necessary. A test flight, on the other hand, involves a greater degree of uncertainty about outcomes, and so potentially carries a much higher level of risk. Only suitably qualified and experienced pilots can conduct test flights, and the test must be subject to stringent controls to mitigate the inherent uncertainty. Tests should only be necessary in exceptional cases – where modelling or trials are insufficient and following a thorough risk assessment and implementation of risk control measures.

5 CONTRACTING HELICOPTER SERVICES

This section covers the approach to contracting helicopter services for various purposes, including the selection of suitable helicopter operators and aircraft.

5.1 CONTRACT SPECIFICATION

5.1.1 Overall tasking

OWCs should provide prospective helicopter operator(s) with a detailed statement of the planned tasking for helicopter support.

Without a clear definition, it will not be possible to be assured that a helicopter operator has the capability to meet the OWC's needs effectively.

Factors to consider include:

– helicopters are likely to be re-tasked frequently and/or to fly multi-task sorties to meet a range of customer requirements;
– notice periods will be required for additional or re-task requests, and meeting such requests will be constrained by aircraft type (e.g. passenger numbers, payload limit), and
– availability, reliability and maintainability, e.g. provision of back-up aircraft and spares, qualified maintenance personnel to undertake repairs.

5.1.2 What the OWC will provide to the helicopter operator

OWCs should inform the helicopter operator(s) of what, if any, supporting infrastructure and services they can provide or make available.

For example, if the operator is expected to use a particular onshore heliport or offshore helideck as a base, the helicopter operator will need information about its manning, opening hours, fuelling facilities, communications and fire cover. Further details of such infrastructure are given in 4.5.5, 4.5.6 and 4.5.8.

OWCs should take great care to ensure coordination between parties in situations when the helicopter and helicopter operating base are supplied by different organisations, to ensure clarity about expectations and responsibilities.

5.1.3 Roles and responsibilities

Key topics to cover in the contract between the OWC and helicopter operator include the following:

OWCs should ensure that there is a clear statement of the safety roles and responsibilities of the OWC, helicopter operator and any relevant third parties (e.g. any separate maintenance contractor).

Interface areas where particular clarity is needed to avoid gaps, duplication or misunderstandings include responsibilities for:

a) training of passengers, and the standards to which they are to be trained;
b) inspection and maintenance of helideck/helihoist platform and equipment (including for example keeping helidecks and platforms clear of contamination or debris);
c) provision and maintenance of fittings and equipment – e.g lash-points, lifting bags or nets;
d) supply of fuel, quality of fuel, checking of fuel supply system;
e) provision of onshore facilities – e.g. hangars, lighting, heating, welfare, security/ border control, fire cover, weather information;
f) communications plans;
g) emergency plans, and
h) periodic review of relevant site-specific operational procedures.

5.1.4 Documenting the contract specification

OWCs should capture all of the points considered in 5.1.1 to 5.1.3 in a consolidated, detailed requirements document (often referred to as 'Employer's Requirements'). This will articulate the standards required to the helicopter operator before a contract is issued. It is important that competent civil helicopter operations expertise is involved in developing this document.

The Employer's Requirements may also be a convenient place to specify operational and commercial factors such as the number and nature of flights to be provided, passenger and cargo capacity, availability and response times.

OWCs should recognise the safety and operational constraints on helicopter operators when setting Employer's Requirements, in order to ensure that there is no pressure to compromise on safety.

An example of the safety-related elements of an Employer's Requirements document is provided in Annex H.

5.2 SELECTION OF HELICOPTER OPERATORS

In identifying, pre-qualifying and selecting potential helicopter operators **OWCs should filter out any operators that do not meet minimum safety criteria, and then score the remaining candidates using an appropriate mix of safety and other criteria. NB: OWCs should <u>not</u> create a shortlist of 'safety-approved' bidders and then select purely on price and other criteria. The aim is to eliminate unacceptable bidders first AND then still take safety into account when deciding between those that remain.**

This will help to eliminate any commercial pressure to go for the cheapest solution.

Where a weighted sum scoring system is used, the aim can also be achieved by setting a mandatory minimum safety score, such that an unacceptable safety score cannot be outweighed by good performance against other criteria.

Key safety indicators to use in screening and subsequent assessment include:

i. A robust, credible, high-quality SMS.

ii. Clear governance, roles and responsibilities for safety.

iii. Evidence of informed senior management leadership on safety.

iv. An appropriate Air Operator Certificate (AOC) and any relevant additional approvals from the NAA (see Annex G for detail). Holding an AOC and additional approvals requires the helicopter operator to have certain additional safeguards in place, but does not in itself guarantee safety.

v. Demonstrable qualifications, training, competence and experience in the specific intended activities. For example, having IFR-rated pilots will improve safety, as well as opening up the conditions under which the helicopter can fly. Specialist training of pilots and crew is required for underslung loads and for HHOs. The HeliOffshore WinRep (Ref) gives further information.

vi. Compliance with relevant good practice – e.g. do they follow these guidelines and the HeliOffshore WinReP? If there are any deviations these need to be justified, risk assessed and accepted, in particular by any employer of passengers travelling on the helicopters.

vii. Availability and findings of satisfactory internal and external audit reports.

viii. Accident/incident records, and how lessons have been learned and implemented, provide an indicator of overall safety culture as well as of any specific safety topics of concern. For example, an unusually large number of serious incidents would be a red flag, but so too would very few records of near misses and safety concerns, as this may indicate a poor reporting culture.

ix. External certification to relevant standards, such as ISO 45001 or OHSAS 18001 (health and safety) and ISO 9001(quality).

x. Company structure, size, resilience and financial stability.

Some of these questions may already be asked within the OWC's standard contractor management or procurement system, but others may require a more aviation-specific approach, possibly supported by an audit by an aviation specialist.

OWCs should avoid the temptation to copy and paste supplier evaluation questionnaires (SEQs) from other OWCs, or from other contract processes. The aim should be to ask questions that will help differentiate safer helicopter operators, specifically in the offshore wind context. An aviation specialist may be needed to help develop the SEQ and assess responses.

The **OWC should ensure that aviation specialist support is involved in developing the SEQ and evaluating responses.**

5.3 SELECTION OF AIRCRAFT

OWCs should independently verify that the aircraft proposed/selected by the helicopter operator will meet their needs.

Selection of aircraft type(s) will be iterative with the design of the infrastructure and decisions about what helicopter applications are required.

In practice, the selection of suitable aircraft is likely to proceed in parallel with selection of the helicopter operator. Helicopter operators should be able to advise on the capabilities, advantages and disadvantages of available helicopter types and models for the required

tasks. However, as each individual operator will typically only have access to a small number of aircraft types, **OWCs should check that they understand the suitability of the choice of aircraft offered by any specific operator, and ask for advertised capabilities (e.g. 'versatile', 'long-range') to be objectively quantified**.

Key parameters to consider (all of which may have implications for safety, or at least need to be considered together with safety) include:

– passenger capacity;
– payload limit;
– equipment fit;
– range;
– performance (speed, engine-out performance during hoisting, and climb-out past obstacles);
– operational capability (e.g. weather limits…), and
– environmental performance – carbon and other emissions, noise …

Helicopter models change over time and variants may be available, with different crewing and equipment fits (e.g. for avionics). Selecting an aircraft is not, therefore, a simple matter of looking on a manufacturer's website. Consequently, unless the OWC has in-depth, up-to-date knowledge of available helicopters and their safety and other features, **OWCs' initial approach to potential operators should be framed in terms of the proposed applications and safety requirements, rather than by directly asking for a specific helicopter type.**

As described in 3.4 and 4.5.8, there is a need to avoid proliferation of communication systems on the project. **OWCs should give particular attention to what radio equipment is fitted, taking account of compatibility with other technologies that will be used on the project.**

Further information on aircraft specification is provided in the HeliOffshore WinReP (Ref).

Safety requirements can be specified in terms of:

– equipment or features required (e.g. dual engine, flotation systems, redundancy of safety-critical equipment), or
– more formally, in terms of functionality, performance and integrity requirements.

The latter is less dependent on knowledge of available technology, but requires more formal safety analysis.

In addition, **OWCs should seek confirmation that the aircraft is compliant with airspace requirements for the wind farm location and transit route.**

Given the nature of the offshore environment, **OWCs should not allow single-engine helicopters to be used for any purpose offshore.**

For dual-engine helicopters, the one-engine inoperative (OEI) performance – the ability to hover or climb away on a single engine – is a key specification factor. However, there are complexities and differences, even at regulatory level, in:

– the assumptions used in calculating requirements e.g. about fuel reserves, wind speed, and allowance for the helicopter being unable to hover with the wind directly 'on the nose' (the optimum situation);
– how it is presented in manufacturers' manuals, and

– different views of what performance is required in a given situation.

The HeliOffshore WinReP (Ref) contains information, agreed with helicopter manufacturers, to help understand and resolve these technical complexities, but the top-level point for OWCs to understand is that the performance requirements must be clearly related to a risk assessment of the specific tasks and environment, not only based on aircraft performance in isolation. For example, the risk assessment should consider:

a) The helicopter configuration and load at the time of the failure.

b) The task being carried out and what is needed to bring it to a safe state. For example, in the case of helicopter hoisting, can the aircraft complete the ongoing segment of the hoist cycle (up or down) on one engine and then safely fly away?

c) How long it will take to achieve a safe state. For example, again in the case of helicopter hoisting, this will depend on factors such as cable length, and whether it is safer for a passenger to disconnect and stay on the landing site, or to be hoisted back into the aircraft.

d) What are the available fallbacks and contingencies in the event of a failure or error?

e) What is the obstacle environment? (see also 4.5.3). Is there an adequate clear volume for the helicopter to climb safely away on one engine? (The climb gradient may be as little as 1 % – see CAP 764 (Ref)).

OWCs should collaborate with the helicopter operator(s) to ensure that suitable and sufficient risk assessments are in place for all helicopter activities, taking account of the specific tasks and environment as well as aircraft performance.

5.4 CONTRACT STRUCTURES

5.4.1 Routine operations

For routine wind farm operations, the most frequent use of helicopters is likely to be the transfer of maintenance technicians to and from the wind farm. Maintenance is typically provided by a contractor to the OWC – in this situation the wind farm operator. As shown in Figure 2 (based on the RenewableUK ORAG (Ref)), there are two common models of contractual relationship between the wind farm operator, maintenance provider and helicopter operator.

In both options the wind farm operator has ultimate responsibility for health and safety.

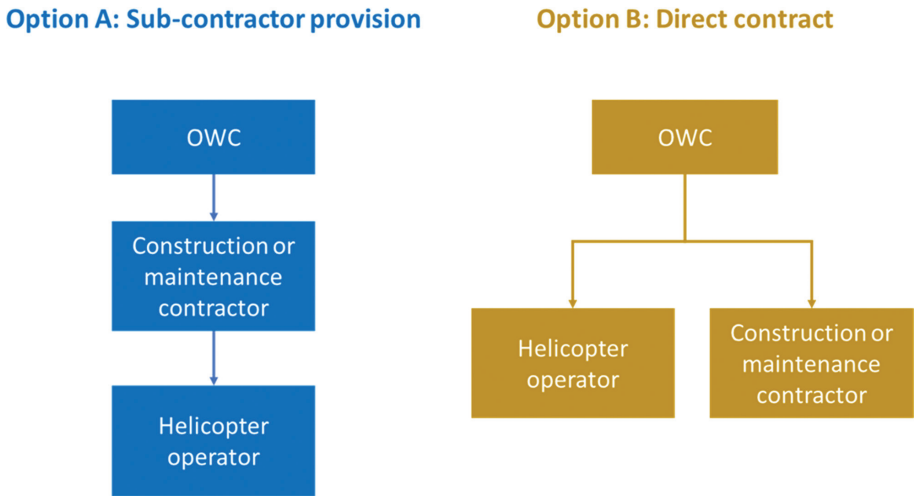

Figure 2: Options for contract structures

In Option A, the wind farm operator contracts the construction/maintenance provider, who in turn contracts the helicopter operator.

In Option B, the wind farm operator contracts the helicopter operator and provides that service to the construction/maintenance contractor.

Similar options exist wherever a contractor to the wind farm operator has their employees transported by helicopter.

In all cases, the employer of those being transported by helicopter should assure themselves of the safety of the operation through oversight of the helicopter operation.

Option A Subcontractor provision

In Option A, **OWCs should monitor and audit both the construction/maintenance contractor and the helicopter operator**. In particular, monitoring of the helicopter operator is important in preventing the wind farm operator becoming too remote from, and thus vulnerable to, risks associated with helicopter operations.

Under this option, the construction/maintenance contractor can directly monitor, audit and control the risk to their employees who travel on the helicopters. However, **OWCs should ensure that their safety requirements are incorporated into the contract between construction/maintenance contractor and the helicopter operator.**

Option B: Direct contract

In Option B, the wind farm operator has direct supervision of both the construction/maintenance contractor and the helicopter operator, and as such **OWCs should monitor and audit both the construction/maintenance contractor and the helicopter operator**.

Also, the wind farm operator must recognise that the construction/maintenance contractor, while having a duty of care towards their employees, cannot in this structure directly impose its own policies and standards on the helicopter operator. **Hence the OWC should ensure that Aviation Policies and standards of both wind farm operator and maintenance provider are aligned and meet minimum requirements.**

The construction/maintenance contractor will need to monitor the aviation risk control of both the OWC and the helicopter operator to ensure that its employees are not being put at risk.

Deciding between Options A and B

OWCs should review the advantages and disadvantages of these contractual models, and any other appropriate contract structure options, and make an informed, safety-based decision that ensures clarity of responsibilities and close cooperation.

OWCs should agree on arrangements for oversight, monitoring and auditing the various parties.

On some projects both options have been used, with Option B during construction and Option A during O&M.

The work involved for all parties in monitoring and auditing each other can be reduced when audits are jointly conducted and/or observed.

The ongoing control of aviation is often provided by a combined air and marine coordination team, with the air coordination element provided by whichever company contracts the helicopter.

5.4.2 One-off operations

In addition to long-term contracts for activities such as WTG maintenance, OWCs may need to contract one-off helicopter operations for purposes such as specialist surveys or inspections, photography, media visits or non-schedule, urgent transportation of passengers or cargo.

The standards of safety sought for such one-off operations should be no different. To give an extreme example, an OWC must not ask a helicopter operator to do something outside their competence or AOC limitations, even 'just this once'. However, questions of reasonable practicability and proportionality will arise regarding how far the OWC can go in qualifying, selecting and monitoring an operator. **As a minimum, OWCs should ensure that a competent aviation specialist carries out a risk assessment of the operator, specific to the site and the operation required, in its operational and environmental context**.

A mere check of compliance, for example that the operator has a current AOC, is never sufficient. Although aspects of the case are specific to UK law, the *StormHarbour* case (Ref) is a salutary reminder of OWC responsibilities.

Guidance on the SMS requirements for various types of contract (standard contracts, short-term, ad hoc and one-time charter) and the associated on the exposure under can be found in Table 1 of IOGP 590-B.

5.4.3 Sharing helicopter services and assets

Sharing helicopter services or assets (such as helidecks) with neighbouring wind farm OWCs, or other parties such as oil and gas operators, has potential safety benefits in terms of the experience and recency of flight crew. It may also have financial benefits, from economies of scale and more efficient use of resources.

It may involve, for example:

– shared use of helidecks and onshore bases, and their facilities such as for fuelling, either routinely or by making them available as diversions;

– sharing of support services and facilities, such as for training, and
– sharing an aircraft between customers e.g. so that it can transport employees of different companies.

However, **OWCs should, in liaison with the helicopter operator(s), identify and manage the potential safety implications of shared services and assets.** Areas for particular attention include:

– compatibility of safety requirements between different OWCs;
– compatibility of different tasks assigned to a shared flight;
– clarity of responsibilities for monitoring and auditing, and agreements regarding sharing of findings;
– potential for conflicting commercial pressures on the helicopter operator – how tasks will be prioritised, especially in the event of delays, diversions or operational problems, and
– inter-site coordination of aviation activity and communications.

The adoption of common standards and procedures as outlined in the HeliOffshore WinReP will be helpful in ensuring the safety of shared services and assets.

Annex F gives an example agreement between two wind OWCs for use of a common helicopter operator.

5.4.4 Multiple helicopter operators

The converse of the service-sharing situation in 5.4.3 is where more than one helicopter operator is working on a site. In this multi-operator case it is possible that, for example, technicians could be taken out to the wind farm by one operator and returned by another.

OWCs should identify and manage the potential safety implications of multiple helicopter operators.

Areas for attention include compatibility between helicopter operators regarding:

– coordination of helicopter activities;
– expectations on the OWC and others;
– standard operating procedures – for example in relation to required WTG configuration for hoisting;
– passenger training;
– expectations on passenger roles and responsibilities, e.g. for assisting with loading the helicopter (see 2.1.3);
– PPE requirements and provision;
– communications technologies, and
– hand signals used between ground crew and pilots.

Requiring all helicopter operators to adhere to common standards, such as in these guidelines and/or the HeliOffshore WinReP (Ref) will help to ensure compatibility and reduce risk.

6 NORMAL OPERATIONS

This section covers safety management during the day-to-day planning and execution of normal helicopter operations. In general this will involve the implementation of the plans and roles defined for the OWC and helicopter operator in Sections 4 and 5 respectively. However, the following 6.1 to 6.6 outline some key aspects that, while they need to be planned for in advance, will also require live monitoring and actions on the day.

6.1 CONSTRAINTS ON HELICOPTER OPERATIONS

Helicopter operators will typically obtain, monitor and respond to forecast weather conditions that may directly affect helicopter operations. However, **OWCs should ensure that there is clarity about responsibilities for providing information, and the parameters and thresholds that will be used to define weather and other limits on helicopter operations.** For example, will information from the wind farm's own anemometers be provided to helicopter operators?

6.1.1 Environmental constraints

Key **environmental factors** include the following. Both current and forecast information will be required. While the helicopter operator will normally be responsible for taking these factors into account in planning and operations, OWCs need to be aware of their importance.

Wind speed and direction, air density

Provided that the flight paths are unobstructed, pilots will always approach and depart into the prevailing wind, because of the greater power margins and the improved chances of safe recovery from a single engine malfunction. Although higher wind speeds lead to greater turbulence downwind of WTGs, helicopter performance in the hover improves with increasing relative wind speed. This is because the relative wind reduces the overall hover power requirement and the loading on the tail rotor.

Helicopters are able to operate in wind speeds generally above those of WTG hatch opening and nacelle working restrictions. It is therefore likely that the WTG manufacturer's restrictions will determine the upper wind speed limit, rather than the helicopter's performance.

Air density (which depends on pressure, temperature and humidity) affects engine and aerodynamic performance and so must be taken into account to ensure the aircraft has adequate power margin.

OWCs should be aware of how wind speed and direction, and resulting constraints relating to routeing, time and fuel requirements, can affect what helicopter tasking is practicable.

OWCs should agree with the helicopter operator whether, and how, real-time wind information from the site can be made available to the helicopter operator.

Sea state

Sea state (or significant wave height – SWH)[9] is a key parameter affecting whether a helicopter will remain upright and float following a forced landing on water ('ditching'). It also affects the ability to recover people safely from the water using rescue equipment such as Dacon scoops.

OWCs should not (implicitly or explicitly) plan for, require or allow flight over a sea state (or SWH) above that for which – as an absolute minimum – the helicopter is certified to ditch (this is already mandatory in some states) and for which there is a good prospect of safe recovery.

It is important to note that the adequacy of aircraft certification requirements has been questioned – see CAP 1145, paras 9.2 and 9.15. Ditching performance in real sea conditions can therefore be less than that claimed.

OWCs should ensure that the helicopter operator fully understands the operational and technical certification issues and limitations in respect of ditching, and that appropriate sea state/SWH limits are put in place accordingly.

Temperature

Sea and air temperature affect survivability in the water, and hence are important in determining what clothing is required – e.g. immersion suits. There are various sources of information on expected survival times in relation to temperature and clothing. However, it is important to recognise that temperature is not the only factor that affects survival[10].

Lighting levels and visibility

Night and/or low visibility/IFR operations will require more stringent safety measures – for example in relation to obstacle criteria and pilot training.

HHOs are not generally conducted at night or in low visibility, other than in emergencies. Indeed they are advised against by some regulators. The UK CAA, in CAP 437 (Ref) for example, states that '*Helicopter hoist operations to wind turbine platforms should be conducted by day in Visual Meteorological Conditions (VMC) only*'. However, with advances in night vision systems, other aircraft systems and the correct controls, routine night hoist operations may become possible in the future.

OWCs that see a potential need for night or low visibility operations should carefully consider the requirements, criteria and mitigations, engaging with the helicopter operator(s) and safety regulator.

Visual cues

The visual cues available to pilots flying over water are less reliable than over land. In low wind conditions with low sea states, it is difficult to assess aircraft height visually. This can lead to aircrew disorientation or loss of situation awareness and has been a factor in a number of offshore accidents.

9 Sea state and weather limits for helicopters are not straightforward to define. Different metrics are used – in some cases sea state, in others significant wave height. Sea state tends to be used in helicopter ditching certification, SWH in the maritime world e.g. for marine transfer limit. Practices can vary by region, operator, regulator, or helicopter. Please see the HeliOffshore WinRep (Ref) for further information.

10 A useful reference is UK HSE's *Review of probable survival times in the North Sea* (Ref), and there is some more recent information in the G+ *Good practice guidelines* – Wind Farm Transfer (Ref), albeit in the different context of falling into the sea during a vessel transfer. There is ongoing research updating knowledge in this area.

OWCs should help avoid aircrew disorientation or loss of situation awareness due to inadequate visual cues. These include:

– limiting operations that require more accurate visual clues, such as hoisting, to daytime Visual Meteorological Conditions (VMC);
– following the HeliOffshore recommendations regarding crew complement and
– having IFR-rated pilots.

Inclement weather

Other forms of inclement weather, such as icing, thunderstorms or volcanic ash can present a direct hazard to aircraft or require operational changes or limitations.

6.1.2 Operational constraints

Practical limits on safe helicopter operations do not only depend on the capabilities of the aircraft and flight crew. **OWCs should keep helicopter operators updated with information on operational factors that may affect safety**. These factors include:

– SIMOPs: for example, tall crane vessels used during construction can present aviation obstacles, necessitating restrictions on certain flight paths or operations;
– unserviceability of equipment, such as a WTG that cannot be configured for hoist operation, failure of the hoist platform status light or a communication outage;
– the ability to maintain the whole wind farm operation and the emergency response chain. For example, there may be no point in despatching a helicopter to collect someone from a WTG if the wind speed is too high for them to open the nacelle hatches. Or, it may not be safe to use a helicopter if rescue vessel access is required but not available.
– any limits on the specific operation – e.g. time constraints due to SIMOPS, whether operations are limited to daytime only, and
– movements (roll, pitch, yaw, heave and lateral) of floating units.

A sound understanding of the interdependencies between system elements will be needed to identify such factors and their implications.

OWCs should involve helicopter operators in the planning and design of the wind farm where possible, and cooperate closely during operations, for example by inviting and giving feedback, and by holding regular safety coordination meetings.

6.2 HELICOPTER CREW COMPLEMENT

Some helicopters are designed and certified such that they can be flown by either one or two pilots, depending on conditions and pilot training. For two-pilot operations, this Multi Crew Concept involves more than simply having two on the flight deck – there must be clearly defined and complementary duties and responsibilities for each.

Parameters that affect the decision between one- and two-pilot operation include:

a) the helicopter type and equipment fit (e.g. level of automation);
b) communications demands – e.g. how many radio channels need to be worked;

c) the complexity of the activities being performed and their operational context – for example whether vessel landings or vessel hoisting are to be conducted;

d) meteorological and environmental conditions – e.g. visibility, day or night, whether flights are intended to take place under Visual or Instrument Flight Rules (VFR/IFR) and whether there is a possibility of having to enter Instrument Meteorological Conditions (IMC);

e) distance from land (navigation and communication loads are greater when out of sight of land;

f) traffic density and complexity;

g) availability and level of air traffic services;

h) length and nature of intended flights, and total flying hours over a period, since these affect alertness and fatigue, and

i) flight crew recency and experience.

To help helicopter operators address the single-/multi-pilot question, HeliOffshore has developed a Crew Composition Assessment Tool decision support tool, described in the WinRep (Ref), aligned with the findings of a consultation with operators and EASA. The tool is based on European responses, as this is where there is most experience of offshore wind, but it is intended to be applicable as good practice worldwide.

OWCs and helicopter operators both have a responsibility for the single-/multi-pilot decision, as part of their duty of care to employees. Setting clear, consistent, safety-based expectations (e.g. to follow the HeliOffshore WinReP) in the Aviation Policy, will help to prevent commercial considerations having undue effect.

OWCs should follow HeliOffshore WinReP regarding single or multi-pilot operation.

6.3 CONTROL/ISOLATION OF WTGS

OWCs should implement robust means for identifying, shutting down and re-starting WTGs, and for communicating WTG status to pilots.

CAP437 Appendix J specifies operational and technical requirements for a helicopter hoist status light, which indicates the safety status of the WTG to the helicopter crew.

Furthermore, robust procedures for communicating WTG status to helicopter crews, either before launch or en route to a WTG must be promulgated and agreed before commencement of helicopter operations. It should be possible to communicate any change in WTG status or level of control immediately.

Design features of WTGs to ensure safe control systems (e.g. as described in IEC 61508, BS EN 50308) are part of the design process undertaken by OEMs, and so are outside the scope of these guidelines.

6.4 FLIGHT OPERATIONS

Much of what an OWC does in relation flight operations will have been covered in following the guidelines on planning and design, and on contracting helicopter services (Sections 4 and 5). Much of the detail, especially concerning day-to-day matters, lies in the domain of

the helicopter operator, and involves highly technical, aircraft-specific matters. Section 10 outlines how OWCs can assure themselves through monitoring that the helicopter operator is following relevant good practice.

There are also aspects of flight operations in which OWC employees are directly involved in day-to-day safety as passengers, and can make an active contribution, for example by carrying out buddy checks on each other's PPE. A checklist for passengers (which can also be used as a tool for gathering feedback) is provided in Annex I.

A large component of the offshore workforce is dispersed and somewhat transient, with technicians and specialists from different companies typically moving between wind farms as construction and installation progress and as maintenance needs dictate. It is therefore particularly important that **OWCs should implement an effective system for communicating safety-relevant information to helicopter passengers and for eliciting feedback**. Methods include toolbox talks, providing handouts and posters in crew rooms, canteens, rest areas etc, and inclusion in the safety briefings given by pilots.

Many personnel going offshore for the first time are nervous and can cause confusion due to lack of awareness and anxiety. Also, many helidecks and assets are completely different from the next. A simple coloured armband worn over the helisuit can be used to let the flight crew, helideck crew and fellow passengers know that this person is new to the operation and may need additional guidance, reassurance and supervision until they become more familiar.

6.5 SITE SURVEYS

Survey type duties are routinely done by fixed wing aircraft or, increasingly, UAS. Where helicopters are used, however, there is relevant guidance in the HeliOffshore WinReP (Ref) Of particular importance to OWCs, the WinReP notes that, in Europe, survey operations are conducted under a Part-SPO (Specialised Operations) approval. This is less demanding than a CAT Air Operator Certificate (AOC) and the pilots and sensor operators are classified as crew. However, Part-SPO is far more demanding than in some other states, which allow these services to be conducted without any organisational approval, therefore necessitating greater oversight by the OWC.

Other sources include:

– The International Airborne Geophysics Safety Association (IAGSA) Safety Manual (Ref), available to IAGSA members. This includes a risk assessment tool specifically for geophysical survey purposes.
– IOGP 590 – Section H – Specialized operations: Airborne geophysical. Note that this points to the IAGSA Safety Manual for more detail.
– Key requirements for surveys, including offshore surveys, are available in threat/control format in the FSF BARS *Standard for contracted aircraft services* (Ref).

6.6 USE AND MAINTENANCE OF HOIST PLATFORMS AND HELIDECKS

CAP 437 (Ref) contains useful material on the operational phase of hoist platforms and helidecks, e.g. on procedures for friction testing and other inspections, meteorological reporting and emergency plans.

For helidecks, IOGP 590-F (Ref) and HSAC 163 (Ref) contain additional detail, especially of fuelling systems.

OWCs should implement a regular inspection and maintenance programme to ensure the safety and serviceability of hoist platforms and helidecks. This should include, for example, checking for and remedying where required:

- foreign object debris;
- surface contamination, e.g. by ice, snow, fuel or oil spills, guano;
- surface condition – friction characteristics, spalling paint condition, pitting etc;
- visibility of markings;
- functioning of all systems: status lights and other lighting, fire-fighting;
- vessel helideck movement monitoring systems;
- meteorological equipment;
- fuelling systems;
- security of handrails, safety netting etc;
- adequacy of supplies and equipment on the platform or helideck: rescue equipment, PPE etc. and
- any infringements of obstacle surfaces.

6.7 HELICOPTER-VESSEL OPERATIONS

6.7.1 General

General guidance on helicopter-vessel operations is available in the ICS *Guide to helicopter/ship operations* (Ref), CAP 437 (Ref), IOGP 590 (Ref), IOGP [690], EASA SPA.HOFO (Ref) and FSF BARSOHO (Ref).

Key points are that vessels should have:

- good two-way communication with the helicopter and helicopter coordinator;
- vessel personnel able to take over the flight watch, who have successfully completed a NAA-approved aviation radio course;
- a heading that provides the helicopter with favourable relative wind over the hoisting/landing point;
- a heightened damage control and fire-fighting state, with ground support personnel, e.g. those providing fire cover, and
- a means of monitoring vessel movements and communicating them to the pilot (e.g. via status lights).

OWCs should assure themselves that appropriate procedures for helicopter operations to/from vessel helidecks or hoist areas are described in the vessel operator's Operations Manual and properly followed.

6.7.2 Helideck provision on SOVs

As noted in 4.5.1, landing on a helideck is a safer means of personnel transfer than hoisting.

OWCs should provide helidecks on SOVs (and other large vessels as appropriate) if logistics require (noting that the availability of such helidecks may be significantly limited by vessel movement). As a minimum, SOVs should have a hoist area.

However, a vessel-mounted helideck is not a substitute for providing (as recommended in

4.5.1) a helideck on a fixed installation. Vessel helidecks cannot provide the same guarantee of a safe landing place as fixed ones, since the vessel may not be present at all times and will be unavailable for use when sea state or wind lead to helideck movements outside the limits for landing or stability when parked (6.7.3).

6.7.3 Limits on helideck movements

More specific guidance on permissible helideck movements for helicopter landing, in terms of maximum vessel PRH rate/amplitude limits, in some cases broken down into day/night and by aircraft and vessel category, are given in:

– the UK [Helicopter Certification Agency's Helidecks Limitations List Part C – Summary of Pitch, Roll and Heave Limitations (Ref)
– IOGP 590 (Ref) and
– IOGP 690 (Ref) – this, however, points to the HCA limitations.

FSF BARSOHO (Ref) provides further qualitative guidance and additional references.

In view of the overlap and mutual cross-referencing between these documents and the variations between them, helideck movement limits are a particular area in which **OWCs need to be assured that the helicopter operator has understood and can follow the relevant national requirements as well as the OWC's own safety expectations**

From April 2021, the UK CAA proposes to introduce additional parameters and associated limits relating to the stability once the aircraft has landed – i.e. to prevent it tipping or sliding on a moving helideck. These new parameters are as follows:

– Motion Severity Index (MSI);
– Wind Severity Index (WSI);
– Relative Wind Direction (RWD).

The scheme is being initially introduced with a conservative, generic limit covering all helicopter types. It is expected that validated helicopter type-specific limits will be introduced as and when produced by helicopter manufacturers.

6.7.4 Limits for hoisting

As noted in 6.7.2 for vessels (and in 4.5.1 more generally) landing on a helideck is a safer means of personnel transfer than hoisting. Hoisting may be unavoidable in some situations, though.

There is as yet no published guidance on vessel movement limits for hoisting. Depending on the nature of the movements, it is possible that movement criteria might need to be either more or less stringent than those for landing on helidecks.

Limits should be agreed with the helicopter operator, supported by a risk assessment taking account of the specifics of the situation, and of any local regulations. A large number of factors will affect the decision. Within the envelope defined by the risk assessment, the decision on the day whether or not to hoist a passenger will rest with the aircraft captain.

7 LATER LIFE CYCLE STAGES

Changes that may occur over the life cycle of a wind farm include life extension or repowering of WTGs and change of wind farm ownership and decommissioning. There may also be changes in the wind farm environment – for example in airspace and ANSP provision, in air operations to adjacent installation, and metocean changes because of climate change.

The OWC's generic SMS should already include a process for monitoring and safely managing such changes: identifying how safety could be affected and ensuring that appropriate arrangements are maintained or developed. It is not possible to give general guidelines covering all the possible scenarios, but one specific example is the case in which there is change of ownership[11] of a helideck-equipped offshore substation. If the OWC wishes to have continued use of the helideck, they will need to ensure appropriate safety and access arrangements.

OWCs should follow their own SMS process for identifying and safely managing changes over the life cycle of a wind farm.

11 Under the UK electricity supply regulatory regime, it is a requirement that the wind farm developer sells the transmission network (i.e. offshore platform, onshore substation and the export cable connecting the two) 18 months after the commercial operational date.

8 ABNORMAL CONDITIONS

Abnormal conditions are non-routine situations which do not present sufficient immediate risk to constitute an emergency. However, unless they are identified promptly and appropriately managed, they can lead to increased risk. There may be a direct safety effect. For example, the longer a loss of communication goes unnoticed, the greater the time for which people are exposed to the resulting risk. Alternatively, the effect may be indirect, where operational anomalies, delays or difficulties in turn erode the margins of safety.

Examples include:

– a missed approach by a helicopter – for example because the helideck is not clear;
– an unserviceable aircraft parked on the helideck;
– a 'dead' or jammed WTG, on which the nacelle or blades cannot be placed in the correct configuration for helicopter approach;
– a WTG that cannot be braked or locked in the correct configuration;
– loss of WTG control;
– loss of communications with personnel, or WTG systems;
– loss of power, and hence of helideck or hoist platform lighting, and
– incorrect hoist platform status indication provided to pilots.

OWCs should identify potential abnormal conditions, working with the helicopter operator, maintenance providers and other interested parties, and develop appropriate standard operating procedures (SOPs) and other risk control measures for such situations.

In many circumstances, there are well established aviation procedures in respect of certain abnormal circumstances and scenarios. It is essential that any SOPs introduced by the OWC are consistent with these and that their relationship is unambiguous.

The HeliOffshore WinReP (Ref) provides further information.

9 EMERGENCIES

In planning for and managing emergencies, **OWCs should follow the G+ Integrated Offshore Emergency Response (IOER) guidelines** (Ref)**.**

The main sections of the IOER are as follows:

– key principles of emergency preparedness and response;
– statutory authority, legislation, guidance and responsibilities;
– planning for emergencies;
– conducting emergency response;
– training and measuring performance, and
– learning from exercises and incidents.

An annex to the IOER provides more detail of national procedures, as yet only for the UK.

Topics covered by the IOER that are of most specific relevance to helicopters (whether as the subject of the emergency or as providing assistance in response) include:

– the roles of aviation stakeholders within an integrated response;
– obligations to assist others in distress at sea (for other than purpose-designed SAR aircraft, this may be limited to providing 'top cover': observation, reporting and rebroadcasting of information);
– additional guidance to that in 3.1.2 on the use of helicopters for medical transfer and evacuations, and
– rescue operations.

Other references include the UK MCA Marine Guidance Note 543 and the MCA/HSE Regulatory expectations for emergency response arrangements for the offshore renewable energy industry [Ref.]

10 CONTINUOUS IMPROVEMENT

10.1 MONITORING AND EVALUATION – GENERAL

Monitoring and evaluation are essential to maintaining and improving safety.

OWCs should establish and maintain an appropriate monitoring and evaluation programme.

Monitoring and evaluation should include the helicopter operator and other aviation services and facilities, such as contracted helidecks, onshore facilities, logistic coordination, handling agents and emergency response.

Both in-house and contracted out activities should be included.

Monitoring and evaluation activities include:

– consultation with employees and interested parties;
– reporting, investigation and monitoring of safety concerns and incidents, and other proactive and reactive KPIs;
– learning from experience, positive and negative;
– audits, and
– management reviews.

Good practices in relation to these will mostly be similar to those for safety management in general – for example the importance of ensuring that a 'just culture' exists within the organisation. However, some key points for OWCs and differences specific to offshore wind helicopter operations are noted in 10.2-3.

When developing an audit programme and engaging auditors, **OWCs should recognise, and make a clear distinction between, specialised audits conducted by an aviation specialist and generic audits against generally-applicable standards such as ISO 9001 (for quality) or ISO 45001 (health and safety).**

10.2 INCIDENT REPORTING AND LEARNING FROM EXPERIENCE

A weakness in current systems is that, even where there are national or regional schemes (e.g. ECCAIRS in Europe), the information recorded is often insufficiently granular and detailed for the specific needs of the wind/helicopter intersection. Also, there is very little cross-industry sharing of reports where an incident occurs involving interfaces between helicopter and WTG, or helicopter and vessel, such as debris on deck, small fires, battery fires, crane operations not stopped during helicopter operations, no guard vessel present. Variations in how incidents are reported, and information is shared, are a barrier to learning from experience.

To help overcome these problems, and to improve the feedback and learning more generally, **OWCs should**:

a) Make use of, and contribute to, industry reporting schemes and share information and experiences wherever possible.

b) Ensure that there are clear lines of responsibility for contributing to the safety reporting schemes of relevant authorities e.g. the NAA, EASA (ECCAIRS) (Ref), or

other industry incident reporting schemes such as the G+ database and Toolbox for offshore wind incidents.

c) Ensure that passengers feel included as part of the operation, so far as safety is concerned, for example by encouraging feedback (see Annex I checklist) and encouraging helicopter crews to be receptive to questions and comments.

d) Ensure that personnel are aware of confidential incident reporting/whistleblowing schemes such as CHIRP (aviation and marine) (Ref).

e) Ask for reports of safety-related occurrences even where no harm occurred and correct procedures were followed – e.g. engine system warnings, even if these were detected and remedied before flight. Review corrective actions and improvements.

f) Collect baseline (denominator) data, e.g. aircraft sectors flown/movements, flying hours, numbers of passengers carried, hoist cycles. These data are essential in order to calculate and compare accident/incident rates or frequencies rather than just absolute numbers of events.

g) Liaise with helicopter operators to understand how their Flight Data Monitoring (FDM) results can best be used. The important point for OWCs is how the operator uses FDM to detect trends or problems, and correct them, not the simple number or rate of exceedances (i.e. parameter values at which alerts are given)[12]. Guidance is available in the *HeliOffshore recommended practice Helicopter Flight Data Monitoring* (Ref).

h) Encourage and respond positively to feedback from helicopter operators.

i) Seek safety maturity measures – e.g. do the OWC and contractors provide an annual safety report to their senior management at least annually. This will ensure responsibilities and accountabilities are addressed and that improvement actions are appropriately prioritised.

j) Adapt, and make use of, published material on monitoring and evaluation, e.g. in the RenewableUK ORAG (Ref) Annex H. The HeliOffshore WinReP (Ref) provides further guidance on this.

k) Make use of regulatory guidance, e.g. EASA *Air Operator Certificate guidelines* (Ref).

l) Identify opportunities to improve through effective oversight of aviation activities and apply the lessons learned, in a timely manner, irrespective of geographical location.

10.3 SAFETY KPIs

In monitoring continued improvement, **OWCs should define KPIs that support monitoring, evaluation and development of a robust safety culture.**

However, KPIs cannot replace a thorough aviation audit programme. Furthermore, it is important that the KPIs help to promote the right behaviours and organisational ethos, with open and transparent approach to all safety-related issues. A focus solely on numbers of incidents is to be avoided, as it can lead to target-chasing (over-reporting) or perverse behaviours (under-reporting) for example.

This should be reinforced by an assessment of the safety culture within the organisation, coupled with how the maturity of safety management is developing.

12 Especially as helicopter operators can set their own exceedance thresholds – they are not universal criteria.

ANNEX A
GUIDELINE DEVELOPMENT APPROACH

DEVELOPMENT PRINCIPLES

The overall principles in developing the guidelines were to ensure that they are:

– User-focused: identifying and meeting OWCs' needs.
– Accessible, including to readers for whom English is not a first language. We have aimed to avoid state-specific terminology, regulatory arrangements, jargon or abbreviations.
– Comprehensive (within the defined scope) but concise. The guidelines aim to fill gaps and provide signposts to other guidelines rather than duplicate them, or risk 'message creep' by too much paraphrasing or summarising of material from other sources.
– Clear in relationship to other guidelines, to avoid the risk of duplication and confusion, with overlaps, gaps or conflicting messages.
– Illustrated with example materials (forms, checklists, assessments etc), but being clear that these are not intended as 'ready-made' templates that can be copied or filled in without thorough consideration.
– Future-proofed so far as possible, avoiding reproducing or referring to the details of specific regulations or standards (as these may be updated), but instead pointing to where the latest versions can be found.
– Aligned and compatible with other G+ Good Practice guidelines in terms of content, style and structure.

The main stages in the development process are outlined as follows.

KICK OFF WORKSHOP

A kick off workshop with the G+ Working Group was held in Sept 2019. An important part of the workshop was a session inviting participants to give examples of real issues faced where there was a lack of guidance. For example, participants noted a lack of processes, documents and defined competences in relation to areas such as:

– training requirements for helicopter hoist operators;
– helicopter chartering;
– managing cargo, spares and dangerous goods, and
– ensuring helidecks are properly maintained.

The guidelines aim to fill these gaps with the material in Sections 4.2, 5.4, 6.4 and 6.6 respectively.

LITERATURE REVIEW

As noted in 1.5.6, given the primary markets of G+ members, guideline development started mainly with European sources and documents already intended to be international (such as IOGP guidance), as a baseline against which to evaluate and incorporate US and Asia variations.

Much of the relevant experience and solutions comes from the oil and gas (O&G) sector. However, the risk profile is significantly different, for example because a higher proportion of O&G installations are manned, and because of the focus on hydrocarbon hazards. The review therefore took care to identify what O&G material was relevant or could be adapted for the wind industry context.

The guidelines were developed over a similar timeframe to that of the HeliOffshore WinReP (Ref). This is a 'sister document' to these guidelines, providing more detailed guidance on helicopter operations in support of offshore wind farms, for an audience including helicopter operators as well as OWCs. Liaison with HeliOffshore throughout the development of these guidelines helped to ensure that the two documents are complementary, and to avoid contradiction, gaps or duplication.

INTERVIEWS

An initial literature review identified a number of gaps and uncertainties in existing guidance. We followed these up in telephone, online and face-to-face interviews with Working Group members and other interested parties.

STRUCTURING THE GUIDELINES

There are several ways in which the guidelines could have been be organised – for example by activity, by type of hazard, or by life cycle stage. Each of these has advantages and disadvantages in terms of making the information easy to find, clear and concise. There is no simple solution, because topics are multi-dimensional. For example, an *activity*, such as hoisting, and its associated *hazards*, needs to be considered across all *life cycle stages* – it needs to be planned for, designed into the system, controlled in live operations and monitored to ensure continuous improvement.

The structure chosen here aims for overall conceptual clarity by taking life cycle stages as the top-level division (Part B, Sections 4 to 10). It is accepted that this life cycle model is an idealised, simplistic one – in reality there will often be iteration.

At lower levels of detail – i.e. within each of these main sections – we have used a more pragmatic breakdown, driven by factors such as how much needs to be said on each specific topic, and an aim to avoid excessive cross-referencing or repetition.

CONSULTATION

The draft guidelines were circulated to interested parties for consultation in Sep–Oct 2020.

ANNEX B
CONSOLIDATED 'TO DO' PROMPT LIST

OWCs can adopt and implement these guidelines in one or more of the following ways:

– incorporation into company standards;
– incorporation into contract specifications;
– use as prompts in audits and reviews.

No	Section	OWCs should …
1. Introduction		
1.	1.4	Delegate competent personnel to consider these guidelines in more detail, and use them as appropriate to develop approaches, systems and tools suitable for the organisation and its projects
2.	1.5.6	Consider, and as a minimum comply with, all applicable local compliance requirements and expectations
2. OWC obligations		
3.	2.1.1	Act as 'intelligent customers', undertaking appropriate and proportionate checks and risk assessments to assure themselves that contractors and their activities are and remain suitable
4.	2.1.1	Provide helicopter operators with information about hazards on the site and any other safety-relevant information
5.	2.1.1	Provide a safe operational and environmental context in which helicopters can operate
6.	2.1.2	Consider whether, and how, helicopters are to be used and set up SMSs appropriate to this
7.	2.1.2	At the level of day-to-day planning, tasking and control, minimise – in liaison with the helicopter operator and others – the likelihood of exposing helicopters to adverse conditions such as inclement weather or conflicts with other air traffic
8.	2.1.3	Cooperate with the helicopter operator to seek a safe and effective distribution of tasks between flight crew and wind industry personnel, with clearly defined and distinguished roles and responsibilities, and operating procedures that reflect these
9.	2.1.4	Have effective measures on the ground to control any dangerous goods that may be provided to the helicopter for transportation
10.	2.2	OWCs **must** take steps to identify and comply with all legal duties
11.	2.2.1	Identify, and engage as appropriate with, all relevant regulators and other authorities
12.	2.2.1	If operating in, or obtaining services from, more than one state, ensure that they have identified all relevant national requirements and understand how to comply with them
13.	2.2.1	Liaise with all relevant national SAR providers (noting that SAR regions are not necessarily the same as state boundaries) in order to understand their requirements and any additional arrangements that may need to be put in place

No	Section	OWCs should …
14.	2.2.1	Ensure that the implications of any differences between the requirements of different regulators can be satisfactorily resolved
3. Understanding and defining the system		
15.	3	Develop a clear and comprehensive understanding of what helicopter services they require, and of the context in which the services will operate
16.	3.1	Decide how, where and when, helicopters are to be used
17.	3.1	Even where there is no current need for helicopter services, OWCs may wish to allow flexibility by making provision for future helicopter operations in the planning and design of the system
18.	3.1	Ensure that wind farm planning, design and operation facilitate SAR, even if they do not intend to use helicopters themselves
19.	3.1.1	Identify the hazards and consider the relative risks of each potential logistic solution for each task
20.	3.2	Consider the full system – the people, procedures, infrastructure and equipment – and not just (for example) the aircraft itself
21.	3.3	Identify and assess risks related to environmental factors
22.	3.4	Identify and assess risks related to aviation operational context factors
23.	3.5	Identify all interested parties and understand their needs and expectations
4. Planning and Design		
24.	4	Make, and implement, a plan for engaging with interested parties
25.	4.1.1	Record (e.g. in an Aviation Policy) their overall aims and commitments regarding safe integration of helicopter operations, and the high level means by which they intend to achieve them
26.	4.1.1	Ensure that the Aviation Policy (or equivalent) is disseminated and understood internally and, as appropriate, by external parties
27.	4.1.1	Ensure that their Aviation Policy and that of their aviation provider are aligned
28.	4.1.2	Ensure that their organisation has the appropriate internal functions, role definitions and documented processes in place. In particular, a management team member should have leadership responsibility for aviation, including owning the Aviation Policy and ensuring that it is implemented
29.	4.1.2	Ensure that they have access to suitably qualified and experienced aviation specialist(s)
30.	4.1.2	Ensure that responsibilities for aircraft coordination and control in and around the site are clearly defined
31.	4.2	Assure themselves that their helicopter operator has an effective training system for flight crew (and others in the direct control of the helicopter operator)
32.	4.2	Ensure that records are maintained of their employees' training and experience as passengers, and monitored to ensure currency
33.	4.2.1	Ensure that, as a minimum, passenger training relating to sea survival complies with the local regulations
34.	4.2.1	Follow the HeliOffshore WinReP on training of passengers

No	Section	OWCs should …
35.	4.2.2	Assure themselves that their employees who will be HHOPs receive hoist training in accordance with the HeliOffshore WinReP
36.	4.2.3	Ensure that helicopter operators follow the HeliOffshore WinReP on training of technical crew
37.	4.2.4	Carefully review the suitability for wind industry use of helideck personnel training guidance, as much of the material currently available is focussed on the needs of the oil and gas industry
38.	4.2.5	Follow the HeliOffshore WinReP on competence of aviation specialists
39.	4.2.7	Ensure they have all the competences to identify and prepare for potential emergencies and to respond to them
40.	4.3	Ensure, in liaison with the helicopter operator, that only individuals whose body size (taking account of the bulk of the PPE worn), mobility and health are commensurate with helicopter escape are permitted to travel
41.	4.3	Ensure that all passengers have their bi-deltoid (across shoulder) measurements taken before helicopter flight, and that these records are available to the helicopter operator on request
42.	4.4	Ensure that any necessary consents relating to aviation have been obtained and that agreements with the relevant authorities are in place
43.	4.4	Assure themselves, through contractor selection and monitoring processes, that the helicopter operator has the necessary consents in place
44.	4.5.1	Provide at least one helideck on a fixed installation within, or in the vicinity of, every far offshore wind farm, unless omission is justified by detailed analysis and with the establishment of other risk control measures
45.	4.5.2	Consider the layout of the farm, including all existing and planned structures around helicopter routes and destinations that could impact on safety
46.	4.5.2	Engage as early as possible with the NAA, aviation specialists, helicopter operator(s) and SAR provider regarding wind farm layout
47.	4.5.2	Consider the effects of layout on wind farm neighbours, and potential cumulative effects, as well as those for the proposed wind farm itself
48.	4.5.3	Consider how obstacle location, height and size will be notified to helicopter operators and recorded on charts and databases, and what lighting, marking or other mitigations will be required
49.	4.5.5	Make provision for the onshore support infrastructure necessary to maintain helicopter operations
50.	4.5.5	Engage with the helicopter operator and the appropriate authorities to determine onshore infrastructure requirements
51.	4.5.5	Ensure the suitability of any onshore facilities made available to helicopter operators, in terms of aviation-specific aspects (e.g. aircraft handling and fuelling facilities, fire cover, lighting, approach guidance) and for general working environment and welfare
52.	4.5.5	Follow the HeliOffshore WinReP (Ref) for the design of heliports and onshore aircraft maintenance and operational bases
53.	4.5.6	Take account of all relevant requirements and guidance for the design of helidecks and hoist platforms

No	Section	OWCs should …
54.	4.5.8	Engage with the relevant NAA(s), ANSP(s), defence organisations, (SAR) authorities and potential helicopter operators at the earliest opportunity, to ensure that all relevant issues are understood and addressed in the planning, consenting, construction and operation phases. OWCs may also wish to liaise with these parties in order to ascertain the suitability of the existing airspace and CNS arrangements, and discuss potential improvements
55.	4.5.9	Ensure that communication systems and competences are in place to enable, as a minimum, provision of a flight watch service
56.	4.5.9	Engage with wind farm operational parties to minimise the number of different radio systems and frequencies
57.	4.5.9	Ensure that all personnel who may use radio are properly trained
58.	4.5.9	Ensure that the necessary consents for operation, including for frequency allocation and licensing of radio stations and personnel, have been obtained from the relevant authorities
59.	4.5.9	Consider holding communication exercises (covering normal, abnormal and emergency situations) before operations begin
60.	4.5.10	Liaise with WTG OEMs and helicopter operators to establish likely movements for the floating WTGs, under different sea state and wind conditions, and assess how these may affect hoisting operations
61.	4.5.10	Ascertain whether floating WTGs are categorised as vessels or fixed structures for the purposes of health and safety legislation in the relevant jurisdiction(s), and ensure compliance with all relevant requirements
62.	4.5.11	Identify the needs for, and arrange for provision of, appropriate PPE, resolving any compatibility issues
63.	4.6	Assure themselves that the wind farm design and helicopter operational concept are safely compatible, in relation to areas such as: – how WTGs and other structures may affect air flows in their vicinity; – adequacy of visual cues, lighting and marking; – the 'flyability' of approach, departure and transit path
64.	4.6	Use mathematical modelling (e.g. computational fluid dynamics) and simulation in preference to live trials
65.	4.6	Make use of relevant published information and guidance, liaise with the WTG OEM and with the helicopter operator, to establish what further work may be needed in preference to live trials
5. Contracting helicopter services		
66.	5.1.1	Provide prospective helicopter operator(s) with a detailed statement of the planned tasking for helicopter support
67.	5.1.2	Inform the helicopter operator(s) of what, if any, supporting infrastructure and services they can provide or make available
68.	5.1.2	Take great care to ensure co-ordination between parties in situations when the helicopter and helicopter operating base are supplied by different organisations, to ensure clarity about expectations and responsibilities
69.	5.1.3	Ensure that there is a clear statement of the safety roles and responsibilities of the OWC, helicopter operator and any relevant third parties (e.g. any separate maintenance contractor)

No	Section	OWCs should …
70.	5.1.4	Capture all safety standards and requirements in a consolidated, detailed document given to the helicopter operator (often referred to as 'Employer's Requirements'
71.	5.1.4	Recognise the safety and operational constraints on helicopter operators when setting Employer's Requirements, in order to ensure that there is no pressure to compromise on safety
72.	5.2	Filter out any operators that do not meet minimum safety criteria, and then score the remaining candidates using an appropriate mix of safety and other criteria. NB: OWCs should not create a shortlist of 'safety-approved' bidders and then select purely on price and other criteria. The aim is to eliminate unacceptable bidders first AND then still take safety into account when deciding between those that remain
73.	5.2	Avoid the temptation to copy and paste supplier evaluation questionnaires (SEQs) from other OWCs, or from other contract processes
74.	5.2	Ensure that aviation specialist support is involved in developing the SEQ and evaluating responses
75.	5.3	Independently verify that the aircraft proposed/selected by the helicopter operator will meet their needs
76.	5.3	Check that they understand the suitability of the choice of aircraft offered by any specific operator, and ask for advertised capabilities (e.g. 'versatile', 'long-range') to be objectively quantified
77.	5.3	Frame the initial approach to potential operators in terms of proposed applications and safety requirements, rather than by directly asking for a specific helicopter type
78.	5.3	Give particular attention to what radio equipment is fitted, taking account of compatibility with other technologies that will be used on the project and the need to avoid proliferation of communication systems
79.	5.3	Seek confirmation that the aircraft is compliant with airspace requirements for the wind farm location and transit route
80.	5.3	Not allow single-engine helicopters to be used for transporting passengers
81.	5.3	Collaborate with the helicopter operator(s) to ensure that suitable and sufficient risk assessments are in place for all helicopter activities, taking account of the specific tasks and environment as well as aircraft performance
82.	5.4	Under Contracting Option A: monitor and audit both the construction/ maintenance contractor and the helicopter operator. Ensure that their safety requirements are incorporated into the contract between construction/maintenance contractor and the helicopter operator
83.	5.4	Under Contracting Option B: monitor and audit both the construction/ maintenance contractor and the helicopter operator. Ensure that Aviation Policies and standards of both wind farm operator and maintenance provider are aligned
84.	5.4	Review the advantages and disadvantages of Options A, B and any other appropriate contract structure options, and make an informed, safety-based decision that ensures clarity of responsibilities and close co-operation

No	Section	OWCs should …
85.	5.4	Agree on arrangements for monitoring and auditing the various parties
86.	5.4.2	For one-off operations, ensure that a competent aviation specialist carries out a risk assessment of the operator, specific to the site and the operation required, in its operational and environmental context
87.	5.4.3	Where shared helicopter services or assets are foreseen, identify and manage the potential safety implications, in liaison with the helicopter operator(s)
88.	5.4.4	Where multiple helicopter operators may be involved, identify and manage the potential safety implications
6. Normal operations		
89.	6.1	Ensure that there is clarity about responsibilities for providing information, and the parameters and thresholds that will be used to define weather and other limits on helicopter operations
90.	6.1.1	Be aware of how wind speed and direction, and resulting constraints relating to routeing, time and fuel requirements, can affect what helicopter tasking are practicable
91.	6.1.1	Agree with the helicopter operator whether and how real-time wind information from the site can be made available to the helicopter operator
92.	6.1.1	Not (implicitly or explicitly) plan for, require or allow flight over a sea state (or SWH) above that for which – as an absolute minimum – the helicopter is certified to ditch (this is already mandatory in some states) and for which there is a good prospect of safe recovery
93.	6.1.1	Ensure that the helicopter operator fully understands the operational and technical certification issues and limitations in respect of ditching, and that appropriate sea state/SWH limits are put in place accordingly
94.	6.1.1	Where there is a potential need for night or low visibility operations carefully consider the requirements, criteria and mitigations, engaging with the helicopter operator(s) and safety regulator
95.	6.1.1	Help avoid aircrew disorientation or loss of situation awareness due to inadequate visual cues, for example by agreeing appropriate lighting and visibility limits and requiring appropriate crew training and complement
96.	6.1.2	Keep helicopter operators updated with information on operational factors that may affect safety
97.	6.1.2	Involve helicopter operators in the planning and design of the wind farm where possible, and co-operate closely during operations, for example by inviting and giving feedback, and by holding regular safety co-ordination meetings
98.	6.2	Follow HeliOffshore WinReP regarding single or multi-pilot operation
99.	6.3	Implement robust means for identifying, shutting down and re-starting WTGs, and for communicating WTG status to pilots
100.	6.4	Implement an effective system for communicating safety-relevant information to helicopter passengers and for eliciting feedback
101.	6.6	Implement a regular inspection and maintenance programme to ensure the safety and serviceability of hoist platforms and helidecks

No	Section	OWCs should …
102.	6.7.1	Assure themselves that appropriate procedures for helicopter operations to/from vessel helidecks or hoist areas are described in the vessel operator's Operations Manual and properly followed
103.	6.7.2	Provide helidecks on SOVs (and other large vessels as appropriate) if logistics require (noting that the availability of such helidecks may be significantly limited by vessel movement) As a minimum, SOVs should have a hoist area
104.	6.7.2	Assure themselves that, with regard to helideck movement limit in particular, the helicopter operator has understood and can follow the relevant national requirements as well as the OWC's own safety expectations
7. Later lifecycle stages		
105.	7	Follow their own SMS process for identifying and safely managing changes over the lifecycle of a wind farm
8. Abnormal conditions		
106.	8	Identify potential abnormal conditions, working with the helicopter operator, maintenance providers and other interested parties, and develop appropriate SOPs and other risk control measures for such situations
9. Emergencies		
107.	9	Follow the G+ Integrated Offshore Emergency Response (IOER) guidelines
10. Continuous improvement		
108.	10.1	Establish and maintain an appropriate monitoring and evaluation programme
109.	10.1	Recognise and make a clear distinction between specialised audits conducted by an aviation specialist and generic audits against generally-applicable standards such as ISO 9001 (for quality) or ISO 45001 (health and safety)
110.	10.1	Take steps to ensure effective feedback and learning
111.	10.2	Define KPIs that support the monitoring, evaluation and development of a robust safety culture

ANNEX C
AVIATION SAFETY REGULATORS AND AGENCIES

This Annex sets out the key aspects of aviation regulatory institutions which have an impact on helicopter operations and will consequently influence the role and responsibilities of OWCs. The degree of impact will vary depending on the region in which the wind farm development is located.

ICAO

Established from the Chicago Convention, which was initiated in 1944 by 52 states, ICAO is a UN body with 193 member states which organises and oversees international aviation.

The regulatory framework is based on Standards and Recommended Practices (SARPs) of which there are over 12 000 published in 19 Annexes. These set out the requirements across all aspects of air operations and supporting infrastructure necessary to achieve safety, efficiency and interoperability on a global basis. These standards form the basis for aviation regulation within the contracting states.

The SARPs are ratified by the contracting states, although states may file differences from the ICAO standard when justified by national circumstances. To ensure national compliance with the global requirements, ICAO conducts a programme of safety audits of contracting states.

ICAO sets the framework within which regional and national regulations are established.

There are six ICAO Regions:

– North America;
– Latin America and the Caribbean;
– Middle East;
– Europe;
– Asia and Pacific, and
– Africa.

ICAO Regions have Regional Air Navigation Agreements (RANs) to coordinate interoperability requirements across the Region, managed by planning groups made up of member states. The planning groups develop operating procedures supplementary to the ICAO Annexes to meet the needs of their specific Region. They deal with matters affecting the safety and regularity of international air navigation. For the European region, this is carried out by the European Air Navigation Planning Group and the supplementary procedures supporting the RAN are published in ICAO Doc 7030.

Within Europe there is a significant difference between the extent of the EU (27 + 2) and the ICAO European Region, which has 47 member states, covering Greenland to Russia.

The EU is one of the 'international organisations which may be invited to attend suitable ICAO meetings' but, with agreement, coordinates the EU member states' positions. Voting rights remain with individual member states.

EASA

Within the EU, the European Union Aviation Safety Agency (EASA) has been established as the responsible authority for safety across the 27 member states, plus Norway and Switzerland.

EASA is governed by the Basic Regulation (Ref). EASA creates legally binding requirements for these 27 + 2 states and monitors performance and compliance with regulatory requirements.

NATIONAL AVIATION AUTHORITIES

The national aviation authority (NAA) (sometimes referred to as the national supervisory authority) is the national body responsible for aeronautical regulation. Examples include the Danish Transport, Construction and Housing Agency, the Luftfahrt Bundesamt in Germany, the UK Civil Aviation Authority and the Federal Aviation Administration in the USA.

The constitution and legal basis of the NAA varies from state to state but in effect each NAA oversees aviation on behalf of the state and is responsible for ensuring that the state complies with ICAO (and where appropriate EU) requirements within the national airspace. The NAA may be a part of government or an independent body. NAAs are responsible for adapting higher level regulatory requirements to the national and local circumstances to deliver a safe and efficient operating environment.

EUROCONTROL

Although Eurocontrol (the European Organisation for the Safety of Air Navigation), is not a regulatory institution, it provides a significant role as a coordinating institution across a wide range of European aviation issues and has authority from the EU as the Network Manager. With a membership of 41 European states, it has a significant span of influence.

ANNEX D
POTENTIAL INTERESTED PARTIES

As noted in 3.5, OWCs need to identify the interested parties and their needs and expectations, managing the associated risks. This Annex lists the main potential parties, their roles and the main interactions that OWCs may have with them.

NB this is a list of potential interested parties. OWCs will not necessarily need to engage with, or otherwise assess the needs and expectations of, every type of organisation listed on every project. The need will depend on the nature and stage of the project, on the contract structure (whose role it is to engage), and on how the entities themselves are interrelated in each state.

Examples are given of some typical entities in each group. The actual entities involved – for example which government department is responsible for aviation – will vary from state to state, and the relevant ANSP(s) will vary according to project location.

Type of organisation	Example entities	Role(s)	Key interfaces and areas for engagement
Regulators and other government authorities/ agencies	ICAO EASA Eurocontrol NAAs Government departments and regulators (national, regional and local) responsible for: – aviation – transport – business and industry – defence – emergency planning – energy – environment – health and safety – land use and development control – marine environment and activities – seabed leasing and development rights – telecommunications	Policy, regulation, harmonisation (see Annex C for further detail of roles)	All lifecycle stages, especially planning and operational stages
Renewable energy operators	Operators on the project wind farm: vessels, jack-ups etc Helicopter or vessel operators serving nearby wind farms Independently owned/ operated/maintained substations	SIMOPs, including cabling, diving, surveying, offshore substation activities and weather monitoring	
Supply chain	WTG OEMs Helicopter operators Vessels Heli-decks Equipment suppliers Maintenance services Consultants	Contractors, suppliers, consultants	All stages

Type of organisation	Example entities	Role(s)	Key interfaces and areas for engagement
Airspace users	Commercial, general aviation or military aircraft operators, police, air ambulance, UAS operators, helicopters serving adjacent wind projects, oil and gas assets; SAR, Coastguard counter-pollution etc Airports, heliports and helidecks	Share use of airspace, infrastructure and services	Strategic, planning and operational interfaces
Maritime industry	Vessel operators – service providers to the wind industry, and others Fisheries and conservation interests	Share use of the maritime environment, infrastructure and services	Strategic, planning and operational interfaces
Industry and trade groups	American Wind Energy Association BWO Federal Association of Wind Farm Operators Offshore Flight Safety Foundation – BARS Program G+ HeliOffshore, IAGSA IOGP International Marine Contractors Association International Maritime Organization Global Wind Organisation Oil and Gas UK SafetyOn, RenewableUK Wind Europe	Promoting industry interests, and good practice	Policy formation Advice and support
Air navigation service providers (ANSPs)	Deutsche Flugsicherung (DFS) Belgocontrol National Air Traffic Services (NATS)	Service providers	

Type of organisation	Example entities	Role(s)	Key interfaces and areas for engagement
Neighbours and third parties	Landowners/land users Non-governmental organisations (NGOs) and community organisations	May have e.g. those concerns about wildlife disturbance or noise Helicopter overflight – especially if used for capture of images or data – has the potential to infringe privacy The noise and visibility of helicopters may create annoyance and disturb livestock or wildlife	Planning and operational phases
Industrial sites	Nuclear, hazardous and military sites	Present airspace restrictions for safety and security reasons	Planning and operational phases
Port authorities		Service providers to vessels	
Emergency Services	Coastguard Maritime search and rescue, Police, hospitals, telemedicine providers	Emergency response	
Insurers			
Certification and accreditation agencies	Notified bodies In some cases, agencies (e.g. UK Helideck Certification Agency) carry out audit and certification functions that in otherwise carried out by regulator Marine warranty surveyors Various commercial companies provide auditing services	Auditing and certification of quality and safety management systems, training, infrastructure, PPE and other products	
Standards organisations	ISO, Cenelec, IEC	Defining standards	All stages

Type of organisation	Example entities	Role(s)	Key interfaces and areas for engagement
Academia and research, development and innovation institutions	NITROS – https://www.nitros-ejd.org/ UK CAA HSRMC – https://www.caa.co.uk/Safety-initiatives-and-resources/Safety-projects/Offshore-helicopter-review/Helicopter-Safety-Research-Management-Committee/		All stages

ANNEX E
EXAMPLE TRAINING PLAN FOR HELICOPTER COORDINATORS

This Annex consists of extracts from an example provided by a European G+ member company.

NB: this training is intended only for operational coordinators working on day-to-day operations, not training for aviation specialists, technical authorities etc. It is important to recognise, and emphasise when delivering such training, that the PPL(H) element is limited. It does not equip trainees to inappropriately or unsafely direct or distract competent aviation professionals.

The following sections below describe each module, providing an introduction to its content and the required end state/outcome.

E.1 OFFSHORE WIND INTRODUCTION

Content of module:

This module aims to present the overall business process of how an offshore wind farm project comes into reality. The course is a presentation of how [company] is organised, how project ideas develop into actual construction projects, and who the decision makers are.

End state:

After completion of the module, the participants should have a good understanding of how [company] operates on the strategic business level, and how a project is developed and managed throughout until it reaches execution. The participants should have a clear.

E.2 HOW TO BUILD AN OFFSHORE WIND FARM

Content of module:

This module aims to provide a clear understanding of each stakeholder's scope of work during the construction of an Offshore Wind Farm (OWF). The course is divided into packages, each containing a description of works commencing at any one time during the project:

- Site Preparation.
- Foundation.
- Cables.
- Wind Turbine Generator.
- Offshore Sub Station.
- Operation and Maintenance.

End State:

After completion of this module, the participants have a good understanding of the components involved and how a wind farm is built up. The participants understand how

each package relies on the others and appreciates that certain steps and work scope must be completed before a new one can begin. Furthermore, the participants are familiar with terms and expressions used.

E.3 HEALTH, SAFETY AND ENVIRONMENT (HSE)

Content of module:

The module provides a full overview of the HSE documentation and culture in [COMPANY].

End State:

After completing this module, the participant will have sufficient background knowledge in order to perform [COMPANY] HSE safety culture in their everyday life. The participant will know the document structure and where to find relevant documentation.

E.4 GLOBAL WIND ORGANIZATION (GWO) TRAINING

Content of module:

This course module includes the basic training requirements for personnel, when working on [COMPANY] projects. The course enables participants to work in the offshore environment in a safe and proper manner.

An external party hosts the courses, making these authorised training providers and issuers of valid certificates after completing each course. The training is located in external facilities as well, providing a realistic and professional training environment. The specific certificates are:

- GWO First Aid.
- GWO Fire-fighting.
- GWO Sea Survival.
- GWO Working at height.
- GWO Manual handling.
- HUET, helicopter underwater escape training.

An offshore medical certificate is also required

End state:

After completion, the participant is able to behave and react as desired in a number of situations, as covered in each individual course. The participant is also more aware of the great attention needed in the offshore environment, and is capable of assessing situations based on personal experiences.

E.5 PRIVATE PILOT LICENCE (PPL), HELICOPTER

Content of module:

In order for the operator to understand the aeronautical environment, this course contains elements from the full PPL(H) education. The module focuses on basic theory and knowledge

of legal rights and obligations, flight planning, meteorology, and other relevant aspects. It does not actually provide a licence, as the training is incomplete.

The module can be conducted in either of two ways:

1) The module is conducted by a certified Flight school, where the participants take part in a number of standard lessons/subjects already planned at the training facility. The training level and lessons are in general to the PPL standard, with no specific adjustments made to suit [COMPANY] need.

2) The module is prepared and conducted as a modified course with modules created specifically for [COMPANY] purpose, enabling adjustments and focusing on all the relevant topics/areas, without the need to follow general PPT standard/lesson plans.

Irrespective of the version above, the subjects covered are:

– Weight and balance/aerodynamics
– Flight Planning Principles
– Meteorology

End state:

After completing the module, the participants are able to perform helicopter coordination duties at the local site. The participants will be able to prepare/plan helicopter activities according to good planning practice, and they are able to understand the reasons/regulations behind it. Furthermore, the participants are familiar with the pilots' knowledge, and their motives to request certain information etc. In the end, this will generate a safe and professional working environment.

E.6 AERONAUTICAL VHF RADIO COMMUNICATION

Radio Operators Certificate of Competence (ROCC)

Content of module:

External providers are used to ensure the context is legally correct and that the module contains all the relevant and necessary topics, presented in the two modules. The courses are two separate courses and one does not preclude the other.

End state:

After completing the two modules, the participants are capable of operating a VHF radio – both maritime and aeronautical. The participants know how to use the correct phrases, how to adjust the radio equipment and how to respond/operate it in an emergency. The modules allow the participants legitimately to use a VHF radio and communicate in the international environment.

E.7 DANGEROUS GOODS

Content of module:

ICAO/IATA standard training including legal requirements, operational restrictions, packaging instructions, marking, labelling and documentation.

End state:

Ensures that the participant knows how to read and apply the regulations for the transport of dangerous goods by air. Gain the competencies to accept, handle and process shipments containing dangerous goods according to the current edition of the IATA Dangerous Goods Regulations (DGR) manual.

E.8 AIRPORT VISIT

Content of module:

This module involves visiting an operating airport, providing with an experience of the ongoing operations and a visualisation of the topics learned during the previous modules.

End state:

The experience from an airport will enable participants to assess and determine options/ actions more realistically and with greater confidence. The participant holds another perspective, which adds great value to the decisions made daily on site. Finally, the experiences from the airport visit makes the participants more aware of the complexity and the level of understanding, when plans changes, are significantly higher.

E.9 MARINE AND HELICOPTER COORDINATION CENTRE – ON-THE-JOB TRAINING

Content of module:

This module covers marine and helicopter coordination, which is the core part of the tasks/ operations taking place in a marine and helicopter coordination centre (MHCC). The MHCC is monitoring all traffic in and around the wind farm and serves as first point of contact in case of an incident/emergency.

During the course, the following topics are explained and learned:

- Purpose of the MHCC.
- Set-up (organisation and management).
- Offshore Management System.
- Duties in the MHCC.
- Coordination (mandate and authority).
- Processes (in the organisational perspective).

End state:

After completion, the participant understands the tasks in the MHCC, and is able to coordinate the operations with MHCC. The participants understand the various processes and are now able to identify and address undesirable circumstances/actions when/if occurring in and around the OWF.

E.10 HELICOPTER COORDINATION TRAINING ON SITE

Content of module:

This module covers operational concept and procedures, relevant for all the operations ongoing. The concepts and procedures are both a part of an extensive safety set-up and an operating set-up, ensuring that all involved parties fulfil responsibilities and tasks according to agreements and contracts.

The concepts and procedures are known by all relevant stakeholders in the operations phase, and serve as a foundation for the daily duties:

- Marine and Air Traffic Safety Concept.
- Communication Concept.
- Communication Procedure.
- HC Procedure.
- Flight Operation Manuals.
- Standard Operational Procedures.
- Reporting Procedures.
- Internal procedures.
- One HSE exercise (conducted locally (potentially paper exercise)).
- Operate the operational and supporting systems:
  - Wind farm Management System.
  - CCTV.
  - Outlook and archiving procedure.
  - Maps, folders, internal drives.

End state:

After completion, the participants will have a full understanding of the concepts and procedures outlining the operational 'rules' and conduct on site. Understanding the documents enables the participants to realise how the agreement/interaction is between operating parties, and act as expected when their advice or coordinating input is required. The documents are primarily the Flight Operations Manual. It provides the background knowledge enabling the participants to start the next module of 'on-the-job-training', where the actual duties are performed. The helicopter specialist is in charge of this module.

ANNEX F
EXAMPLE HELICOPTER SHARING AGREEMENT

An example of top-level content, adapted from an example provided by a G+ member.

The sharing agreement is based on the principle of best utilisation of the helicopter. The agreement describes in general terms how a transfer between companies is defined.

It is [Company A] and [Company B] responsibility to monitor and report the usage of transfers on a monthly basis.

The utilisation of the shared service helicopter shall be planned and prioritised according to the following principles:

i. All predetermined flight slots are to be confirmed in use at the daily Operations meeting the day before the flight is scheduled, no later than X pm (3 p.m.)

ii. Any flight slots that are not confirmed by the primary user can then be selected by the secondary user. These are agreed at the daily meeting by all parties.

iii. Any provider that has a down WTG overnight will take priority with the first flight on all days.

iv. Should a provider lose their primary flight slot (due to down WTG) they will receive priority the next day to realign with the annual schedule.

v. On the scheduled flight day, any un-confirmed flight slots are available to be booked through the Operations team by 10:30 a.m. The maximum duration of a visit from this time slot is three hours.

vi. If both providers request an unconfirmed flight slot, the priority is given to the provider who had the slot in the annual schedule unless it is required for a down WTG.

ANNEX G
AIR OPERATOR CERTIFICATES AND ADDITIONAL APPROVALS

As noted in 5.2, G+ recommends that for any operations in support of wind energy, OWCs should only use helicopter operators holding a relevant and valid AOC and any relevant additional approvals.

An AOC is legally mandatory in any case for commercial air transport (CAT) (i.e. transport of 'passengers, cargo or mail for remuneration or other valuable consideration').

It is important to note that the AOC and approvals are necessary, but not sufficient for safety.

Additional approvals are required for operations such as HEMS, SAR, air ambulance. IFR, VFR, multi engine, offshore HHO, HEC, External loads (e.g. HESLO/underslung loads), hostile environment (SPA-HOFO) etc

OWCs need to assure themselves that the AOC and approvals are appropriate to the intended operations. There are complexities and national differences around:

– the activities for which AOCs are required – how these are defined and categorised;
– what additional controls and licences are required.

Specialist advice may therefore be required to assess the suitability of an AOC and approvals.

Underslung loads and surveying/mapping are classed as 'high risk operations' by the UK CAA, at least. Each activity will need to be assessed taking account of:

– the specific nature of the activity;
– the environment in which it is conducted, and
– whether the activity poses a high risk, including to third parties on the ground.

Further detail on AOCs and approvals are available in the HeliOffshore WinReP (Ref).

ANNEX H
EXAMPLE OWC REQUIREMENTS ON HELICOPTER OPERATORS ('EMPLOYER'S REQUIREMENTS')

This is a EASA-based example consisting of extracts from an example provided by a European G+ member company.

Quantitative and other highly specific requirements have been redacted, as they are only applicable to the specific case.

This example shows only safety-related Requirements. A similar format can be used to specify other aspects, such as functional, service level, technical, commercial or contractual Requirements.

H.1 INTRODUCTION

This Appendix sets out the minimum aviation requirements for the Services during the Term of this Agreement, with the purpose of managing and reducing risks and creating a safe environment and safe working culture. The Supplier shall comply with these aviation requirements, this Agreement, applicable Laws and Good Industry Practice for performance of the Services. The Supplier is responsible for ensuring that any of its Sub-suppliers comply with the same obligations.

The aviation requirements are based on 1) the commission regulation (EU) No 965/2012 of 5 October 2012, also known as EASA OPS, and 2) the Employer's Construction Phase Plan/ Employer's Project Site Health, Safety and Environment Plan.

The Employer's Construction Phase Plan/Employer's Project Site Health, Safety and Environment Plan sets the minimum requirements for all work at, and in relation to, the Site in terms of HSE, and is based on the Employer's HSE management system (which is in accordance with applicable Laws and ISO 9001, ISO 14001 and OHSAS 18001).

The Employer's Construction Phase Plan/Employer's Project Site Health, Safety and Environment Plan shall be reviewed (and amended/updated, if relevant) by the Employer (1) if pertinent circumstances have changed, e.g. Good Industry Practice, applicable Laws, the Employer's HSE management system and (2) at least once a year.

Furthermore, the Supplier shall comply with the Code of Conduct for Business Partners, please cf. Appendix xx to this Agreement.

H.2 GENERAL

The Employer uses aviation services for four different operational purposes when operating to, and within, off-shore wind farms, which may include, but are not limited to, WTG, transformer units, off-shore substations, support vessel, installation vessels, floating and fixed accommodation modules and foundation transition pieces. The four different operational purposes can be categorised as follows:

a) **Helicopter Transfer Operations.** Flights from an onshore airport/heliport to an offshore installation or vessel with a certified helideck, and flights within the offshore wind farm to and from offshore installations, or vessels, with a certified helideck.

b) **Helicopter Hoist Operations (HHO)**. HHO helicopters are primarily used for transport/transfer of technical personnel and equipment onto/from the WTGs via hoist to the nacelle. HHO can also be conducted for transport/transfer of personnel and equipment to offshore installations that do not have a helideck.

c) **Helicopter Emergency Medical Services (HEMS)**. Dedicated HEMS are used when existing SAR service is assessed to be insufficient or local legislation requires it.

d) **Survey Operations.** Normally fixed wing aircraft operations with high definition cameras conducting survey for sea mammals and bird species/activity in and around the offshore wind farm area.

H.3 AVIATION REQUIREMENTS

H.3.1 Minimum requirements to the air operator certificates and approvals

a) The Supplier shall hold an Air Operators Certificate (AOC), cf. Regulation (EU) 965/2012 on air operations (EASA AIR OPS), Annex III – Part-ORO, SUBPART AOC.

b) The following Specific Approvals, cf. EASA OPS Annex V, PART SPA, shall – as relevant for the Services – be included in the AOC requirement:
- Dangerous Goods (DG) (SUBPART G).
- Helicopter Hoist Operations (HHO) (SUBPART I).
- Helicopter Operations in hostile environment and without a safe forced landing capability and/or Helicopter Offshore Operations (HOFO) (SUBPART K).
- Helicopter Emergency Medical Service Operations (HEMS) (SUBPART J).
- Helicopter operations with Night Vision Imaging Systems (NVIS) (SUBPART H).

c) The Supplier shall have authorisation from the competent authority to conduct helicopter external load sling operations (HESLO) (Annex VIII PART SPO SUBPART E section 1).

d) Any changes to the AOC that require prior approval by the competent authority, cf. ORO.GEN.130 Changes to an AOC holder, shall be notified by the Supplier to the Employer within 14 Days after receipt of knowledge of such changes.

H.3.2 Minimum requirements to management system (QHSE requirements)

a) The Supplier shall make every reasonable effort to utilise the principles of accident and loss prevention in the management of all activities and programmes, and ensure that their line management includes owners, managers and all levels of supervision, and that their employees, personnel and representatives are responsible for identifying, eliminating and/or controlling known hazards that can result in personal injury, illness, property damage, fire, any breach of security, environmental impact or other form of controllable loss.

b) The Supplier shall support the Employer's HSE management system by fostering a culture where all Site personnel will be ultimately responsible for their own safety by complying with, and enforcing, applicable Laws, best practice, as well as promptly

reporting all unsafe acts or conditions to supervisor. The Supplier is responsible for taking immediate and long-term corrective actions to solve any such problems.

c) The Supplier shall appoint a designated Site/Base[13] Safety/Compliance manager/ assistant (HSE person) to manage, and respond to, quality, health, safety and environmental issues. In addition to the requirements cf. EASA OPS ORO.GEN.200, the person and the role shall as a minimum comply with the following:
   - The person shall be qualified to manage the execution of the Supplier's SMS.
   - The person's responsibilities include assisting in implementing and maintaining the Supplier's SMS, designed to meet the requirements outlined in this Agreement.
   - The person shall be authorised to implement changes regarding the Supplier's HSE programmes and their administration, quality of life issues, unsafe acts and conditions, and non-compliance.
   - The person shall be educated and trained in all relevant emergency procedures.
   - The person shall provide HSE training programmes for the Supplier's employees, personnel and representatives, and implement protective measures to prevent damage, injury, or loss to its employees, personnel and representatives performing the Services, as well as other impacted persons in the Supplier's area of responsibility.

[*Prior to the Supplier's start of work, the Employer shall be provided with contact information of the HSE person*]

d) The Supplier shall have written instructions and procedures documenting how risks are appropriately and sufficiently mitigated to as low as reasonably practicable (ALARP) for the Services under this Agreement. All work instructions shall be based on formal risk assessments. The Supplier is responsible for ensuring that this is done for all work performed under his or her operational responsibility, control, supervision or management. The Supplier is responsible for ensuring that appropriate supervision of all work is maintained.

e) The Supplier shall ensure that all relevant method statements and work instructions are handed out and understood by anybody involved/performing the tasks and that any questions have been clarified before commencement of the work.

f) The Suppliers shall carry out an **annual** Compliance Monitoring Programme (HSE Programme).

[*A copy of the Compliance Monitoring Programme shall be submitted for information to the Employer in connection with any planned audit prior to contract award*.]

[*The annual Compliance Monitoring program for the following calendar year shall be submitted to the Employer no later than 1st of December or the first Business Day thereafter. No later than 4 weeks prior to Services Commencement Date, the Supplier shall submit its program for the rest of the year*.]

[*The Supplier shall submit a copy of all site relevant Audit reports.*]

13 If the operation is conducted remote from the operator's home base.

g) The Supplier shall have an ongoing process to identify actual or potential items of nonconformity and take corrective/preventive action. Where a risk assessment has determined, new or changed hazard or control requirements, preventive or corrective actions shall be developed, communicated and implemented.

[*The Supplier shall provide the Employer with a record of such actions.*]

[*The Supplier shall submit to the Employer's HSE Manager or another Employer-appointed person (in the form of PDF files) a RAMS on the safe execution of the work not less than 10 Business Days prior to the commencement of any activity on Site. The Employer will strive to review the submitted documentation as soon as possible.*]

[*The Employer is entitled to postpone the work at Supplier's cost, if the RAMS relevant to the work is incomplete, inadequate or missing.*]

[*A register of the task/service-specific risks, and their corresponding mitigating actions, shall be kept updated throughout the whole term of this Agreement. Each new update is subject to the Employer's review and comments.*]

h) The Supplier shall take suitable steps to control the risks to the health and safety of its personnel from manual handling activities such as lifting, lowering, pushing, pulling or carrying. This will include the preparation of manual handling risk assessments where required, and the workforce must be consulted and involved with this process to provide first-hand experience.

i) Waste materials and debris must be handled by supplier so that they cause the least possible damage and disturbance to the Site and the environment. No waste must be disposed of at sea. Supplier shall as a minimum comply with the Site-specific procedures for waste management prepared by the Employer and applicable Laws for handling of waste. To the extent that any consent for the handling and disposal is required from the public authorities, the Supplier shall at its own cost obtain such consents prior to the commencement of any work on the Site.

j) Alcohol may not be consumed during working hours. Reporting to work under the influence *of alcohol is prohibited. 'Under the influence' is defined as the presence of alcohol in the* body which exceeds 0.00 % (in blood alcohol level). Possession of open containers of alcoholic beverages in or around the Base and Area of Operation, including all vehicles and equipment at the Site, is prohibited. Random drug and alcohol testing may be done at the Site. The Employer may conduct unannounced drug and alcohol tests of all personnel. Personnel will be randomly selected by an independent entity. 'Randomly selected' means that tests are not announced ahead of time and that every person has an equal chance of being selected for a test each time a selection is made. An individual may refuse to submit to drug or alcohol testing or physical examination; however, refusal to submit to such testing may result in the assumption that the individual is under the influence and will result in dismissal from the Site. The Employer reserves the right to search and inspect for drugs and alcohol in order to maintain a safe workplace. The Supplier is responsible for ensuring that all its employees, agents, consultants and Sub-suppliers comply with this requirement at all times.

k) All personnel working on the Site shall be familiar with the Emergency Response Plan, please cf. 4.5. In case of an emergency or evacuation, all persons are obliged to act in accordance with the Emergency Response Plan. Supplier shall ensure that all under his management, control or supervision (including passengers, Sub-suppliers and visitors) are familiar with, and comply with, the Emergency Response Plan.

l) The Supplier shall maintain related HSE records and these records shall be made available to the Employer upon request. HSE records shall include, but not be limited to:
- HSE-related reports.
- Certificate of competency.
- Certificates or documentation of calibration and/or testing.
- HSE-related memos or letters.
- Training records.
- Inspection reports.
- Audit reports and corrective action documents.
- Other documents generated by the management of HSE in the course of the project.
- Documentation of meeting(s) held.

m) The Supplier's nominated Safety/Compliance Manager (HSE person) shall coordinate, collect and submit information/documentation to the Employer, who will pass the information on to the Project Health and Safety File as appropriate.

The Project Health and Safety File consists of information which will assist persons carrying out service and maintenance work within the wind farm scope, and includes as required:
- General description of the operational set-up.
- Identified new hazards during the operation and how they were mitigated.
- Consolidated operational procedures for operating to/from and within the wind farm.
- Any other 'lessons learnt' that may be beneficial to following operations.

H.3.3 Requirements to flight operations and procedures

All flight operations shall be conducted in accordance with the relevant parts of EASA OPS, be included in the Supplier's OM and shall comply with the following requirements:

Minimum Requirements to Flight Operations and Procedures

a) Communication procedures shall describe the requirement to establish two-way radio communication with the Marine and Helicopter Coordination Centre (MHCC) prior to entering the Offshore Wind Farm (OWF). (GI 06-65)

b) For HHO, the appropriate power setting referred to in EASA Annex IV, Part-CAT Subpart I SPA.HHO Operating Requirements, with respect to a critical power unit failure shall be based upon the Aircrew Flight Manual (AFM) One Engine Inoperative (OEI) Hover Out of Ground Effect (HOGE) two-minute limitation.

c) For flight planning HHO, the AFM shall be used and may use factored headwind, in this case xx % of forecast wind in area, ETA +– 1 hr.

d) HHO procedures shall cover:
- normal and all emergency procedures for HHO to WTG;
- normal and all emergency procedures for HHO to uncontrolled WTG;[14]
- normal and all emergency procedures for HHO to other fixed installations, and
- normal and all emergency procedures for HHO to vessels.

e) The HHO emergency procedures shall as a minimum include hoist (winch) failing either to raise or descend personnel, wire damage, shock to the wire/winch and harness or PPE failure.

14 The nacelle and blades cannot be put in the ideal/standard position for hoisting operations.

f) The HHO procedures shall as a minimum describe the following:
   – approach to hoist area;
   – performance check;
   – conditions to be in place before commencing hoist;
   – HHOP movement in cabin;
   – communication;
   – conditions to be in place before departure, and
   – departure from the hoist area.

g) Helicopter Hoist Operation Passenger (HHOP) shall not exit the cabin before the helicopter is at a steady hover overhead the hoist platform/area, unless it is less than XX feet above the water surface.

h) The helicopter shall remain overhead the hoist platform/area until the HHOP is safe inside the cabin of the helicopter, unless during emergency or if it is less than XX feet above water.

i) During actual HHO no extra passengers are allowed on board the helicopter other than those being hoisted.

j) All HHO procedures shall include the relevant requirements in A.3.6 Helicopter Certification, Performance and Technical Equipment.

k) HHO wind limitations:
   – Maximum XX m/s or XX knots for regular hoist operations.
   – Maximum XX m/s or XX knots for hoist operations in a retrieval situation with incoming weather.

l) All HHO procedures, incl. associated risk assessments, cf. SPA.HHO.140, shall be submitted not later than four weeks prior to Services Commencement Date.

Preferred Requirements to Flight Operations and Procedures

a) During HHO, hover height should not exceed 20 feet above the hoist platform/area.

H.3.4 Requirements to flight crew

Minimum Requirements to Flight Crew

a) Pilots shall hold appropriate licences, CPL/IR(H) or ATPL(H) as applicable, incl. EASA Class 1 Medical.

b) HHO pilots shall hold a minimum of XXX flight hours in helicopters.

c) The helicopter crew, incl. the hoist operator, shall comply with the ICAO English Language Proficiency Standards level 4.

d) In case of stopover/shutdown on the offshore helideck and if the helicopter crew is required to move off the helideck to other levels on the installation/vessel, the helicopter crew must comply with the requirements for an Offshore Access Level 2 (GI 08-01).[15]

Preferred Requirements to Flight Crew

a) All aircrew should be full-time employed.

b) Hoist operators should have previous hoist experience.

15 EASA Class 1 Medical is accepted as the Medical certificate.

H.3.5 Minimum requirements to passenger qualifications, personal protection equipment and training

All passengers being transported offshore via helicopter shall be confident with their Personal Protection Equipment (PPE) and capable of egressing the helicopter in case of ditching cf. Appendix XX Training and Medical Requirements, (GI 08-01).

Passenger Qualifications

The Supplier shall not accept passengers on board the flight unless they hold the following qualifications cf. appendix XX: (GI 08-01)

– Site induction.
– Full GWO Training package.
– Current Helicopter Under Water Escape Training (HUET) and – if applicable by Laws – Emergency Breathing System (EBS).
– Current Helicopter Hoist Training (HHT) (only for HHO).

Personal Protective Equipment (PPE)

All passengers shall wear the following PPE during flight:

– Immersion suit, approved in accordance with ETSO-2C503.
– Lifejackets and waistcoat, approved in accordance with ETSO-2C504 (compatible with survival suit).
– Compressed Air Emergency Breathing System (CA-EBS) – if applicable by Laws.
– Personal Locator Beacon (PLB), 121.5 MHz and 406 MHz.
– Ear protection.
– Mission/Tetra radio, minimum one pr. team (Only HHO).
– Safety helmet for work at height, approved according to EN397 (Only HHO).
– Hoist harness with sternal fall arrest attachment points, approved according to EN361 (Only HHO).
– The life vest and immersion suit shall be compatible with, and not in any way inhibit, any hoist harness used during HHO (only HHO).

Helicopter Training

a) The Supplier shall provide Helicopter Hoist Operations Passenger (HHOP) training. Theoretical and practical training shall include three (3) live hoists to and from a Heli hoist basket located on a WTG or other suitable training device
b) The Supplier shall provide XX-day renewal – HHOP shall have carried out X live Heli hoists within the previous XX days, or receive an HHO safety briefing prior to departure.
c) The Supplier shall provide renewal training for HHOP- if a HHOP has not carried out a live HHO within the previous XX calendar months, then the training in a). shall be carried out.
d) The Supplier shall provide helicopter type-specific training for HLOs including all emergencies expected to be handled by an HLO on the specific aircraft
e) The Supplier shall provide helicopter typespecific training for underslung operations related to the cargo handling.

f) The Supplier shall document the training and issue a training certificate for the HHOP to use during check-in prior to a flight.

H.3.6 Requirements regarding aircraft certification, performance and technical equipment

The following requirements are applicable to all helicopters regardless of type of service or type of helicopter:

Minimum Requirements regarding Aircraft Certification, Performance and Technical Equipment

a) Helicopters shall be airworthy and certified in accordance with EASA Regulations.

b) Helicopters shall be certified in Category A, equipped and operated in accordance with the relevant sub-parts to the EASA Regulations.

c) Helicopters' flight and navigational instruments and associated equipment, shall allow operations under VFR and operations under IFR or at night. (Ref CAT.IDE.H 130).

d) The helicopters shall be equipped with an emergency flotation system certified to sea state 6. (Ref CAT.IDE.H.320).

e) The life raft(s) carried by the helicopter in accordance with CAT.IDE/SPA.HOFO, shall be approved in accordance with ETSO-2C505.

f) Helicopter communication and navigational equipment shall comply with CAT. IDE.H.345.

g) Helicopters' communication equipment shall permit simultaneously communication on VHF/AM with Air Traffic Control (ATC) and the employers Marine and Helicopter Coordination Centre (MHCC).

h) The helicopter shall be equipped with four/five-point PAX harness with centre buckle.

i) The helicopter shall be capable of transmitting ADS-B.

In addition to the abovementioned requirements, the following minimum requirements apply to helicopters conducting HHO:

j) For hoisting to WTG, the helicopter maximum rotor diameter shall be calculated in accordance with National Aviation Regulation and the actual WTG type.

k) The helicopter shall be capable of sustaining minimum X minute One Engine Inoperative (OEI) Hover Out of Ground Effect (OGE).

l) The helicopter shall be equipped with interphone system for the use of the HHOP.

Preferred Requirements regarding Aircraft Certification, Performance and Technical Equipment

a) Except for HHO (ref. 3.6.k), helicopters should be capable of Performance Class 1 (PC1), preferably CAT A procedures, to allow the helicopter to land within the rejected take-off distance or safely continue the flight to an appropriate landing area, in the event of failure of a critical power unit.

b) The helicopter should be equipped with a maritime VHF/AM radio.

c) The HHO helicopter should be equipped with TETRA radio.

H.3.7 Requirements regarding flight safety occurrence reporting and investigation

The Parties agree to share information and to cooperate and actively work together with the shared goal of zero harm, meaning no accidents, incidents or work-related illnesses. The cooperation between the Parties shall be based on a no blame culture and focus on proactive prevention of accidents.

a) Any occurrence that requires reporting, cf. ORO.GEN.160 Occurrence reporting shall also be reported to the Employer.

b) All accidents and incidents shall be reported as soon as possible to the Employer. A written report shall be submitted by the Supplier within 24 hours. A suitable final report shall be submitted to the Employer no later than seven (7) Days after any accident or incident occurred.

c) In the event of a prolonged investigation into the accident or incident, interim reports shall be submitted every seven (7) Days.

d) Apart from accidents requiring the involvement of the Accident Investigation Board (AIB), the Employer retains the right at all times to carry out an investigation of any accident, incident or occurrence and involve external organisations or resources as it sees fit.

H.4 GENERIC REQUIREMENTS

No later than three months before Services Commencement Date, the Employer shall provide the Supplier with detailed information on passenger manifests, geographical location, surroundings, type of WTGs, vessels in the area, vessel safety zones and other mission-relevant information, which is necessary for conducting the daily operations offshore.

H.4.1 Bridging document

As a general principle for the Services under this Agreement, the Supplier's procedures are followed unless otherwise specified. However, it is the Supplier's responsibility to document, that its procedures comply with the requirements set out in this Agreement as well as applicable Laws, best practice, referenced documents and site-specific procedures and requirements including, but not limited to, the Employer's Construction Phase Plan (CPP)/ HSE plan.

Prior to any operation taking place, the Employer will, in cooperation with the Supplier, establish a bridging document (Helicopter Coordination Manual (HCM)) detailing which procedures are applicable for different parts of the work. This bridging document will be a part of the Employer's CPP/HSE plan for the site, and shall be kept updated and re-sent during the period of the Agreement. The Employer reserves the right to reject any changes if they, in the Employer's reasonable opinion, are jeopardising safety, quality or the environment. The Employer shall without delay inform the Supplier if any document referenced in the bridging document is updated, changed or deleted.

H.4.2 Monthly reporting

The Supplier shall submit to the Employer a monthly report, please cf. Clause XX in this Agreement.

The monthly report shall be submitted (by e-mail) no later than two business days after the last day in each month during the Term of this Agreement, and in a form approved by the Employer.

In relation to the HSE part of the monthly report, each monthly report shall cover the days from and including the 26th of the month preceding the month in which the report is due for submission up to and including the 25th of the month in which the report is due for submission. As a minimum, the HSE part of the monthly report shall include, but not be limited to, the following:

- Man hours worked and flight hours.
- Incidents involving injury with absence from work (one day).
- Incidents without absence from work.
- Restricted Work cases with description of task.
- Total number of incident-related absence days (Incl. one day).
- Accidents, incidents and occurrences.
- Reportable accidents and incidents (in accordance with regulations).
- First Aid Cases (FAC).
- Toolbox talk (safety briefings) numbers – including number of attendees.
- Safety Walk numbers.
- Emergency exercises.
- Passengers without proper certification including induction.
- Number of technicians trained and course dates.
- Status on corrective action reports (CARs).
- Notes of any contact with the authorities concerning health, safety or environment.
- Method statements issued by the Supplier – in addition to those in effect at the beginning of the project.
- Risk assessments issued by the Supplier, i.e. task method statement and task risk assessment.
- Audits and health and safety inspections completed.

These statistics are required in a summarised monthly report with a written statement on each accident or incident that may have occurred, with relevant reference to the number of accidents and incidents.

H.4.3 Audits and inspections

The Employer or any third party assigned by the Employer shall have the right to perform Audits and/or Inspections of the Supplier and any of its Sub-suppliers prior to and throughout the Term of this Agreement, please also cf. Clause XX and Clause XX in this Agreement.

[An Audit shall be performed by the Employer based on the requirement in this present document (Aviation Requirements for Europe. A successful safety audit is a precondition for awarding the contract, please cf. Instructions to Tenderers, section X.X.]

The Supplier shall provide the required facilities and assistance with respect to the execution of such activities. The Employer's Audit and/or Inspections shall not relieve the Supplier of his responsibility for the performance of the Services.

The Employer shall have the right to participate as observer in the planning and execution of all internal audits, incl. audits of Sub-suppliers.

For routine audits, a minimum five days' notice shall be given prior to any audit inspection activity initiated either by Employer or Supplier.

Non-routine audits can be conducted if, in the reasonable opinion of the Employer, the Supplier or one of his Sub-suppliers fails to meet safety obligations (i.e. any applicable Laws, industry best practice, requirements from the Employer's HSE Plan, the Supplier's own HSE Plan, this Agreement or accidents, near misses or observations with the potential of a fatality or permanent disability, numerous accidents, near misses or observations) that put safety of own personnel, the Employer's personnel, external personnel or the public at risk. Non-routine audits can be initiated immediately without prior notice by the Employer.

H.4.4 Safety improvement notices

If, in the reasonable opinion of the Employer, the Supplier or his Sub-suppliers fails to meet the health and safety obligations as stated in this Agreement, the Employer may issue a safety improvement notice in accordance the Agreement. The cost related to the steps taken to address the issue shall be borne by Supplier.

Intensified HSE inspection

If, in the reasonable opinion of the Employer, the Supplier or his sub-supplier(s) fails to, or appears to fail to, perform adequately according to the safety improvement notice then without prejudice to any other remedy under the Agreement, the Employer reserves the right to impose an intensified HSE inspection/surveillance regime until Supplier's HSE performance is once again satisfactory.

This measure can be put into action in the following cases:

– Accidents or serious incidents on Supplier or sub-supplier's or sub-supplier's production site(s), transfer site(s) or the installation Site(s).
– To ascertain that the plan issued by Supplier setting out the steps to be taken to address the issue, as specified in Clause Safety Notice, is followed and implemented.
– In case of repeated observations of breach of material site-specific safety rules as set out in HSE plan, violation of laws and/or regulations or industrial regulations.

The Employer shall stipulate the amount of resources and competences of the intensified HSE inspection/surveillance regime. The maximum period of the intensified HSE inspection is six weeks, whereafter the performance shall be re-evaluated. The length of the period shall be decided before initialisation of the HSE inspection/surveillance, and can be extended only after a status meeting between the Employer, the HSE inspection team and Supplier has been held.

All costs connected with the intensified HSE inspection/surveillance shall be borne by Supplier until Supplier's performance, in the reasonable opinion of the Employer, is once again in accordance with the aforementioned plan, the Agreement, Laws and/or regulations. The Employer reserves all contractual rights in such a situation.

H.4.5 Emergency response plans

The Employer shall develop a Site-specific emergency response plan applicable to all who work on the Site (the 'Emergency Response Plan'). Cooperation with authorities in emergency situations will form part of the Emergency Response Plan.

The Employer shall be responsible for developing specific emergency cooperation plans if required by applicable Laws or by relevant safety authorities.

All parties working on Site shall be familiar with the Emergency Response Plan. In case of an emergency or evacuation, all persons are obliged to act in accordance with the Emergency Response Plan. The Supplier shall ensure that all under its management, control or supervision (including Sub-suppliers and visitors) are familiar with, and comply with, the Emergency Response Plan.

The Employer will arrange emergency response drills on a regular basis in accordance with the specifications in the Emergency Response Plan. Supplier shall only be obliged to participate in any drills to the extent that it has any of its personnel dedicated to work on the relevant part of the Site. The frequency of the drills shall be as defined in the Employer's HSE Management System. In addition to the infield drills, desktop drills are to be held in accordance with the Emergency Response Plan. These will typically be carried out on 'wind days'. In case of any work performed by Supplier, the Employer shall have no liability to Supplier or any of its Sub-suppliers for the cost of participation in the emergency drills.

The Supplier is responsible for implementing procedures that address how reasonably foreseeable situations (that are not sufficiently covered by the Emergency Response Plan) are controlled. In such case, the Supplier shall provide detailed procedures to the Employer prior to any work being commenced. The procedure shall describe responsibility, obligations, training and equipment that are needed as well how they are coordinated with the Emergency Response Plan. These procedures shall be subject to regular drills planned and executed by Supplier. The frequency of drills shall reflect the complexity of the procedure, the risk related to the accident the procedure shall control etc. Supplier shall be able to document the effectiveness of the procedure and shall be able to document that the procedures provide a sufficient and appropriate preparedness.

H.4.6 Operations manual

The Supplier shall develop and, no later than four weeks prior to Services Commencement Date, submit a Supplier site-specific Operations Manual (OM) which shall establish how the Supplier will organise and manage the Services according to this Appendix. Further, the OM shall detail how the Supplier will comply at all times with the EASA OPS, Employer's Construction Phase Plan/Employer's Project Site Health, Safety and Environment Plan, applicable Laws and Good Industry Practice.

The Supplier site-specific OM shall be reviewed (and amended/updated, if relevant) by the Supplier (1) if pertinent circumstances have changed, e.g. Good Wind Industry Practice, applicable Law and the Employer's Construction Phase Plan/Employer's Project Site Health, Safety and Environment Plan and (2) at least once a year.

Amendments and/or updates to the Supplier site-specific OM during the Term shall be agreed by the Parties.

ANNEX I
CHECKLIST FOR HELICOPTER PASSENGERS

(Adapted from ORAG (Ref)*, courtesy of RenewableUK)*

The following is a checklist for helicopter passengers, to help them notice poor practice and insidious degradation. It could be made available, for example, as training material or as a checklist to take and complete on flights, as a tool for gathering feedback on the helicopter operator's safety performance.

Example of poor practices that have occurred, and that could be recorded using the checklist

No proper seat provided

Being informed that there is no need for an immersion suit as 'not that cold'

Seat belts broken, tied together with knots …

PRIOR TO FLIGHT

Qualification to fly should be checked

A pre-flight briefing should be received, including:

– Weather/MET Ocean Data.
– Personal protective equipment (PPE) to be worn.
– Task for today.
– Specifics of hoisting.
– Emergency Procedures.
– Dangerous Air Cargo.
– Route to the helicopter.
– Reminder to carry out buddy checks on PPE.
– 'New traveller' armband (See 7.4).

PRIOR TO TAKE-OFF

– A seat should be allocated, compatible with any body size (shoulder width) restrictions.
– Seat restraint should work.
– Escape route should be known.
– When and how to move within the aircraft should be briefed.

DURING FLIGHT

– Should be informed of any divergence from brief.
– When to reposition for transfer.
– How to transfer safely.

PRIOR TO LANDING

– Where to sit and how to be secure.

ON LANDING

– How to depart the aircraft avoiding dangers.
– Return PPE.
– Feedback to the crew/management.

ANNEX J
GLOSSARY

Consenting	is the process by which any necessary permissions are obtained, from a regulator or other authority, for the development or operation of a wind farm, or of associated activities. Various terms are used to describe these permissions: consents, licences, approvals, permissions, permits or authorisations etc, depending on the regulatory regime(s) involved. For brevity, these guidelines use the term 'consent' for all such permissions.
Helicopter operator	an organisation providing helicopters, crew or services.
Legislation/ regulation	In these guidelines, 'legislation' is used to mean the law that places duties on OWCs, and 'regulation' to mean the systems and organisations for checking that OWCs are complying with legal requirements and for, where necessary, taking enforcement action. The terms are confusing, since regulators often issue guidance, which may or may not have the force of law. Also, in some jurisdictions, some legislative documents are referred to as regulations – for example EU Commission Regulation (EU) No 1321/2014 of 26/11/2014 – Continuing Airworthiness Regulations, or the UK Management of Health and Safety at Work Regulations 1999. For the OWC, the important point to recognise is that they may well have legal duties even where is no proactive regulation or prior authorisation from a regulator required

OWC

In this document, the term 'OWC' (capitalised) is used to mean:

– organisations with primary responsibility for the overall safety of the offshore wind energy project that use, or are considering using, helicopters to support the project. The organisations most likely to have such responsibility are:
– during planning, design, construction, upgrade, repowering or decommissioning: the client/customer, developer or lead contractor.
– during operations and maintenance: the wind farm owner or operator.

– other organisations that contract helicopter services, such as a WTG manufacturer carrying out commissioning prior to handover, or a maintenance provider.

– organisations that are not the helicopter contract owner, but nevertheless have their employees transported by helicopter.

– organisations that do not intend to use helicopters in their normal activities, but who may require helicopter assistance in emergencies.

'OWC' includes both the singular (an OWC) and the plural (OWCs).

The relevance of any particular guideline to a specific OWC will depend on their role and responsibilities on the project.

Other parties, such as the helicopter operator, or vessel operators will also be health and safety duty holders in relation to their own activities

Safety

is sometimes used, for brevity, to include both health and safety.

ANNEX K
ABBREVIATIONS

AOC	air operator's certificate
AFM	aircrew flight manual
ALARP	as low as reasonably practicable
AMC	acceptable means of compliance
ANSP	air navigation service provider
ARA	airborne radar approach
ATC	air traffic control
ATM	air traffic management
ATS	air traffic service
BARS	Basic Aviation Risk Standard
BARSOHO	BARS for offshore helicopter operations
BVLOS	beyond visual line of sight
CA-EBS	compressed air emergency breathing system
CAR	corrective action report
CNS	communication, navigation and surveillance system
CPP	construction phase plan
EASA	European Union Aviation Safety Agency
EASA OPS	Commission Regulation (EU) no 965/2012 on air operations
ETSO	European Technical Standard Order
FAC	first aid cases
FDM	flight data monitoring
FSF	Flight Safety Foundation
GNSS	global navigation satellite system
HDA	helideck assistant
HERTL	helideck emergency response team leader
HERTM	helideck emergency response team member
HEMS	helicopter emergency medical services
HESLO	helicopter external sling load operations
HHO	helicopter hoist operations
HHOP	helicopter hoist operations passenger
HLO	helicopter landing officer
HSAC	Helicopter Safety Advisory Committee
HSE	health, safety and environment, or UK Health and Safety Executive
HUET	helicopter underwater escape training
IAGSA	International Airborne Geophysics Safety Association

IATA	International Aviation Transport Association
ICAO	International Civil Aviation Organization
IEC	International Electrotechnical Commission
IFR	instrument flight rules
IOGP	International Association of Oil and Gas Producers
IOER	G+ Integrated Offshore Emergency Response – good practice guidelines for offshore renewable energy developments
IMC	instrument meteorological conditions
ISO	International Organisation for Standardization
MHCC	maritime helicopter coordination centre
MRCC	maritime rescue coordination centre
NAA	national aviation authority (= national supervisory authority)
NUI	normally unattended installation
OEI	one engine inoperative
OEM	original equipment manufacturer
OSP	offshore support platform
OSV	offshore sub-station
OWC	offshore wind company
PLB	personal locator beacon
PPE	personal protective equipment
PPL	private pilot licence
RAN	regional air navigation agreement
RPAS	remotely piloted aircraft systems (also known as UAS)
SAR	search and rescue
SARPs	standards and recommended practices (of ICAO)
SEQ	supplier evaluation questionnaires
SIMOPS	simultaneous operations
SMS	safety management system
SOP	standard operating procedure
SOV	service operations vessel
SWH	significant wave height
UAS	unmanned aircraft system (also known as RPAS)
UAV	unmanned aerial vehicle
UXO	unexploded ordnance
VFR	visual flight rules
VMC	visual meteorological conditions
WTG	wind turbine generator

ANNEX L
REFERENCES

References are shown to those versions used in the development of these guidelines, but readers are advised to always consult the latest versions.

The Confidential Reporting Programme for Aviation and Maritime (CHIRP)

(https://www.chirp.co.uk/)

Danish Civil Aviation Administration

(https://www.trafikstyrelsen.dk/)

Document BL3-5 Regulations on helidecks on offshore installations. Edition 4

European Union Aviation Safety Agency (EASA)

(https://www.easa.europa.eu/)

EU Commission Regulation No. 965/2012 – Air Operations Regulation (EASA AIR OPS) see especially Annex V: EASA SPA.HOFO Approval for helicopter offshore operations

ECCAIRS *Safety reporting scheme*

EBOOK- *Air operator certificate guidelines for EASA and IOSA and successful management of its audits*

The 'Basic Regulation' - Regulation (EU) 2018/1139

Flight Safety Foundation (FSF)

(https://flightsafety.org/)

Basic Aviation Risk Standard – *Offshore Helicopter Operations – Safety Performance Requirements* (BARSOHO). Version 4

Basic Aviation Risk Standard – *Offshore Helicopter Operations – Safety Performance Requirements* (BARSOHO). I*mplementation Guidelines*. Version 4

BAR *Standard for Contracted Aircraft Operations* Appendix 6 of Version 8

FSF BAR *Standard for Remotely Piloted Aircraft Systems* (RPAS)

Energy Institute

(https://publishing.energyinst.org/)

G+ Integrated Offshore Emergency Response (IOER) *Good practice guidelines for offshore renewable energy developments*

Good practice guidelines for offshore renewable energy developments

HeliOffshore (http://helioffshore.org/)

Wind Farm Recommended Practices (WinReP)

Approach Path Management Guidelines. Issue 1 Version 3.0

Helicopter Flight Data Monitoring (HFDM) – *Recommended Practice for Oil and Gas Passenger Transport* Version 1.0

Helicopter Safety Advisory Conference (HSAC)

(http://www.hsac.org/)

HSAC Recommended Practice 161 (RP 161). *New Build Helideck Design Guidelines.* 2nd Edition.

HSAC Recommended Practice 163 (RP 163). I*nspection, Maintenance and Operation of Offshore Helidecks.* 2nd Edition.

HSAC Recommended Practice 164 (RP 164). *Standardization of Helideck Information Plates*. 2nd Edition

International Air Transport Association

(https://www.iata.org/)

IATA Dangerous Goods Regulations (DGR) Manual

International Airborne Geophysics Safety Association (IAGSA)

(https://www.iagsa.ca/)

Safety manual/Guidelines for low level airborne geophysical survey operations

International association of Oil and Gas Producers

(https://www.iogp.org/)

Aircraft Management Guidelines (AMG) (Version 2). IOGP Report 590

Offshore Helicopter Recommended Practices. IOGP Report 690

International Chamber of Shipping (ICS)

(https://www.ics-shipping.org/)

Guide to Helicopter/Ship Operations. 4th Edition

International Civil Aviation Organization (ICAO)

(https://www.icao.int/)

Convention on International Civil Aviation Annex 12 – Search and Rescue. 8th Edition

Aerodromes and Volume 2 – Aerodromes (Heliports) Annex 14 Volume 1. 8th Edition

Norwegian CAA

(https://luftfartstilsynet.no/en/)

Regulations relating to helicopter operations – use of offshore helidecks.

OPITO

(https://opito.com/)

OPITO *Helideck Operations Initial Training Standard (HLO and HDA Initial Training)*. Standard Code 7040 Revision 1, Amendment 2

Helicopter Landing Officer for NUI Operations – Initial and Further Training. Standard Code: 7048 (Initial) 7049 (Further), Amendment 0

For attended installations, OPITO also provides initial and further training standards for Helideck Emergency Response Team Leader (HERTL) and Team Member (HERTM) roles: Standard Codes 7041, 7042, 7541 and 7542

RenewableUK

(https://www.renewableuk.com/)

Good Practice Guidelines for Offshore Renewable Energy Developments. Issue 2

Guidelines for Renewable Energy Duty Holders in the Management, Procurement and Operations of Unmanned Aircraft Systems in Renewables. Issue 1

Offshore Renewables Aviation Guidance (ORAG)

Renewables and Unmanned Aircraft Systems – Guidelines for Operations (RUGO)

British and Irish Legal Information Institute

(https://www.bailii.org)

StormHarbour case. Dusek and others v Storm Harbour Securities

UK Civil Aviation Authority

(https://www.caa.co.uk/home/)

CAP 437 – *Standards for Offshore Helicopter Landing Areas.* Version 8.1.

CAP 764 – *CAA Policy and Guidelines on Wind Turbines*. Issue 6.

Please note that both CAP 437 and CAP 764 were under review at the time of writing (Nov 2020).

CAP 1145 – *Safety Review of Offshore Public Transport Helicopter Operations in support of the Exploitation of Oil and Gas. Version 1.*

CAP 1714 – *Aviation Safety as the UK leaves EASA*.

UK Helicopter Certification Agency (HCA)

(https://www.helidecks.org/)

Helidecks Limitations List Part C – Summary of Pitch, Roll and Heave Limitations

UK Health and Safety Executive

Review of Probable Survival Times in the North Sea. Offshore Technology Report Helicopter safety offshore. HSE Offshore Technology Report 2000/089.

UK Maritime and Coastguard Agency (MCA)

(https://www.gov.uk/government/organisations/maritime-and-coastguard-agency)

MCA/HSE *Regulatory expectations for emergency response arrangements for the offshore renewable energy industry.*

MGN 543 *Offshore Renewable Energy Installations* (OREI) – *Guidance on UK Navigational Practice, Safety and Emergency Response.*

Note: update in development at the time of writing (Nov 2020)

Energy Institute
61 New Cavendish Street
London W1G 7AR, UK

t: +44 (0) 20 7467 7100
f: +44 (0) 20 7255 1472
e: pubs@energyinst.org
www.energyinst.org

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