



Maritime and Coastguard Agency

MARINE GUIDANCE NOTE

## MGN 371 (M+F)

---

# Offshore Renewable Energy Installations (OREIs) - Guidance on UK Navigational Practice, Safety and Emergency Response Issues.

Notice to Other UK Government Departments, Offshore Renewable Energy Developers, Offshore Transmission Owners, Port Authorities, Ship owners, Masters, Ships' Officers, Fishermen and Recreational Sailors.

*This notice replaces MGN 275 and should be read in conjunction with the MCA Marine Guidance Note entitled "Offshore Renewable Energy Installations (OREIs) - Guidance to Mariners operating in the vicinity of UK OREIs".*

Note: References contained in this document can be accessed via the MCA website at [www.mcga.gov.uk](http://www.mcga.gov.uk) .

Other useful websites include:

- [www.berr.gov.uk](http://www.berr.gov.uk)
- [www.opsi.gov.uk](http://www.opsi.gov.uk)
- [www.un.org/depts/los](http://www.un.org/depts/los)
- [www.maritimedata.co.uk](http://www.maritimedata.co.uk) .

---

### PLEASE NOTE:-

Where this document provides guidance on the law it should not be regarded as definitive. The way the law applies to any particular case can vary according to circumstances - for example, from vessel to vessel and you should consider seeking independent legal advice if you are unsure of your own legal position.

### Summary

This guidance note highlights issues that need to be taken into consideration when assessing the impact on navigational safety and emergency response (search and rescue and counter pollution) caused by offshore renewable energy installation developments, proposed for United Kingdom internal waters, territorial sea or in a Renewable Energy Zone beyond the territorial sea.

### Key Points

- The recommendations in this guidance note should be used, primarily, by offshore renewable energy installation developers, seeking consent to undertake marine works.

- Specific annexes address particular issues as follows:  
 Annex 1: Site position, structures and safety zones  
 Annex 2: Developments, navigation, collision avoidance and communications  
 Annex 3: MCA's wind farm shipping template for assessing wind farm boundary distances from shipping routes  
 Annex 4: Safety and mitigation measures recommended for OREI during construction, operation and decommissioning  
 Annex 5: Search and Rescue (SAR) matters.
- These recommendations should be read in conjunction with the "Methodology for Assessing the Marine Navigational Safety Risks of Offshore Wind Farms" published by the Department for Business Enterprise and Regulatory Reform (BERR).

**Introduction:**

- 1.1 Offshore Renewable Energy Installations (OREI) include offshore wind farms, marine current turbines, wave generators and any other installation, with the potential to affect marine navigation and safety, proposed for United Kingdom (UK) internal waters, territorial sea or in a Renewable Energy Zone (REZ) beyond the territorial sea .
- 1.2 Recommendations in this guidance note should be taken into account by OREI developers seeking formal consent for marine works. Failure by developers to give due regard to these recommendations may result in objections to their proposals on the grounds of navigational safety or emergency response preparedness. Additional information on the process for consenting OREI and the regulatory framework is available from the Business, Enterprise & Regulatory Reform (BERR) web site.. After the publication of this MGN, updated guidance on consent and similar issues can be obtained from the BERR website under "Energy". It should be noted that BERR is not responsible for consenting projects in the internal and territorial waters of either Scotland or Northern Ireland.
- 1.3 The considerations and criteria contained in the attached annexes are intended to address the navigational impact and emergency response of OREI proposed for UK sites. Their development necessitates the establishment of a clear consents process to deal with potential detrimental effects. The consent regime must take account of local factors, national standards and international aspects which could influence the establishment of an OREI.
- 1.4 The Energy Act 2004 establishes a regulatory regime for OREI beyond territorial waters, in the UK's REZ, and supplements the regime which already applies in Great Britain's internal and territorial waters. Section 99 of the Act deals specifically with navigation and introduces a new section, 36B with the title "duties in relation to navigation" into section 36 of the Electricity Act 1989. Under 36B(1) a consent cannot be granted for an OREI which is likely to interfere with the use of "*recognised sea lanes essential to international navigation*". This term is married at 36B (7) to Article 60(7) of the United Nations Convention on the Law of the Sea 36B(2) of the Electricity Act consolidates into section 36 the provisions of section 34 of the Coast Protection Act 1949.
- 1.5 The recommendations have been developed in consultation with BERR, the devolved government authorities for Scotland, Wales and Northern Ireland, mariners in the commercial, military, fisheries and recreational sectors, relevant associations and port authority representatives, the General Lighthouse Authorities (GLA) and emergency support services such as the Royal National Lifeboat Institution (RNLI).

## **2. How and when the recommendations should be used.**

- 2.1 This Guidance Note, as the name implies, is intended for the guidance of developers and others. Whilst non-mandatory, failure to accept the principles of the guidance may result in delaying the consents process. The recommendations should be taken into account by OREI developers and their contracted environmental and risk assessors in the preparation of Scoping Reports (SR), Environmental Impact Assessments (EIA) and resulting Environmental Statements (ES).
- 2.2 These should evaluate all navigational possibilities, which could be reasonably foreseeable, by which the siting, construction, establishment and de-commissioning of an OREI could cause or contribute to an obstruction of, or danger to, navigation or marine emergency response. They should also be used to assess the most favourable options to be adopted, including those of operational site monitoring.
- 2.3 Potential navigational or communications impacts or difficulties caused to mariners or emergency response services, using the site area and its environs, should be assessed. Those difficulties which could contribute to a marine casualty leading to injury, death or loss of property, either at sea or amongst the population ashore, should be highlighted as well as those affecting emergency response. Consultation with local and national search and rescue authorities should be initiated and consideration given to the types of aircraft, vessels and equipment which might be used in emergencies. This should include the possible use of OREI structures as emergency refuges and any matters that might affect emergency response within or close to the OREI.
- 2.4 Assessments should be made of the consequences of ships deviating from normal routes and recreational or fishing vessels entering shipping routes in order to avoid proposed sites. Special regard should be given to evaluating situations which could lead to safety of navigation being compromised e.g. an increase in 'end-on' or 'crossing' encounters, reduction in sea-room or water depth for manoeuvring, leading to choke points, etc.
- 2.5 In terms of navigational priority, these recommendations do not encourage a differentiation to be made between any types of seagoing water craft, operations, or mariners.

## **3. Annexes:**

- 3.1 The recommendations contained therein apply to all sites, whether within the jurisdiction of port limits or in open sea areas. However, port authorities may require developers to comply with their own specific criteria. In addition, where proposals within port limits could affect navigation or emergency planning or response, the port authorities will be under an obligation to review its safety management system, in accordance with the Port Marine Safety Code. Such reviews should be undertaken in parallel with the OREI developer's Environmental Impact Assessment and the outcome addressed in the resulting Environmental Statement.
- 3.2 OREI developers should comply with the recommendations during all phases of their planning, construction, operation and decommissioning.
- 3.3 Information concerning their navigational impact during these four phases should be promulgated in ample time to all relevant mariners, organisations and authorities.

General guidance on navigational safety assessment in and near to OREI can be obtained from the MCA website

3.4 Contingency arrangements to deal with marine casualties in or adjacent to sites, including responses to environmental pollution, should be planned and practised to test their efficiency.

3.5 The following annexes contain recommendations on:

Annex 1: Considerations on site position, structures and safety zones.

Annex 2: Navigation, collision avoidance and communications.

Annex 3: MCA shipping template, assessing wind farm boundary distances from shipping routes.

Annex 4: Safety and mitigation measures recommended for OREI during construction, operation and decommissioning.

Annex 5: Standards and procedures for generator shutdown and other operational requirements in the event of a search and rescue, counter pollution or salvage incident in or around an OREI.

**Note:** *The Maritime and Coastguard Agency (MCA) reserves the right to vary or modify these recommendations on the basis of experience or in accordance with internationally recognised standards in the interest of safety of life at sea and protection of the marine environment.*

## More Information

Navigation Safety Branch  
Maritime and Coastguard Agency  
Bay 2/29  
Spring Place  
105 Commercial Road  
Southampton  
SO15 1EG

Tel : +44 (0) 23 8032 9523  
Fax : +44 (0) 23 8032 9204  
e-mail: [navigationsafety@mcga.gov.uk](mailto:navigationsafety@mcga.gov.uk)

General Inquiries: [infoline@mcga.gov.uk](mailto:infoline@mcga.gov.uk)

MCA Website Address: [www.mcga.gov.uk](http://www.mcga.gov.uk)

File Ref: MNA/053/010/0626

Published: August 2008  
Please note that all addresses and  
telephone numbers are correct at time of publishing

© Crown Copyright 2008

**Safer Lives, Safer Ships, Cleaner Seas**

*Printed on material containing minimum 75% post-consumer waste paper*

*An executive agency of the*  
*Department for*  
**Transport**

## **Annex 1 - Considerations on Site Position, Structures and Safety Zones**

### **1. Site and Installation Co-ordinates**

Developers are responsible for ensuring that formally agreed variations in the co-ordinates of site perimeters and individual OREI structures are made available, on request, to interested parties at all project stages, including application for consent, development, array variation, operation and decommissioning. This should be supplied as authoritative Geographical Information System (GIS) data, preferably in Environmental Systems Research Institute (ESRI) format. Metadata should facilitate the identification of the data creator, its date and purpose, and the geodetic datum used. For mariners' use, appropriate data should also be provided in latitude/ longitude formats.

### **2. Traffic Survey**

An up to date, traffic survey of the area concerned should be undertaken within 12 months prior to submission of the Environmental Statement. However, if deemed necessary, to cover seasonal variations or perceived future traffic trends, the survey period may be extended to a maximum of 24 months, in which period a minimum of 42 days survey is required, and pro rata, i.e. 35 days during an 18 month period, etc. This should include all the vessel types found in the area and, as a minimum, address all those types listed in Table 12 of the BERR "Methodology for Assessing the Marine Navigational Safety Risks of Offshore Wind Farms" and is likely to total at least 28 days duration but also taking account of seasonal variations in traffic patterns, and fishing operations. These variations should be justified in consultation with representative recreational and fishing vessel organisations, and, where appropriate, port and navigation authorities. The BERR shipping database should be referred to in the initial stages of the traffic survey. While recognising that site-specific factors need to be taken into consideration, any such survey should, in general, assess:

- a. Proposed OREI site relative to areas used by any type of marine craft.
- b. Numbers, types and sizes of vessels presently using such areas.
- c. Non-transit uses of the areas, e.g. fishing, day cruising of leisure craft, commercial passenger vessels undertaking visits to the OREI, racing, aggregate dredging, etc.
- d. Whether these areas contain transit routes used by coastal or deep-draught vessels on passage.
- e. Alignment and proximity of the site relative to adjacent shipping routes.
- f. Whether the nearby area contains prescribed routeing schemes or precautionary areas.
- g. Whether the site lies on or near a prescribed or conventionally accepted separation zone between two opposing routes.
- h. Proximity of the site to areas used for anchorage, safe haven, port approaches and pilot boarding or landing areas.
- i. Whether the site lies within the limits of jurisdiction of a port and/or navigation authority.
- j. Proximity of the site to existing fishing grounds, or to routes used by fishing vessels to such grounds.

- k. Proximity of the site to offshore firing/bombing ranges or ordnance dumping grounds and areas used for any marine military purposes either presently or in the past.
- l. Proximity of the site to existing or proposed offshore oil / gas platform, marine aggregate dredging, marine archaeological sites or wrecks, or other exploration/exploitation sites. This should include projects in the planning process, in addition to those consented.
- m. Proximity of the site to existing or proposed OREI developments, in co-operation with other relevant developers, within each round of lease awards.
- n. Proximity of the site relative to any designated areas for the disposal of dredging spoil.
- o. Proximity of the site to any types of aids to navigation and/or Vessel Traffic Services (VTS) in or adjacent to the area and any impact thereon.
- p. Researched opinion using appropriate computer simulation techniques with respect to the displacement of traffic and, in particular, the creation of 'choke points' in areas of high traffic density.

**Note:** *The BERR "Methodology for Assessing the Marine Navigational Safety Risks of Offshore Wind Farms" should be closely followed throughout the Environmental Impact Assessment*

### **3. OREI Structures**

It should be determined:

- a. Whether any features of the OREI, including auxiliary platforms outside the main generator site, mooring and anchoring systems, inter-device and export cabling, could pose any type of difficulty or danger to vessels underway, performing normal operations, including fishing, or anchoring. Such dangers would include clearances of wind turbine blades above the sea surface, the least depth of current turbine blades, the burial depth of cabling, etc.

**Note:** *Recommended minimum safe (air) clearances between sea level conditions at mean high water springs (MHWS) and wind turbine rotors are that they should be suitable for the vessels types identified in the traffic survey but generally not less than 22 metres, unless developers are able to offer proof that no risk exists to any vessel type with air drafts greater than the requested minimum. Depths, clearances and similar features of other OREI types which might affect marine safety should be determined on a case by case basis.*

- b. Whether any feature of the installation could create problems for emergency rescue services, including the use of lifeboats, helicopters and emergency towing vessels (ETVs)
- c. With respect to specific OREI devices, how rotor blade rotation, other exposed moving mechanical parts and/ or power transmission, etc., will be controlled by the designated services when this is required in an emergency.

**Note:** *Annex 5 of this document details HM Coastguard recommended standards and procedures for the use of an Active Safety Management System (ASMS) in the event of an incident in or around offshore wind farms and other OREIs.*

#### **4. Assessment of Access to and Navigation Within, or Close to, an OREI**

To determine the extent to which navigation would be feasible within or near to the OREI site itself by assessing whether:

- a. Navigation within and /or near the site would be safe :
  - i. by all vessels, or
  - ii. by specified vessel types, operations and/or sizes.
  - iii. in all directions or areas, or
  - iv. in specified directions or areas.
  - v. in specified tidal, weather or other conditions.
- b. Navigation in and/or near the site should be :
  - i. prohibited by specified vessels types, operations and/or sizes.
  - ii. prohibited in respect of specific activities,
  - iii. prohibited in all areas or directions, or
  - iv. prohibited in specified areas or directions, or
  - v. prohibited in specified tidal or weather conditions, or simply
  - vi. recommended to be avoided.
- c. Exclusion from the site could cause navigational, safety or routeing problems for vessels operating in the area, e.g. by causing a vessel or vessels to follow a less than optimum route.
- d. Guidance on the calculation of safe distances of wind farm boundaries from shipping routes can be found in MCA's "Shipping Routes : Wind Farm Template" which follows as Annex 3
- e. Advice on the safe distances of other OREI developments from shipping routes may be obtained from MCA's Navigation Safety Branch
- f. The foregoing information may be used to assess the dimensions of any safety zones requested by developers. For further information, see Annex 4 Section 1 (iii) of this MGN. See also SI 2007 No 1948 "The Electricity (Offshore Generating Stations) (Safety Zones) (Application Procedures and Control of Access) Regulations 2007" and specific BERR guidance for OREI development
- g. Relevant information concerning applications for safety zones under SI 2007 No 1948 "The Electricity (Offshore Generating Stations) (Safety Zones) (Application Procedures and Control of Access) Regulations 2007" for a particular site during any point in its construction, operation or decommissioning, should be specified in the Environmental Statement accompanying the development application. Specific BERR guidance is available for OREI applications Information concerning retrospective applications for safety zones should be promulgated to MCA and other interested parties without delay.

## **Annex 2 - Navigation, collision avoidance and communications**

### **1. The Effect of Tides and Tidal Streams**

It should be determined whether:

- i. Current maritime traffic flows and operations in the general area are affected by the depth of water in which the proposed installation is situated at various states of the tide i.e. whether the installation could pose problems at high water which do not exist at low water conditions, and vice versa.
- ii. The set and rate of the tidal stream, at any state of the tide, has a significant affect on vessels in the area of the OREI site.
- iii. The maximum rate tidal stream runs parallel to the major axis of the proposed OREI site layout, and, if so, its effect.
- iv. The set is across the major axis of the OREI layout at any time, and, if so, at what rate.
- v. In general, whether engine failure or other circumstance could cause vessels to be set into danger by the tidal stream.
- vi. The structures themselves could cause changes in the set and rate of the tidal stream.
- vii. The structures in the tidal stream could be such as to produce siltation, deposition of sediment or scouring, affecting navigable water depths in the windfarm area or adjacent to the area.

### **2. Weather**

It should be determined whether:

- i. The site, in normal, bad weather, or restricted visibility conditions, could present difficulties or dangers to craft, including sailing vessels, which might pass in close proximity to it.
- ii. The structures could create problems in the area for vessels under sail, such as wind masking, turbulence or sheer.
- iii. In general, taking into account the prevailing winds for the area, whether engine failure or other circumstances could cause vessels to drift into danger, particularly if in conjunction with a tidal set such as referred to in 2.1 (v) above.

### **3. Visual Navigation and Collision Avoidance**

It should be determined whether:

- i. The structures could block or hinder the view of other vessels under way on any route.
- ii. The structures could block or hinder the view of the coastline or of any other navigational feature such as aids to navigation, landmarks, promontories, etc.



#### 4. Communications, Radar and Positioning Systems:

To provide researched opinion of a generic and, where appropriate, site specific nature concerning whether:

- i. The structures could produce radio interference such as shadowing, reflections or phase changes, with respect to any frequencies used for marine positioning, navigation or communications, including Automatic Identification Systems (AIS), whether ship borne, ashore or fitted to any of the proposed structures.
- ii. The structures could produce radar reflections, blind spots, shadow areas or other adverse effects:
  - a. Vessel to shore;
  - b. Vessel to vessel
  - c. VTS radar to vessel;
  - d. Racon to/from vessel.
  - e. Search And Rescue and maritime surveillance aircraft to vessels and/or OREI structures
- iii. The OREI, in general, would comply with current recommendations concerning electromagnetic interference.
- iv. The structures and generators might produce sonar interference affecting fishing, industrial or military systems used in the area.
- v. The site might produce acoustic noise which could mask prescribed sound signals.
- vi. The generators and the seabed cabling within the site and onshore might produce electro-magnetic fields affecting compasses and other navigation systems.

**Note:** Information on potential effects on radar, communication and communications systems can be found on the MCA website

#### 5. Marine Navigational Marking

It should be determined:

- i. How the overall site would be marked by day and by night taking into account that there may be an ongoing requirement for marking on completion of decommissioning, depending on individual circumstances.
- ii. How individual structures and fittings on the perimeter of and within the site, both above and below the sea surface, would be marked by day and by night.
- iii. If the specific OREI structure would be inherently radar conspicuous from all seaward directions (and for SAR and maritime surveillance aviation purposes) or would require passive enhancers and / or,
- iv. If the site would be marked by one or more radar beacons (racons) and/ or,
- v. If the site would be marked by an Automatic Identification System (AIS) transceiver, and if so, the data it would transmit.
- vi. If the site would be fitted with a sound signal, and where the signal or signals would be sited.

- vii. If the structure(s) would be fitted with aviation marks, and, if so, how these would be screened from mariners or potential confusion with other navigational marks and lights resolved.
- viii. Whether the proposed site and/or its individual generators would comply in general with markings for such structures, as required by the relevant General Lighthouse Authority (GLA) or recommended by the Maritime and Coastguard Agency, respectively.
- ix. The aids to navigation specified by the GLAs are being maintained such that the 'availability criteria', as laid down and applied by the GLAs, is met at all times. Separate detailed guidance is available from the GLAs on this matter.
- x. The procedures that need to be put in place to respond to casualties to the aids to navigation specified by the GLAs, within the timescales laid down and specified by the GLAs.

## 6. Hydrography

In order to establish a baseline, confirm the safe navigable depth, monitor seabed mobility and to identify underwater hazards, detailed and accurate hydrographic surveys are required.

- i. It is considered necessary that a hydrographic survey of the site and its immediate environs extending to 500m outside the development area be undertaken at each of the following stages:
  - a. As part of the consent application
  - b. Following installation of the development
  - c. On a pre-established periodicity during the life of the development (with survey frequency being determined by, amongst other considerations, the mobility of the seabed).
  - d. Following decommissioning of all or part of the development.
- ii. In addition, if the establishment of the development will alter maritime traffic patterns by necessitating vessels to avoid the area by seeking an alternative passage over areas last surveyed on UK Hydrographic Office nautical charts prior to 1986, it may be considered necessary that a hydrographic survey of these alternative passages and their immediate environs extending to 500m outside the alternative passages be undertaken.
- iii. All hydrographic surveys listed above as part of Annex 2 (Hydrography) should fulfil the requirements of International Hydrographic Organization (IHO) Order 1 standard multibeam bathymetry in every respect, with final data being supplied as a digital full density data set, and erroneous soundings flagged as deleted but included in the data set. A full report detailing survey methodology and equipment should accompany the surveys. On completion of each survey, results should be forwarded to:

Hydrography Manager  
The Maritime & Coastguard Agency  
Bay 2/30, Spring Place  
105, Commercial Rd  
Southampton  
SO15 1EG
- iv. Further information on hydrographic guidelines for developers can be found on the MCA web-site at: <http://www.mcga.gov.uk/hydrography>

## **Annex 3: MCA Template for assessing distances between wind farm boundaries and shipping routes**

### **“SHIPPING ROUTE” TEMPLATE - NOTES**

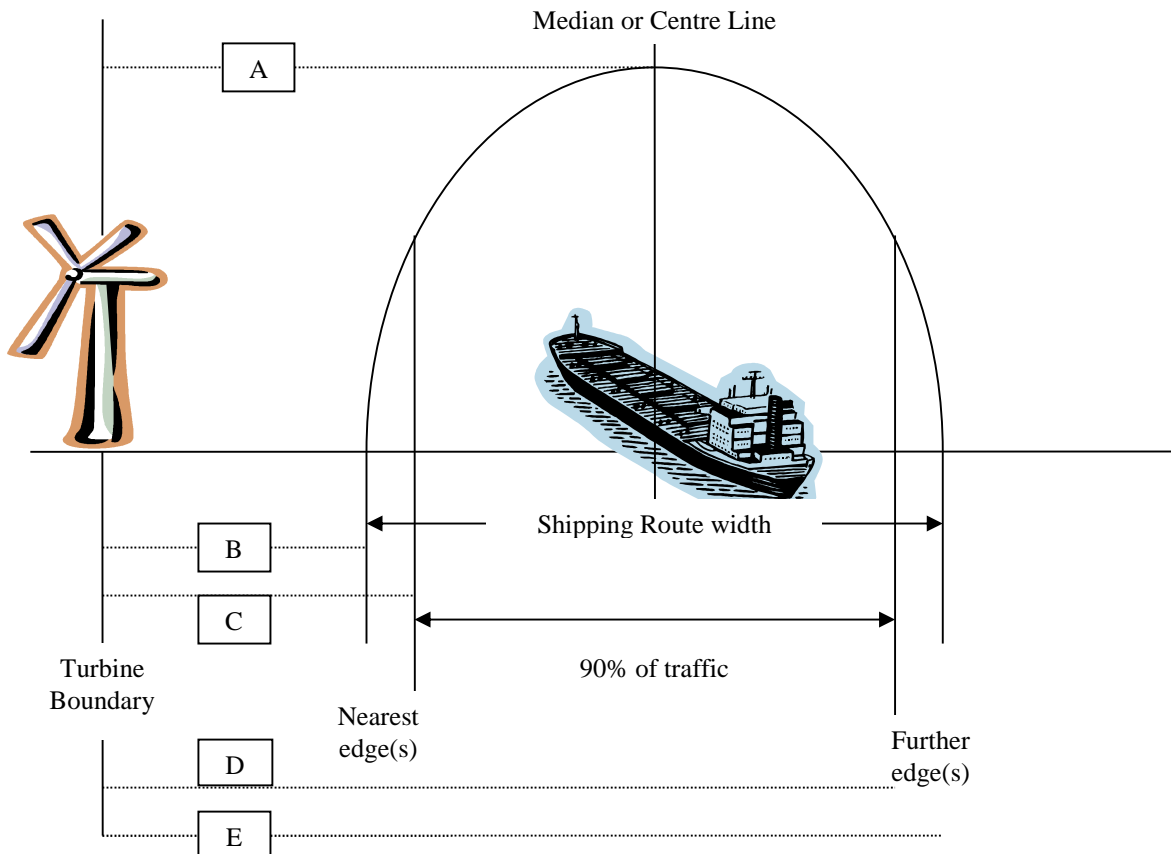
#### **Background**

1. In late 2004 the Greater Wash wind farm developers group sought guidance from the Maritime and Coastguard Agency on the inter-relationship of wind farms to shipping routes so that they could take early recognition of the factors involved when planning a turbine layout within their allocated water space. This template is the result.
2. The template fuses together the radar results of the North Hoyle electromagnetic trials with published ship domain theory so as to better interpret the inter-relationship of marine wind farms and shipping routes. The resultant also points to a likely process by which consent applications would be viewed.
3. The template was presented to developer groups during Autumn 2004 and offered for consultation to stakeholders in 2005.

#### **Use**

4. It is important to recognise that the template is not a prescriptive tool but needs intelligent application. For example, there may be opportunities for the interactive boundaries to be flexible where, again, for example, vessels may be able to distance themselves from turbines to provide more comfort without significant penalty, conversely turbines could be distanced from shipping nodal points. Domains have been derived from a statistical study of ship domains based on radar simulator performance, and traffic surveys in the North Sea, but it is recognised that larger, high speed, Hazmat and passenger carrying vessels may have larger domains.
5. Such traffic surveys would also establish any route traffic bias where mariners may naturally offset themselves to starboard to facilitate passing encounters in accordance with the International Regulations for Preventing Collisions at Sea (COLREGS). Additionally, marine traffic surveys would identify vessel type or category which may consequently require larger domains. In the approaches to ports this is particularly relevant. This additional information would influence where boundaries need to be established.
- 6 Mitigation measures are not specifically identified by the template, which necessarily takes a generic approach rather than site specific view. Separate papers may address potential measures, but those envisaged by this template include, but are not necessarily limited to:
  - a) IMO Routeing measures
  - b) Vessel Traffic Services
  - c) Aids to navigation
  - d) Safety zones
7. The mention of the IMO/UNCLOS safety zone at 500 metres does not imply a direct parallel to be applied to wind farms. It is only used to illustrate an existing limitation (MSN 1290 refers). For further guidance, see the Department for Business, Enterprise and Regulatory Reform (BERR) document “Applying for Safety Zones Around Offshore Energy Installations”

## INTERACTIVE BOUNDARIES



8. Similarly, the position of, or where an interactive boundary lies, either needs definition or agreement - which will require interpretative flexibility, see diagram above where:

- A = Turbine boundary to the shipping route median or centre line
- B = Turbine boundary to nearest shipping route edge
- C = Turbine boundary to nearest shipping 90% traffic level\*
- D = Turbine boundary to further shipping 90% traffic level\*
- E = Turbine boundary to further shipping route edge

(\* = or another % to be determined)

Clearly, marine traffic survey information is required to inform such boundaries.

**WIND FARM: “SHIPPING ROUTE” Template**

<b>Distance in miles (nm) of Turbine Boundary from Shipping Route</b>	<b>Factors</b>	<b>Risk</b>	<b>Tolerability</b>
<b>&lt; 0.25nm (500m)</b>	500m inter-turbine spacing = small craft only recommended	<b>VERY HIGH</b>	<b>INTOLERABLE</b>
<b>0.25nm (500m)</b>	X band radar interference	<b>VERY HIGH</b>	
<b>0.45nm (800m)</b>	Vessels may generate multiple echoes on shore based radars	<b>VERY HIGH</b>	
<b>0.5nm (926m)</b>	Mariners’ high traffic density domain	<b>HIGH</b>	<p align="center"><b>TOLERABLE IF ALARP (As Low As Reasonably Practicable)*</b></p> <p><small>* Descriptions of ALARP can be found in a) Great Britain Health and Safety Executive (2001) Reducing risks protecting people b) IMO (2002) MSC Circ 1023 dated 5<sup>th</sup> April 2002 Formal Safety Assessment c) IMO (2007) MSC 83-21-INF2 Consolidated guidelines for Formal Safety Assessment</small></p>
<b>0.8nm (1481m)</b>	Mariners’ ship domain	<b>HIGH</b>	
<b>1 nm (1852m)</b>	Minimum distance to parallel boundary of TSS	<b>MEDIUM</b>	
<b>1.5nm (2778m)</b>	S band radar interference ARPA affected	<b>MEDIUM</b>	
<b>2 nm (3704m)</b>	Compliance with COLREGS becomes less challenging	<b>MEDIUM</b>	
<b>&gt;2nm &gt; (3704m)</b>	But not near TSS	<b>LOW</b>	
<b>3.5nm (6482m)</b>	Minimum separation distance between turbines opposite sides of a route	<b>LOW</b>	
<b>5nm (9260m)</b>	Adjacent wind farm introduces cumulative effect Distance from TSS entry/exit	<b>VERY LOW</b>	<b>BROADLY ACCEPTABLE</b>
<b>10nm (18520m)</b>	No other wind farms	<b>VERY LOW</b>	

#### **Annex 4 – Safety and mitigation measures recommended for OREI during construction, operation and decommissioning.**

Mitigation and safety measures will be applied to the OREI development appropriate to the level and type of risk determined during the Environmental Impact Assessment (EIA). The specific measures to be employed will be selected in consultation with the Maritime and Coastguard Agency's Navigation Safety Branch and will be listed in the developer's Environmental Statement (ES). These will be consistent with international standards contained in, for example, the Safety of Life at Sea (SOLAS) Convention - Chapter V, IMO Resolution A.572 (14) and Resolution A.671 (16) and could include any or all of the following:

- i. Promulgation of information and warnings through notices to mariners and other appropriate media.
- ii. Continuous watch by multi-channel VHF, including Digital Selective Calling (DSC).
- iii. Safety zones of appropriate configuration, extent and application to specified vessels. As noted in Annex 1, section 3, see also SI 2007 No 1948 "The Electricity (Offshore Generating Stations) (Safety Zones) (Application Procedures and Control of Access) Regulations 2007 and specific BERR guidance for OREI developments
- iv. Designation of the site as an area to be avoided (ATBA).
- v. Implementation of routeing measures within or near to the development.
- vi. Monitoring by radar, AIS, closed circuit television (CCTV) or other agreed means.
- vii. Appropriate means for OREI operators to notify, and provide evidence of, the infringement of safety zones or ATBA's.
- viii. Any other measures and procedures considered appropriate in consultation with other stakeholders.
- ix. Creation of an Emergency Response Cooperation Plan with the relevant Maritime Rescue Coordination Centre from Construction Phase onwards

**Note:** *It is recommended that, where possible, individual OREI marking should conform to a "spread sheet" layout, i.e. lettered on the horizontal axis, and numbered on the vertical axis. The detail of this will depend on the shape, geographical orientation and potential future expansion of each OREI development. MCA will advise on the specific requirements for each development.*

## **Annex 5 – Standards and procedures for generator shutdown and other operational requirements in the event of a search and rescue, counter pollution or salvage incident in or around an OREI.**

Full details of Emergency Response Co-operation Plans (ERCoP) are available from the MCA web site. It should be noted an ERCoP is required to be in place for the construction, operation and decommissioning phases of any OREI. General information is as follows:

### **1. Design Requirements**

The OREI should be designed and constructed to satisfy the following requirements for emergency shut-down in the event of a search and rescue (SAR), counter pollution or salvage operation in or around a wind farm or other OREI site.

- i. All wind turbine generators (WTGs) and other OREI individual structures will each be marked with clearly visible unique identification characters which can be seen by both vessels at sea level and aircraft (helicopters and fixed wing) from above.
- ii. The identification characters shall each be illuminated by a low-intensity light visible from a vessel thus enabling the structure to be detected at a suitable distance to avoid a collision with it. For offshore wind farms, the size of the identification characters in combination with the lighting should be such that, under normal conditions of visibility and all known tidal conditions, they are clearly readable by an observer, stationed 3 metres above sea levels, and at a distance of at least 150 metres from the turbine. For other OREI types, device detection and identification distances shall be agreed with MCA's Navigation Safety Branch. It is recommended that lighting for this purpose be hooded or baffled so as to avoid unnecessary light pollution or confusion with navigation marks. (Precise dimensions to be determined by the height of lights and necessary range of visibility of the identification numbers).
- iii. For aviation purposes, OREI structures should be marked with hazard warning lighting in accordance with CAA guidance and also with unique identification numbers (with illumination controlled from the site control centre and activated 'as required') on the upper works of the OREI structure so that aircraft can identify each installation from a height of 500 feet (150 metres) above the highest part of the OREI structure.
- iv. Wind Turbine Generators (WTG) shall have high contrast markings (dots or stripes) placed at 10 metre intervals on both sides of the blades to provide SAR helicopter pilots with a hover-reference point.
- v. All OREI generators and transmission systems should be equipped with control mechanisms that can be operated from the OREI Central Control Room or through a single contact point.
- vi. Throughout the design process for an OREI, appropriate assessments and methods for safe shutdown should be established and agreed, through consultation with MCA's Navigation Safety Branch, Search and Rescue Branch and other emergency support services. (see OREI Emergency Response Cooperation Plans)
- vii. The OREI control mechanisms should allow the Control Room, single contact point Operator to fix and maintain the position of WTG blades, nacelles and other appropriate OREI moving parts to configurations determined by the Maritime Rescue Co-ordination Centre (MRCC). This same Operator must be able to immediately effect the control of offshore substations and export cables.
- viii. Nacelle hatches and other OREI enclosed spaces in which personnel are working should be capable of being opened from the outside. This will allow rescuers (e.g. helicopter winch-man) to gain access to such spaces if the occupants are unable to

assist and when sea-borne approach is not possible. These spaces may be secured when no site personnel are present. OREI access areas, nacelle roofs and landing platforms should also be fitted with clearly marked safe areas, railings, hand holds and/or strong points for the securing of safety harnesses.

- ix. WTG access ladders, although designed for entry by trained personnel using specialised equipment and procedures for turbine maintenance in calm weather, could conceivably be used, in an emergency situation, to provide refuge on the turbine structure for distressed mariners. This scenario should therefore be considered when identifying the optimum position of such ladders and take into account the prevailing wind, wave and tidal conditions.
- x. Although it may not be feasible for mariners in emergency situations to be able to use wave or tidal generators as places of refuge, consideration should nevertheless be given to the provision of appropriate facilities.

**Note:** *The foregoing design requirements are under continuous review, in co-operation with other statutory consultees, and may be modified when deemed necessary.*

## **2. Operational Requirements**

- i. The Central Control Room, or mutually agreed single contact point, should be manned 24 hours a day.
- ii. The Central Control Room operator, or mutually agreed single contact point, should have a chart indicating the GPS position and unique identification numbers of each of the WTGs in the wind farm. or individual devices in other types of OREI.
- iii. All MRCCs will be advised of the contact telephone number of the Central Control Room, or single contact point (and vice versa)
- iv. All MRCCs will have a chart indicating the GPS position and unique identification number of each of the WTGs in all wind farms or all devices in other types of OREI.
- v. All search and rescue helicopter bases will be supplied with an accurate chart of all the OREI and their GPS positions.
- vi. The Civil Aviation Authority shall be supplied with accurate GPS positions of all OREI structures for civil aviation navigation charting purposes

## **3. Operational Procedures**

- i. Upon receiving a distress call or other emergency alert from a vessel which is concerned about a possible collision with a WTG or is already close to or within a wind farm, or when the MRCC receives a report that persons are in actual or possible danger in or near to a wind farm and search and rescue aircraft and/or rescue boats or craft are required to operate over or within the wind farm, the MRCC will establish the position of the vessel and the identification numbers of any WTGs which are visible to the vessel. This information will be passed immediately to the Central Control Room, or single contact point, by the MRCC. A similar procedure will be followed when vessels are close to or within other types of OREI site.
- ii. The control room operator, or single contact point, should immediately initiate the shut-down procedure for those WTGs as requested by the MRCC/SC, and maintain the WTG in the appropriate shut-down position, as requested by the MRCC, or as agreed with MCA Navigation Safety Branch or Search and Rescue Branch for that particular installation, until receiving notification from the MRCC that it is safe to restart the WTG.
- iii. The appropriate procedure to be followed in respect of other OREI types, designs and configurations will be determined by these Maritime and Coastguard Agency



branches on a case-by-case basis, in consultation with appropriate stakeholders, during the Scoping and Environmental Impact Assessment processes.

- iv. Communication procedures should be tested satisfactorily at least twice a year. Shutdown and other procedures should be tested as and when mutually agreed with MCA.

#### **4. SAR Helicopter Procedures/Requirements**

The following notes from the MCA Emergency Response and Co-operation Plan template are reproduced below for guidance:

**Note:** *Helicopter Search and Rescue units have specific requirements to allow them to operate safely within windfarms and close to, or over, wind turbine generators*

- i. *Emergency evacuation of persons directly from a WTG nacelle by SAR helicopter is a last resort. It will normally be considered where risk to life is such that the speed of reaction and transfer of survivors to a place of safety or of injured persons directly to shore medical facilities can most effectively be achieved by SAR helicopter.*
- ii. *If winching is to take place from/to a WTG, the WTG blades will have to be feathered and the rotor brakes applied (where feasible blades should be pinned - perhaps before major works commence). The nacelle should be rotated so that the blades are at 90 degrees off the wind with the wind blowing on to the left side of the nacelle e.g. if wind is blowing from 270 degrees, the nacelle will need to be rotated to right so that the hub is facing 360 degrees.*
- iii. *If winching is to take place to/from a nacelle, wherever possible wind farm personnel should be in the nacelle to assist the winchman.*
- iv. *In poor visibility or at night, any lighting on WTGs may be required to be switched on or off - at the discretion of the helicopter pilot.*
- v. *For SAR helicopter operations, radar is a prime flight safety tool - especially at night, in bad weather and poor visibility. It is therefore fundamental to the safe operation of SAR helicopters within and around wind farms that the WTGs are detectable to airborne radars (at a safe range) and that the aircraft crew, using radar, can discriminate between individual turbines.*